News release from the Royal Society of New Zealand and the Office of the Prime Minister's Chief Science Advisor

15 April 2015

Asbestos exposure during Canterbury rebuild unlikely to cause significant health problems for house occupants – report finds

A review of scientific evidence about the risks of asbestos exposure to residents of houses undergoing renovation and repair work, such as has been carried out and is ongoing in the aftermath of the Canterbury earthquakes, has found the health risks are generally low. Nevertheless care should always be taken to minimise inhalation of asbestos fibres.

The report concludes that remediation activities are unlikely to result in any significant increase in risk to homeowners and occupants of damaged houses, unless they repeatedly perform such work themselves, without taking proper precautions such as wetting the surfaces and using a respirator.

Entitled *Asbestos Exposure in New Zealand: Review of the Scientific Evidence of Non-occupational Risks,* the report was convened by Sir David Skegg, President of the Royal Society of New Zealand, and Sir Peter Gluckman, the Prime Minister's Chief Science Advisor (PMCSA), at the request of the Ministry of Health. A research analyst in the Office of the PMCSA, Dr Anne Bardsley, was assisted in writing the report by a Royal Society expert panel with expertise in public health, epidemiology, toxicology, and hazard and risk assessment.

Sir David Skegg, who is a cancer epidemiologist, says it is the inhalation of asbestos fibres, not skin contact or ingestion, that has been established as causing harm. Workers exposed to asbestos, without adequate protection, can develop a variety of life-threatening lung diseases and cancers.

"The health risks from asbestos inhalation are influenced by the intensity, the frequency, and the duration of the exposure, with some variation in risk based on the type of asbestos encountered."

"The review found no evidence that a single peak in exposure of the kind encountered during house maintenance or repair would have a material effect on disease risk," he said.

Although the conclusions of the report should be reassuring for many occupants, they do not provide grounds for complacency about the risks for people working with asbestos – including residents doing their own renovations. "Homeowners must approach renovations with caution," he said.

Sir Peter Gluckman said asbestos products are common in older New Zealand houses. "Building products composed of asbestos mixed with cement were produced over a 50-year

period until the mid-1980s. Asbestos-containing materials remain in place in older buildings and houses, including asbestos cement roofing, external cladding, internal wall linings, textured ceilings, vinyl flooring, and insulation around pipes and hot water heaters."

He said that the large number of building demolitions as a result of the Canterbury earthquakes of 2010 and 2011 has increased the public awareness of asbestos and the possibility of exposure.

The report stresses that if bonded asbestos-containing materials are maintained in good condition, they do not pose a health risk to building occupants. However, uncontrolled removal of such materials using power tools, dry scraping or sanding methods can generate significant concentrations of airborne asbestos fibres, and exposure of this kind may increase risk to people performing such work repeatedly. Nonetheless, the exposure levels experienced by residents during most home renovation activities are generally orders of magnitude lower than historical occupational exposures that are known to increase the risk of asbestos-related diseases.

"This report should reassure home occupants that the risks of developing asbestos-related diseases following brief exposure from asbestos-containing materials are very low, but it will also reinforce the importance of taking adequate precautions when working with asbestos-containing materials during building renovations," he said.

The report notes that many countries have now banned the importation and continued use of asbestos-containing materials and, given the global scientific consensus about the nature of risks as well as the availability of modern alternatives, it recommends that New Zealand should also introduce such a ban.

Sir David Skegg said that while no asbestos-containing materials are manufactured in New Zealand, there may still be some imported, as this is not rigorously controlled.

"New Zealand should follow the example of other developed countries and ban the importation of all building materials containing asbestos."

The full review is available to download at www.royalsociety.org.nz and www.pmcsa.org.nz.

A public meeting will be held in Christchurch on Friday 1 May, to explain the evidence used in the review. This meeting will be at 6pm in the Rolleston Lecture Theatre, University of Otago Christchurch, 2 Riccarton Avenue (next to Christchurch Hospital).

