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NATIONAL ASBESTOS PROGRAM

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Abstract:

Proficiency testing is used internationally to provide objective evidence of testing laboratories testing competence. The need for ongoing confidence in laboratory performance is not only essential for laboratories and their customers but also other interested parties such as regulators and laboratory accreditation bodies. This paper details Australia's National Asbestos Program which covers the counting of fibres on prepared slides. The aim of this program is to monitor the accuracy and reliability of results produced by individual counters from participating laboratories and thus improve the overall standard of work carried out in the area. This is considered essential given that important and often expensive decisions are based on test results produced by testing laboratories involved in the estimation of airborne asbestos dust.

Every year in Australia, hundreds of people die from asbestos-related disease. This material was in common use before the dangers to health were widely known. It is now illegal to use it in any new products in Australia.

Key words:

Asbestos
Accuracy
Reliability

1. INTRODUCTION

Asbestos can cause serious diseases including cancers, such as mesothelioma and lung cancer, and other non-malignant lung diseases such as asbestosis, pleural plaques and pleural thickening. Asbestos has been used in roofing, asbestos cement sheets and pipes, insulation, building materials and other products.

Asbestos is the name given to a number of naturally occurring fibrous silicate minerals. It is strong and heat resistant, which is why it was widely used in a range of products. Asbestos has been used in roofing, asbestos cement sheets and pipes, clutch and brake linings, insulation, building materials, boilers, electrical fittings, gaskets, floor tiles, plastics, textiles and other products.

Exposure to airborne asbestos particles is the greatest risk to health. When the asbestos fibres become airborne, people working with asbestos may inhale particles. These particles remain in the lungs and, over time, can cause disease. A person's chance of developing asbestos-related disease depends on how much asbestos they have been exposed to and for how long.

Since 31 December 2003, asbestos and all products containing asbestos have been banned in Australia. They cannot be imported, stored, supplied, sold, installed, used or re-used. This ban does not extend to asbestos-containing products in existing installations such as vinyl floor tiles and asbestos cement roofing or sheeting. These products can be left in place until they need to be replaced. The Australian Occupational Health & Safety Regulations also specify that only licensed asbestos removalists may remove large amounts of fixed or installed asbestos-containing material.

2. PROGRAM SUMMARY

Proficiency Testing Australia (PTA) oversees the technical operation and development of the National Asbestos Program (NAP). Independent experts provide check-counting services, together with technical advice.

Over the past twenty-five years PTA (and previously NATA Proficiency Testing) has continued to provide a stock of asbestos fibre slides that are used in the NAP.

Participation in this proficiency testing program would satisfy the requirements of ISO/IEC 17025 **[1]** for assuring the quality of tests results.

Asbestos Air Monitoring is conducted to ensure that people are not exposed to a level of asbestos dust that places their health at risk and that the control measures in place are effective. Risk of exposure to high levels of asbestos dust may occur where asbestos is being removed once it has been identified, or disturbed, or where known asbestos-containing materials are degrading and potentially liberating airborne fibres.

The essence of the program is that reference slides of asbestos dust fibres are counted periodically by individual counters employed by each participating laboratory. Performance is assessed as "satisfactory", "questionable" or "unsatisfactory" by comparing participants' counts (in fibres/100 fields) with established reference values.

Each round takes approximately twelve months, during which time each counter initially receives one set of six slides. A follow up set of six slides is also sent

shortly afterwards to counters whose performance is categorised as "unsatisfactory" for the initial stage.

The formal assessment of the counter (and thus laboratory performance) is based on the results obtained after each cycle (i.e. two consecutive rounds) over a two year period.

For the Round 31 and Round 32 program conducted during 2012 and 2013 a total of 524 different counters participated. These counters were employed in 99 separate facilities located throughout Australia, New Zealand, Hong Kong and United Arab Emirates.

3. OPERATION OF THE PROGRAM

For this program the samples are prepared in a vibrating aerosol asbestos fibre generator. Twenty-five (25) mm membrane filters are exposed to dust clouds of various types and concentrations of asbestos and asbestos fibres are drawn through the filters using a pump. The filters are then removed and cut in half. Both halves of the filter are mounted on separate glass slides by the procedure described in the NOHSC Guidance Note **[2]**.

Each slide is initially assigned a reference value (fibres/100 fields) using the mean of counts obtained by independent experienced counters from the sample supplier tested by the Membrane Filter Method described in the NOHSC guide. Upper and lower limits are then assigned using a statistical approach which takes into account the Poisson distribution underlying the microscope fibre counting process used. These reference values and limits have been reviewed as more empirical data has become available after each Round of the NAP.

