# Investigation: Activity-based sampling to mimic agricultural activities in an area where naturally-occurring asbestos is present

The Heads of Asbestos Coordination Authorities (HACA) proactively commissioned a project looking at activity-based sampling to mimic low-grade agricultural activities in an area where naturally-occurring asbestos (NOA) is known to exist. Simulated activities which mimic the level of disruption and activities performed by common agricultural processes were conducted to gain understanding of the risks, if any, of exposure to NOA.

A former gravel pit in an agricultural area was chosen to represent a worst case scenario. A Detailed Site Investigation (DSI) of this site was undertaken as part of the project in order to delineate, by way of a comprehensive sampling program, the characteristics of the selected site to complement the information collected during the investigation.

Activity-based sampling (ABS) was conducted which involved simultaneous collection of personal exposure air monitoring measurements while undertaking various simulated tasks. The tasks undertaken during the ABS program were thought to be representative of common agricultural practices and included a series of mechanical activities as well as a manual raking task.

All mechanical activities employed the use of a diesel-powered Classic 950 Dingo machine with attachments which included: post hole / auger, ripper tines and a 4-in-1 bucket for extraction and levelling. The manual raking activities involved using a hand rake in a systematic manner across the entire surface of a pre-determined area.

Ten random boreholes were taken using mechanical auger (to a depth of 50cm) and a wetted 500mL sample (as recommended by NEPM 1999) of fill material was collected, with a chain of custody for each sample completed, and the samples were delivered to an NATA accredited laboratory for analysis by AS4964-2004: Method for the qualitative identification of asbestos in bulk samples. This characterisation highlighted the heterogeneous nature of NOA in the natural environment with only two of the ten samples containing chrysotile fibre bundles.

Personal exposure air monitoring was conducted as part of the ABS program and included baseline measurements prior to the commencement of the simulated activity-based tasks.

Air monitoring for the project was carried out in accordance with NOHSC: 3003 (2005) National Occupational Health and Safety Commission (NOHSC) ‘Guidance Note on the Membrane Filter’. Exposure monitoring is designed to reliably estimate exposure so that it can be compared with the occupational exposure standard, or provide an estimate of a person’s exposure. Exposure air monitoring was performed in a manner to cause minimal interference with the work activities.

All personal sampling was conducted in the breathing zone of the person conducting the agricultural activities, and observers present during the activities, so that the results are indicative of the workers' exposure to asbestos fibres under the representative working conditions. The flow rate through the filter holder was checked immediately before and after monitoring using a calibrated rotameter. To avoid overload of samples taken during simulated activities in this project, sampling collection times were reduced. Analytical blanks were sent with all personal air monitoring samples as required by the standard.

The results of activity-based sampling for all personal exposure monitoring samples were determined to be lower than the detection limit for the method and conditions employed during this project, despite the presence of NOA in this location and findings of chrysotile above the limit of detection of 0.1g/kg in the soil. The findings of the project highlight that risks from land where NOA is present, albeit in relatively low concentrations for the site selected as part of this project, are low during disturbances caused by low-grade agricultural activities. It should be noted that while results of air sampling did not identify airborne asbestos fibres above the detection limit, there is still the potential for asbestos fibres to become airborne. Therefore reasonable and prudent precautions are recommended when undertaking agricultural activities in NOA areas. HACA have developed a fact sheet to address farming in areas of NOA:

http://www.workcover.nsw.gov.au/health-and-safety/safety-topics-a-z/asbestos/naturally-occurring-asbestos2/naturally-occurring-asbestos-publications/farming-in-areas-of-naturally-occurring-asbestos2.

For workplaces, it is necessary to ensure airborne asbestos exposures are eliminated, or minimised if elimination is not possible, so far as reasonably practicable. Management and control strategies are required under NSW Work Health and Safety legislation to be documented. It is prudent to make an assessment of the hazards and risks that potentially arise from NOA for agricultural workers who may be inadvertently exposed to asbestiform minerals during agricultural activities.