ENDS

[**Note**: the executive summary is included below]

For more information

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Background Information

Asbestos Exposure in New Zealand: Review of the Scientific Evidence of Non-occupational Risks
Introduction and Executive Summary

Introduction

The purpose of this report is to provide a comprehensive and up-to-date understanding of the scientific evidence on the risks from casual asbestos exposure in the non-occupational environment in New Zealand, specifically addressing the level of risk to occupants of houses containing asbestos, and of exposure during renovations and repairs. The potential effects of events such as the Canterbury earthquakes and consequent rebuild on exposures and risk are considered. The intent of this report is to inform decision-making on asbestos management and consequent public health measures including risk communication to the public.

In order to assess asbestos risks in the residential environment, it was necessary to use the evidence base established by investigations in historical occupational settings, where asbestos exposure was very much higher and the association of such exposure with adverse outcomes was clear. Although the report discusses exposures that may be encountered by workers today who are involved in building construction, renovation, remediation and demolition, we caution readers not to treat the analysis of occupational risks as definitive; the information is provided to assist with understanding the non-occupational risks.

Executive Summary

Asbestos is a term referring to a group of related, naturally-occurring fibrous silicate minerals that have been mined extensively around the world and were once widely used industrially and in building construction because of their characteristic strength, pliability, insulating properties, and resistance to fire and chemical breakdown. Over time, asbestos was linked to a number of serious lung diseases and cancers in workers who were heavily exposed to its raw fibres in mines, mills, and factories producing asbestos products. Asbestos-related diseases were later observed in workers who regularly handled these products, and in people environmentally exposed to airborne fibre contamination near asbestos mines and factories.

Inhalation exposure to asbestos is now known to be a serious public health risk, with consequential disease liable to develop after a long latency period – the risk of which is influenced by the intensity (dose), the frequency, and the duration of the exposure (i.e. the cumulative amount breathed in). Although other routes of exposure are possible (e.g. dermal contact, ingestion), inhalation is the only route that has been established as causing harm. Fibrotic lung diseases (pleural changes and asbestosis), lung cancer, malignant mesothelioma, laryngeal cancer, ovarian cancer and possibly other cancers can occur 20 to 50 years after heavy exposure to asbestos fibres. The risk of developing disease from asbestos inhalation increases with increasing cumulative exposure. Efforts to reduce and ultimately to eliminate this risk have led to total prohibition of the production, importation and use of asbestos in many countries, and strict regulation of exposure of workers involved in repairing or removing asbestos-containing materials (ACMs). The presence of ACMs throughout many older homes and buildings means that the asbestos hazard still lingers, and non-occupational exposure of the public is an ongoing risk, although the magnitude of this risk is not well characterized. This report aims to summarise the available evidence in

order to inform policymakers and the public about the extent of risk from non-occupational exposure to ACMs in residential houses in New Zealand, and potential actions to be taken.

Asbestos exposure in New Zealand

Unprocessed asbestos was imported into New Zealand beginning in the late 1930s and building products composed of asbestos mixed with cement were produced over a 50-year period up until the mid-1980s. ACMs used in building construction were also imported from other countries. Many of these products were used in the construction of New Zealand houses between 1940 and 1990.

The incidence of asbestos-related diseases has been rising in New Zealand in accord with the expected latency from past heavy exposure of workers in the asbestos industry, and those working regularly with ACMs (e.g. construction workers). Although New Zealand lagged behind many other countries in dealing with the asbestos hazard, regulations on its use and on acceptable workplace exposure levels have ended the era of very high occupational exposure risk, and a decline in asbestos-related disease incidence is to be expected in the future. However the legacy of past asbestos use in New Zealand persists in the numerous ACMs that remain in place in older buildings and houses, including asbestos cement roofing, external cladding, internal wall linings, textured ceilings, vinyl flooring, and insulation around pipes and hot water heaters.

