AIOH POSITION PAPER

ASBESTOS

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AUTHORISATION

This position paper has been prepared by the AIOH Exposure Standards Committee and authorised by the AIOH Council.

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Australian Institute of Occupational Hygienists Inc (AIOH

The Australian Institute of Occupational Hygienists Inc. (AIOH) is the association that represents professional occupational hygienists in Australia. Occupational hygiene is the science and art of anticipation, recognition, evaluation and control of hazards in the workplace and the environment. Occupational hygienists specialise in the assessment and control of:

- Chemical hazards (including dusts such as silica, carcinogens such as arsenic, fibrous dusts such as asbestos, gases such as chlorine, irritants such as ammonia and organic vapours such as petroleum hydrocarbons);

- Physical hazards (heat and cold, noise, vibration, ionising radiation, lasers, microwave radiation, radiofrequency radiation, ultra-violet light, visible light); and

- Biological hazards (bacteria, endotoxins, fungi, viruses, zoonoses).

Therefore the AIOH has a keen interest in the potential for workplace exposures to asbestos fibres, as its members are the professionals most likely to be asked to identify associated hazards and assess any exposure risks.

The Institute was formed in 1979 and incorporated in 1988. An elected governing Council, comprising the President, President Elect, Secretary, Treasurer and three Councillors, manages the affairs of the Institute. The AIOH is a member of the International Occupational Hygiene Association (IOHA).

The overall objective of the Institute is to help ensure that workplace health hazards are eliminated or controlled. It seeks to achieve this by:

- Promoting the profession of occupational hygiene in industry, government and the general community.

- Improving the practice of occupational hygiene and the knowledge, competence and standing of its practitioners.

- Providing a forum for the exchange of occupational hygiene information and ideas.

- Promoting the application of occupational hygiene principles to improve and maintain a safe and healthy working environment for all.

- Representing the profession nationally and internationally.

More information is available at our website – http://www.aioh.org.au

Consultation with AIOH Members

AIOH activities are managed through committees drawn from hygienists nationally. This position paper has been prepared by the Exposure Standards Committee, with comments sought from AIOH members generally and active consultation with particular members selected for their known interest and/or expertise in this area. Various AIOH members were contributors in the development of this position paper. Key contributors included: Linda Apthorpe and Gary Rhyder.

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AIOH Position on Asbestos and its Potential for Occupational Health Issues

Summary

Asbestos is a hazardous material and as such, has the potential to cause harm to human health. Even though asbestos is banned in Australia (and other countries), there is still a large industry involved in its assessment and removal. In addition there is a considerable amount of industry that faces occupational exposures in exempt areas such as waste management, and non-asbestos mining, road building and other earthmoving activities. due to the presence of contaminant asbestiform minerals.

Risk to health is via inhalation of 'respirable' asbestos fibres only. When asbestos-containing materials are in good condition and left in situ, they pose no risk to health.

Removal of asbestos-containing material (ACM) should be conducted by asbestos removal contractors to ensure minimal disturbance and no risk to health for workers or nearby persons. Removals must be conducted using approved methods and supervised by competent persons. The potential for exposure to naturally occurring asbestiform minerals needs to be identified and controls implemented in accordance with legislative requirements. NATA laboratories should be used for analysis of airborne fibre samples and asbestos identification samples.

The AIOH believe that current exposure standards used in Australia are adequate, but as with any carcinogen, exposures should be maintained as low as reasonably practicable (ALARP).

What is Asbestos?

Asbestos is a naturally occurring fibrous mineral that has been used in many products for strength, heat and friction resistance and various insulation properties.

There are six types of the fibrous asbestos minerals, in two groups as described below:

- The serpentine asbestos is chrysotile (or white) asbestos. Chrysotile has been the most commonly used form of asbestos.

- Amphibole asbestiforms are amosite (brown or grunerite asbestos), crocidolite (blue asbestos), tremolite, actinolite and anthophyllite. The former two types were the most commonly used amphibole types.

Asbestos fibres exist in parallel bundles that tend to split longitudinally when subjected to pressure, forming finer and finer fibres that maintain a high length-to-width aspect ratio. Crocidolite and amosite fibres tend to be straighter and stiffer than chrysotile fibres (Pickford & Davies, 2007).

Serpentine and amphibole asbestiforms that are found in certain types of rock formations can have fibrous and non-fibrous structures. The fibrous form is called asbestos. It is important to note that non-fibrous forms can have similar chemical composition however, do not have the same health effects as the fibrous forms. There are other minerals that are similar to asbestos in their particle shape, but do not possess the characteristics required to classify them as asbestos.

Amphibole, and to a lesser extent serpentine minerals, are widely distributed in the earth's crust, hence asbestos may occur as an accessory mineral. For example, tremolite and actinolite are a matter of significance for any skarn deposits, in fact, for any igneous deposit

that has limestone as a host, and, at some level, for almost all porphyry coppers. Chrysotile can occur in serpentine rocks, especially if they are associated with metamorphism of ultramafic rocks. Asbestos can also occur as an accessory mineral with other industrial minerals (eg. amphibole asbestos with vermiculite and talc). Fibrous minerals may be associated with carbonate-facies iron formations.