A sample distribution schedule covering a 12 month period is used for the dispatch of the six slide set to each of the nominated counters and for the return of the slides and results from the counter to the program coordinator. The six slides are counted independently by the nominated counter. The procedure detailed in the NOHSC Guidance Note must be strictly followed by the counter together with the counting rules, i.e. count 100 fibres or 100 fields whichever comes first, with a minimum of 20 fields being evaluated. These results are entered on the result sheet together with the additional information required with respect to the microscope used. The 'comments' section is used if a counter wishes to reject a slide (e.g. due to deterioration).

4. EVALUATION OF COUNTER PERFORMANCE

Processing Results - The NAP compares a counter's result for a single slide with a "reference" value. Each slide has an established reference value, and corresponding inner and outer limits, which are symmetrical intervals around an established mean. As fibre-count data follow a Poisson distribution, and the standard deviation of a Poisson distribution is a function of the mean of the

distribution, then the limits on either side of the mean for the NAP slides are, in fact, a multiple of the standard deviation.

Each counter receives a score out of 12 for each round made up of the sum of the scores for individual slides counted within a set. The scores for individual slides are:

2 if the count is extreme (i.e. outside the outer limits)
1 if the count is marginal (i.e. between inner and outer limits)
0 if the count is satisfactory (between inner limits)

A total score of “>4” is unsatisfactory, “3” is questionable and “0-2” is satisfactory.

If the total score for the six slides is 4 or more (i.e. unsatisfactory), the counter will be sent a further set of six "follow-up" slides before the next round of the program. If a score of 3 or more is obtained in a "follow-up" round, then the counter’s performance will be classified as unsatisfactory for the cycle. If a score of “2” or less is obtained in a “follow-up” round, performance is graded as “questionable”, and a count of “2” or less must be obtained in the subsequent round for performance to be classified as “satisfactory” for the cycle.

If any counter receives two scores of 3 or more during a cycle (i.e. any two consecutive rounds), the performance category for the cycle will be classified as "unsatisfactory" and the counter will need to obtain a score of “2” or less for their next two sets of slides before their grading can be classified as “satisfactory”. Counters may request additional sets of “follow-up” slides prior to the next routine round to facilitate this process (time-frame will be subject to slide availability). These additional sets of slides are referred to as “special follow-up”.

Check Counts - Any slide for which a counter obtains a score of 2, or a score of 1 if it affects the performance category, are checked 'blind' by an independent experienced counter. No information on counter code or reference value is provided. If this independent counter confirms the original reference value (and hence outer and inner limits) the score for the participant stands. In the event that the reference value is amended or the slide discarded due to deterioration, the laboratory counter is given the benefit of any doubt.

Performance Criteria and Interim Report - After a counter has performed in two consecutive rounds a performance category is also provided for the cycle. This is based on the scores obtained in both rounds and the criteria applied.

After each round (and any associated follow-up) an interim report is produced which provides a summary of performance both for the round and cycle.

Classification of Counters - The performance category after each cycle is used to determine the counter classification. To demonstrate continued competence, the counter must obtain a "satisfactory" category after each cycle (i.e. must not receive two scores of 3 or more in two consecutive rounds). If a counter’s performance is classified as unsatisfactory at the end of a cycle, then the counter normally has to achieve two scores of 0-2 (i.e. on each of two additional sets of

six slides) before his or her performance can be considered satisfactory. These additional sets of slides are referred to as “special follow-up“ slides.

Training - Counters who are categorised as "unsatisfactory" usually require further training. This may be provided in-house as part of the internal quality control procedures. Other formal training programs are run from time to time by various private organisations and some State Authorities. Later, performance in the next round of the NAP will provide external quality control and monitor the counter's performance.

5. CONCLUSION

The NAP provides participating laboratories an external means of monitoring the accuracy and reliability of results produced by individual counters within their laboratory.

The program assists individual counters by providing tangible evidence of their own performance, and when not satisfactory, highlights the need for additional training or remedial action.

The overall performance in Rounds 31 and 32 was quite pleasing, with 91% of participating counters classified as satisfactory.

6. REFERENCE

[1] ISO/IEC 17025: 2005 General requirements for the competence of testing and calibration laboratories

[2] Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres prepared by the National Occupational Health and Safety Commission, 2nd Edition, [NOHSC:3003(2005)].