The necessity of large numbers of building and infrastructure demolitions as a result of the Canterbury earthquakes of 2010 and 2011 has increased awareness of asbestos, and the possibility of exposure to asbestos from ACMs in damaged older homes. There has been public concern that improper handling of asbestos in homes undergoing renovation and repair during the Canterbury rebuild may have exposed people to dangerous levels of airborne asbestos fibres. The main concern is exposure of the public to friable asbestos – that which is loosely bonded and can be crumbled or reduced to powder by hand pressure. Asbestos is considered non-friable if it is bonded within building materials and is therefore more resistant to mild abrasion or damage. Non-friable ACMs that are in good condition do not release fibres and do not pose a health risk, but they can become friable when damaged or weathered, or during remediation, repair or removal.

Risk characterization and assessment

Asbestos has been clearly shown to be a hazardous material with the propensity to cause cancer and other diseases in exposed individuals. The risks associated with asbestos depend on the extent and intensity of the exposure to the hazard and the possible underlying risk factors or susceptibilities of the individual. Risks also differ depending on the type of asbestos to which an individual is exposed. Asbestos fibres are naturally ubiquitous at very low levels in air and water, and therefore there are no completely unexposed populations. Nonetheless, there is no level of exposure that is known to carry no risk of asbestos-related disease.

<u>Asbestos types and potency</u>

All asbestos types can cause asbestos-related cancers. However, the different chemical composition and structures of the asbestos types affect their toxicity and persistence in lung and pleural tissues resulting in differences in carcinogenic potential. There are three common asbestos types that have been used industrially. Amosite and crocidolite are of the amphibole variety - they have straight fibre structures and are highly insoluble in lung fluid, and thus can persist in lung tissues for decades after inhalation. The third, and by far the most commonly used type in New Zealand, is chrysotile, which has a curly fibre structure and is relatively more soluble and more readily cleared from the lungs than the amphiboles. Estimates from different studies vary, but it is generally acknowledged that the cancer risk is higher from amphibole exposure than from chrysotile exposure. One estimate of the ratio of

the potency for inducing mesothelioma suggested that chrysotile is up to 500x less potent than crocidolite, and 100x less potent than amosite. Nonetheless, all forms of asbestos are considered to be carcinogenic, and therefore hazardous.

Dose, duration, and cumulative exposure

Epidemiological studies suggest that the level of risk of asbestos-induced cancer is directly related to the cumulative asbestos exposure received (the amount breathed in) over a period of time. This means that a small number of high-exposure incidents may confer roughly the same risk as a larger number of lower-exposure incidents. However, because of the long latency between accumulated exposure and cancer development, a given cumulative exposure accrued over a short period is expected to result in a higher risk of actually developing a cancer than the same exposure accrued over a longer period, if both exposures were to begin at the same time. This is because a substantial portion of the longer exposure will occur at older ages, when the potential to experience the full latency period is less likely.

Exposure level estimation

Asbestos is found in certain types of rock formations, and is present at very low levels in air and water as a result of natural erosion processes. However, industrial activities have greatly increased the levels of airborne asbestos fibres in some locations and situations. Environmental exposure has been high in the vicinity of working asbestos mines and factories. Levels are elevated around motorways and in cities, because of release of asbestos fibres from many automotive brake linings. The large amount of existing asbestos cement products making up the exterior cladding and roofs of many buildings and homes also contributes to a significant release of asbestos fibres into the total environment each year.

This report is primarily concerned with the airborne asbestos levels that may be found within homes where friable ACMs are present, and human exposures during repair or removal of such materials when the work has been carried out by others. The potential risk to building occupants posed by the presence of old ACMs has been the subject of intense debate, but studies suggest that undisturbed ACMs do not cause elevated airborne asbestos concentrations inside buildings. Fibre release episodes from small repair or maintenance activities or from random dislodging of ACMs also do not substantially increase average concentrations inside buildings, although they might result in exposure to an individual undertaking such work or present nearby.