Asbestos in Materials

The three main types of asbestos commercially used in Australia, are chrysotile, amosite asbestos and crocidolite asbestos. These forms were used because of their fibrous structure which added various properties; eg strength or heat insulation properties to the material in which it was used.

When considering the potential for an ACM to release respirable asbestos fibres, it is important to understand the terms 'friable' and 'bonded'.

Friable ACM may be crumbled or pulverised or reduced to powder by hand pressure when dry; eg pipe insulation, sprayed insulation, millboard. Disturbance of these materials can generate large quantities of 'respirable' fibres.

Bonded ACM are where the fibres are locked into a matrix; eg asbestos-cement, vinyl tiles etc. The fibres are contained within the matrix by use of such materials as resins and cement etc. Even with significant disturbance of bonded ACM, including removal activities, generation of measurable 'respirable' fibres is unlikely.

Hazards Associated with Asbestos

A hazardous material has the potential to cause adverse effects, whilst risk is the likelihood of a substance causing adverse effects.

The presence of asbestos may constitute a health hazard, however risk to health is based on the likelihood that 'respirable' fibres are inhaled.

Respirable fibres are very small fibres (ie smaller than 3 micrometres in diameter, usually longer than 5 micrometres and have aspect ratios of at least 3:1) that can be inhaled into the lower regions of the lung.

Friable products have a greater potential to liberate respirable fibres as slight disturbances can allow the fibres to be released into the air. For bonded products, where fibres are contained within a matrix, it is more difficult to release any measurable respirable fibres into the air. There is much less risk of airborne respirable fibres being liberated from bonded ACM unless it is being worked (eg drilled, sawn).

The greater the inhaled dose of asbestos fibre, the greater the risk of developing disease. Dose is represented by both the amount of asbestos in the air and the duration of exposure. Therefore, inhalation of large amounts of respirable fibres over long periods of time may lead to asbestos related diseases and there is no scientific evidence to suggest that small or single exposures to asbestos will cause asbestos related diseases. All humans have continuous very low level background environmental exposure to asbestos fibres.

The three major diseases occupational lung diseases caused by asbestos are:

- asbestosis

- lung cancer
- mesothelioma

For persons exposed to asbestos, other factors such as smoking can increase the risk of developing lung cancer.

How do we Measure and Identify it?

Airborne asbestos fibre testing measures the number of respirable fibres that may be present in an atmosphere. This method is used primarily to test compliance with an exposure standard or an engineering control standard in circumstances such as:

- Monitoring of work situations where the process or product is exempt from the prohibition on asbestos usage (eg waste management and contaminant asbestiform minerals in mining and road building earthmoving activities);
- Monitoring of adjacent areas during asbestos removal work; and
- Testing of an area prior to re-occupancy after asbestos removal work.

Air monitoring must be carried out in accordance with the National Occupational Health and Safety Commission (NOHSC) 'Guidance Note on the Membrane Filter Method (MFM) for Estimating Airborne Asbestos Dust' (2nd Edition (2005)).

Results for airborne asbestos fibre monitoring are reported as fibres per 100 fields (raw result) and a calculated concentration of fibres per millilitre of air (f/mL). The detection limit for the method is 10 fibres per 100 fields which under normal circumstances results in a final concentration of less than 0.01 f/mL. Therefore, any result where the total number of fibres per 100 fields is less than 10, and the final concentration is less than 0.01 f/mL, is satisfactory.

Depending on the situation the results obtained from airborne monitoring are compared against either the occupational exposure standard or the engineering control standard.

- The Occupational Exposure Standard of 0.1 f/mL has been set for all forms of asbestos including the commercial types chrysotile, amosite and crocidolite. The exposure standard is in part based on quantitative risk assessment derived from epidemiological studies conducted on asbestos workers. It is to be applied to personal monitoring in situations where workers are handling, disturbing or having bystander exposure to asbestos materials, bearing in mind that it is important in these situations to keep exposures as low as reasonably practicable (ALARP).

- The Engineering Control Standard of 0.01 f/mL is a value set at the analytical detection limit of the membrane filter method. It is to be applied in situations where static, or area sampling is carried out to test for leakage at the perimeter of asbestos removal enclosures, and for testing the removal area prior to re-entry of unprotected persons. Air monitoring in this instance should not be used as a substitute for critical inspection of the area or process.

Asbestos identification analysis is used to identify if a sample contains asbestos fibres. This should be done in accordance with AS 4964-2004: 'Method for the qualitative identification of asbestos in bulk samples'. The sample could be a building material, dust or soil. Asbestos identification analysis must be conducted prior to disturbance of any suspected ACM. If

asbestos is detected then certain procedures must be followed during any disturbance activities.

NATA[1] accredited laboratories must conduct the analysis for airborne fibre sampling. It is also recommended that laboratories accredited by NATA for identification conduct asbestos identification analysis. All results should be reported on NATA test certificates signed by the NATA signatory.[2]

Major Uses / Potential for Exposure (in Australia)

The new use and re-use of all forms of asbestos and ACM is now prohibited in Australia. ACM in situ may remain in buildings and equipment providing it remains in good condition. In addition, asbestos cannot be imported into Australia.