In developing management and control strategies, it is considered best practice to thoroughly investigate the hazards that exist in order to elucidate the risks that are present in the workplace which will help identify the best management and control practices to reduce risks to workers. Guidance material for managing asbestos in the workplace is available from SafeWork NSW at:

http://www.workcover.nsw.gov.au/health-and-safety/safety-topics-a-z/asbestos/asbestos-at-work

Practical Guidance for Reducing Risk to NOA - Information for Agricultural Workers and Employers

It is recommended that the following practical guidance is considered prior to undertaking agricultural activities to reduce exposures from airborne asbestos fibres during disturbance activities.

Employers of agricultural workers should consider implementing control measures using a hierarchy of control approach, i.e. an approach using a ranking of controls in order of effectiveness to reduce the risk from airborne asbestos fibres as far as reasonably practicable.

The most effective way to reduce exposures to asbestiform minerals for agricultural workers would be to determine a course of action that does not place workers within the vicinity of asbestos hazards. This could be achieved by eliminating planned work activities or processes in areas where NOA has been found to exist, and where the planned activities are likely to result in excessive dust creation and disturbance.

A suitable approach to reduce exposures to asbestiform minerals would be to take into account areas where an increased likelihood of NOA is exhibited, or has been shown in NOA maps which can be viewed at:

http://www.workcover.nsw.gov.au/health-and-safety/safety-topics-a-z/asbestos/naturally-occurring-asbestos.

Where work activities must take place in areas where NOA is present then it would be appropriate to consider the implementation of measures which either isolate or create an effective barrier to asbestos hazards. What these measures could look like in practice is to separate / isolate workers from any contamination present by maximising the distance of workers from areas of concern or by the addition of some form of cover over the contamination present – e.g. covering contaminated soils or rocky outcrops containing NOA with uncontaminated soil, gravel or vegetation (such as a ground cover of NOA tolerant plants, and/or add a layer of garden mulch, woodchips).

Engineering controls

Engineering controls are an effective means to create a barrier. An example of using an engineering control to reduce exposures would be using mobile plant equipment with HEPA filter fitted when work must be continued in these areas. This engineering control approach would be an effective measure as opposed to using equipment lacking the capability to filter airborne asbestos fibres from the workers breathing zone, or when tasks are being performed manually – which would have workers exposed for extended periods compared to using mechanical means.

Another engineering approach which might prove effective in some situations, if practical, would be to design and implement a system to add water to raise soil moisture above 10%, which has been shown to reduce levels of respirable airborne fibres during disturbance activities. Engineering solutions can also be employed to minimise the tracking of potentially contaminated materials away from worksites, and to reduce the spread of contaminated materials within the site.

Care should be taken when implementing engineering controls, and all controls for that matter, to ensure that other risks are not introduced to the work environment – e.g. introduction of water in the above example may lead to electrical or slip hazards being introduced where they were previously not an issue.

Administrative controls

Administrative controls are often required to support higher level controls being put into place, and also form an effective method of control in themselves. Like engineering controls, the number of administrative controls depends on the particular work being conducted and should be tailored accordingly.

Administrative controls may include: Work Health Safety Management Plans, Asbestos Management Plans, Dust Mitigation Plans, Standard Operating Procedures, Safe Work Method Statements, air monitoring and bulk sampling (i.e. Sampling and Analysis Program), health surveillance and monitoring, contaminated waste programs, decontamination procedures, clothing cleaning protocols and administration and provision of personal protective equipment (including respiratory protection equipment).

A number of provisions in NSW Legislation explicitly require some of the above control measures to be in place. For example, the requirement to have and update Asbestos Management Plans (including putting reasons and rationale for decisions relating to asbestos) and the need to train workers in relation to asbestos, and NOA, when workers are likely to encounter them during work activities.

Administrative controls need to include a comprehensive program of education for workers, covering a broad range of issues pertinent to NOA when workers are working in these areas.

The most effective way to protect workers will depend on particular circumstances, but is likely to require combinations of the above measures, and sustained vigilance in monitoring and maintaining control measures that are put in place to ensure effectiveness. For more comprehensive information on managing risks associated with asbestos in the workplace, the Code of Practice *How to Manage and Control Asbestos in the Workplace* is also available on the SafeWork NSW website.

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**Clinton Jarman**
**Respiratory Scientist, Medical Services**
**Dust Diseases Authority**