Risks of low-level exposure

While the risk associated with working with raw asbestos or regularly handling ACMs as part of an occupation is relatively well understood, the level of risk arising from occasional, low exposures is more difficult to assess. The vast majority of data relating asbestos exposure to disease risk have come from studies of heavily-exposed groups in asbestos mining, milling, transport and manufacturing industries, or other occupational groups working with asbestos products (e.g. construction trades, ship builders, mechanics, etc.). Assessment of risks of low-level asbestos exposure has had to rely on extrapolation from studies of such highly-exposed workers in order to estimate risk for disease development in minimally-exposed non-occupational groups. A degree of uncertainty in assessing these risk levels is unavoidable, as knowledge of dose-response relationships at low exposure is limited by methodological and technical considerations.

In particular, the incidence of lung cancer attributable to asbestos exposure is difficult to quantify, because there is a substantial background incidence due to factors other than exposure to asbestos (mainly tobacco smoking). Whereas a substantially elevated incidence of lung cancer can be quantified in highly-exposed worker populations, any increase above background rates resulting from low-level, non-occupational asbestos exposure would be

difficult to detect, and has not been reported (though the risk should not be considered as nil). Current non-occupational exposure levels are also considered to be too low to cause asbestosis. Mesothelioma, which is a highly specific outcome of asbestos exposure, occurs at lower exposure levels than asbestosis or lung cancer and is the disease most likely to occur in relation to non-occupational exposures. This report thus focuses mainly on the risk of mesothelioma, as the low exposures to the general public of New Zealand today are not likely to increase the risk of any other asbestos-related diseases.

Reports of mesothelioma resulting from exposure to asbestos in the non-occupational setting have been increasing in many countries, although most involve environmental exposures related to residence near asbestos mines or factories. Exposure estimates have not been reported in such populations, so it is difficult to relate these risks to other non-occupational exposures, such as those encountered by occupants of houses with damaged or deteriorating ACMs or who have undertaken or been present during ACM repair or removal. The health risk to most building occupants appears to be very low. There is no evidence that a single peak in exposure of the kind encountered during maintenance or repair of ACMs significantly affects disease risk, although each incident of such exposure would add to an individual's cumulative exposure.

Risk assessment in the Canterbury Home Repair Programme

Earthquake damage to ACMs, as well as the removal and repair processes could cause release of asbestos fibres from previously non-friable materials, potentially resulting in elevated exposure and health risks. The use of proper abatement and cleanup procedures can effectively reduce these increased risks. For example, most asbestos removal procedures involve wetting the surface to reduce the release of dust. Dry scraping or sanding of friable ACMs should be avoided.

In the immediate aftermath of the Canterbury earthquakes, cleanup procedures and home remediation did not always follow appropriate guidelines for avoiding asbestos exposure. The level of exposure to workers and the public during this time is not known with certainty. A simulation study involving a small number of Christchurch houses was conducted to replicate typical exposures during removal work (in terms of duration and dustiness) that was carried out in the first year after the earthquakes, before stricter procedures for asbestos monitoring and abatement were fully operational. The resulting exposures were found to be well below the permissible workplace exposure standard even for full-time abatement work over a 3-year period, and it was therefore concluded the risk to occupants (who would have experienced only short duration exposures during this time) would have been extremely low.

Is the public at risk?

Assessment of the current scientific knowledge on exposure levels and risks associated with home remediation activities such as those that have taken place (and are still in progress) in Canterbury indicates that they are unlikely to result in a significant increase in risk to homeowners and occupants of damaged houses, unless they were performing the work themselves, without taking proper precautions such as wetting the surfaces and using a respirator. A simulation study showed that even in a scenario of uncontrolled removal of potentially friable ACMs by dry scraping methods, asbestos concentrations in air in the vicinity of workers' respirators did not reach regulatory levels. It is nonetheless very important that correct procedures for dealing with asbestos during remediation work are followed, and homeowners undertaking repair and renovation work themselves should be made aware of the potential hazard if asbestos is disturbed. Overall, the risk is considered to be low if proper precautions are taken, but it is recommended that repair or removal of friable ACMs are handled by professionals who are trained in the correct procedures. Neither alarm nor complacency about the level of risk to bystanders is warranted. While

there has also been concern expressed about the dust present in the air in the immediate aftermath of the earthquake, data from major earthquakes elsewhere are reassuring.

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