It is important that any material suspected of containing asbestos is tested by asbestos identification analysis prior to any disturbance activities occurring (eg removal, refurbishment or demolition).

Exposure sources are largely non existent provided that removal techniques following the NOHSC Code of Practice for the Safe Removal of Asbestos 2nd Edition (2005) are used, no unauthorised removal or refurbishments are conducted and any suspected ACM is tested prior to disturbance activities. Many jurisdictions have licensing requirements for asbestos removals.

Soil can be contaminated with bonded asbestos cement that arises from inappropriate burial (eg illegal dumping). Potential for human exposure is limited and specialised removal techniques (eg dust control) may be required in some circumstances or jurisdictions.

Where naturally occurring asbestiform minerals are present as a contaminant in situations of mining, road works and construction, allowance for controlled work is made under the various exemptions and regulations. Exposures should be maintained in accordance with the ALARP principle. Often it is technically difficult if not impossible to determine the degree of exposure to contaminant asbestiform minerals using regulatory air monitoring techniques (other than to say that the airborne level is less than the monitoring detection limit, which is in part determined by the ratio of fibres to host rock dust particles in the dust cloud sampled) as the contaminant level in the ore body whilst visible in some veins and inclusions, makes up only a very minor fraction of the mass of bulk material. Operational practices should be conducted in accordance with legislative requirements, for example, refer to the MOSHAB Guideline.

Risk of Health Effects

Asbestos is a risk to health via inhalation only and risk to health is based upon the following factors:

- Condition and type of ACM
- Potential for disturbance of the ACM.

[1] National Association of Testing Authorities.

[2] Note that in some states use of a NATA lab for asbestos identification is mandatory.

Therefore, if ACM is left in situ and in good condition then there is no risk to health.

A risk assessment can be conducted by a suitably experienced occupational hygienist regarding risk to health from ACMs.

Available Controls

Risks can be managed following the hierarchy of controls. When left in situ the controls are mainly administrative and include an asbestos register, labelling, and regular checks (ie inspections) on the condition of any ACM.

For any work involving the disturbance or removal of any ACM there are strict guidelines in regard to the isolation of work areas, personal protective equipment and ventilation requirements.

Substitution of ACM with a non asbestos-containing alternative may be suitable for some applications. Substitution materials generally include man made mineral fibres, commonly called synthetic mineral fibres (SMF). For more information regarding SMF, please refer to AIOH Position Paper on SMF.

Current Applicable Legislation

All occupational health and safety jurisdictions have legislation that covers asbestos and call up the following publications. Note: NOHSC has been replaced by the Australian Safety and Compensation Council (ASCC).

- Code of practice for the safe removal of asbestos [NOHSC: 2002(2005)] (available from www.ascc.gov.au).

- Code of practice for the management and control of asbestos in the workplace NOHSC: 2018 (2005)] (available from www.ascc.gov.au).

AIOH Recommendation

The information for health aspects of asbestos is now well documented. The AIOH recommends that:

- AIOH members with relevant asbestos experience are used for asbestos related enquiries. This includes asbestos inspection surveys, sampling, removal methodologies, clearances and project management.

- Asbestos identification testing is conducted on suspicious materials prior to any disturbance activities.

- In accordance with local legislation, suitably qualified and/or licensed asbestos removal contractors are used.

- NATA accredited laboratories are used for analysis of airborne fibre samples and asbestos identification samples.

- Inspection surveys are conducted to assist building owners/administrators to manage any ACM appropriately.

- ACM present in buildings or structures is suitably labelled.

- Any exposure to asbestos should be kept as low as reasonably practicable.

References and Sources of Additional Information

- Pickford, G & B Davies (2007), Aerosols in the Workplace. In Principles of Occupational Health & Hygiene: An Introduction, Ed by C Tillman. Allen & Unwin, Crows Nest, NSW, Australia.

- State and Federal based Government Authorities for relevant jurisdictional information (eg NSW WorkCover Authority, Comcare).

- Search the NATA website (www.nata.asn.au) for accredited laboratory details and approved analysts for asbestos related tests (namely airborne fibre testing and asbestos identification analysis).

- Management of asbestos in the non-occupational environment, enHealth, Department of Health and Ageing (Australian Government) 2005. Available from http://enhealth.nphp.gov.au/council/pubs/ecpub.

- MOSHAB Guideline: Management of Asbestos in Mining Operations, WA Department of Minerals and Energy, July 2001 – under revision (available from http://www.docep.wa.gov.au/resourcesSafety/Content/Mining/Guidance_material_and_publications/Occupational_health.html).

- Guidance note on the membrane filter method for estimating airborne asbestos dust [NOHSC: 3003 (2005)] (available from www.ascc.gov.au).

- Australian Standard 4964 (2004). 'Method for the qualitative identification of asbestos in bulk samples'.

- AIOH website for search of consultants (www.aioh.org.au).