

# APIL's Occupational Health Special Interest Group Meeting

*12<sup>th</sup> November 2018*

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Registrar of FAAM

*Low level exposure to asbestos, significance  
and culpability – one expert's view*



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# Bussey – 00654701Ltd (Anglia Heating Ltd) [2018]

*“... TDN13 does not establish a ‘bright line’ to be applied in all cases arising out of the period 1970 – 1976. Still less is it a bright line to be applied to asbestos exposure in a different period whether before or after 1970 to 1974.*

*“... It is necessary to look at the information which a reasonable employer in the defendant’s position at the relevant time should have acquired and then to determine what risks such an employer should have foreseen”.*



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# What is low level exposure?

*“it seems that a very brief exposure to the dust can prove fatal in man”*

Dr Alfred Byrne, Medical Correspondent, 31 Oct 1965



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# Low level exposure?

*“a level above that commonly found in the air in buildings and the general outdoor environment”.*  
1996 Advisory Council report

# Low level exposure?

Background is up to  $0.0005 / \text{cm}^3$



Background is up to 500 fibres/ $\text{m}^3$



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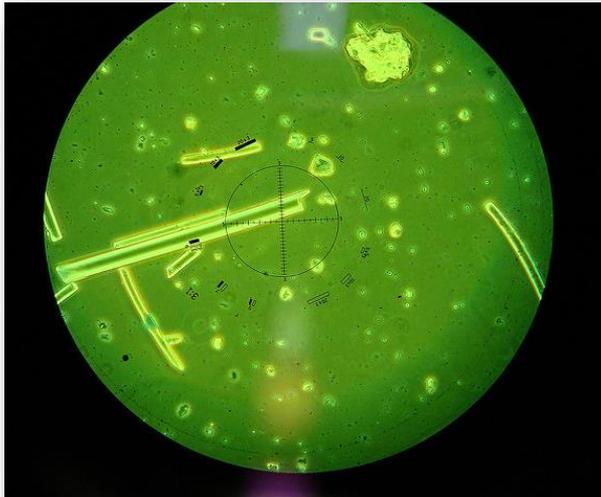


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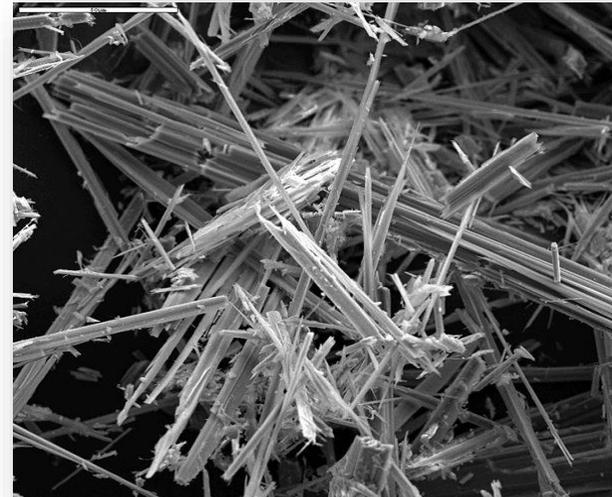
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# Low Level Exposure?

- Optical microscopy
  - 500x magnification
  - No fibre discrimination
  - LoQ 0.01 fibres/ml



- Electron microscopy
  - 200,000x magnification
  - Fibre discrimination
  - LoQ 0.0005 fibres/ml



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# 1969 – Byrom and asbestos in buildings

## A DUST SURVEY CARRIED OUT IN BUILDINGS INCORPORATING ASBESTOS-BASED MATERIALS IN THEIR CONSTRUCTION

J. C. BYROM, A. A. HODGSON and S. HOLMES

Asbestosis Research Council, Rochdale, Lancs.

**Abstract**—An assessment has been made of the amount of asbestos dust in the respirable size range present in typical situations where the principal types of asbestos-based building materials have been used. More than 60 buildings of various types have been included in the survey. In over 90 per cent of the locations sampled, the asbestos dust concentrations present in the atmosphere of the completed buildings do not exceed one-tenth of the level regarded as acceptable for occupational exposure. More than 40 per cent of the concentrations are of the same order as the level in buildings where no asbestos has been used.



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## 1969 - Byrom

90% <0.04 fibres/ml  
[<40,000 fibres/m<sup>3</sup>]



Applying Sprayed "Limpel" Asbestos to Steel Decking and Beams, new Head Office for The Electrolytic Zinc Co. of Australia Ltd.  
Architects: Stephenson and Turner. Contractor: Lewis Construction Pty. Ltd.

In our present state of knowledge, the dust concentrations found in completed buildings incorporating asbestos-based products in their construction are not considered likely to constitute a hazard to the health of the occupants.



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# Nash and Sherwood 1953

## An Occupational Hygiene Team\*

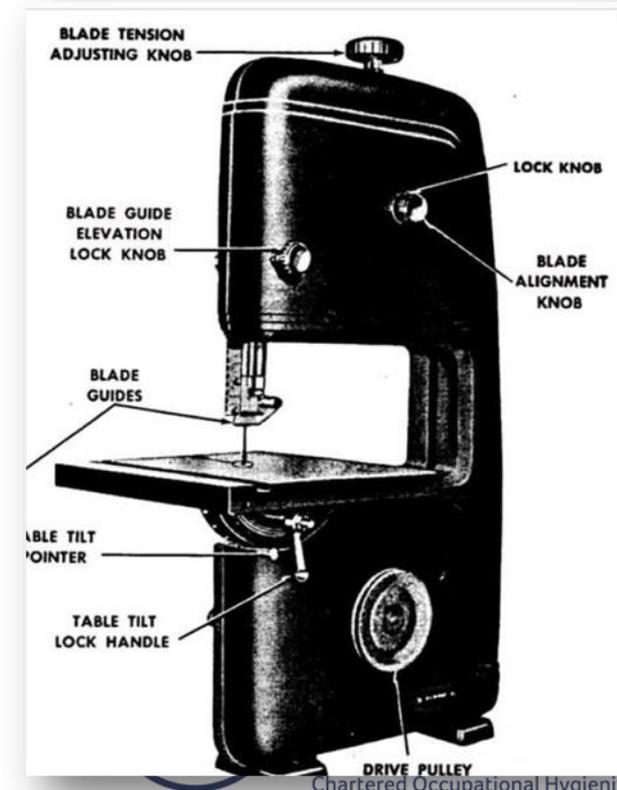
PETER H. NASH and R. J. SHERWOOD

with the assistance of

JOAN BEDFORD

*From the Slough Industrial Health Service  
and the Occupational Health Unit, the London School  
of Hygiene and Tropical Medicine*

*“In an operation involving the cutting of asbestos board with a bandsaw, a considerable amount of dust was seen to be produced, even though the saw was fitted with a standard type of exhaust system. Counts showed the operator's average exposure to be 170 particles per cc.”*



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# Nash and Sherwood 1953

## An Occupational Hygiene Team\*

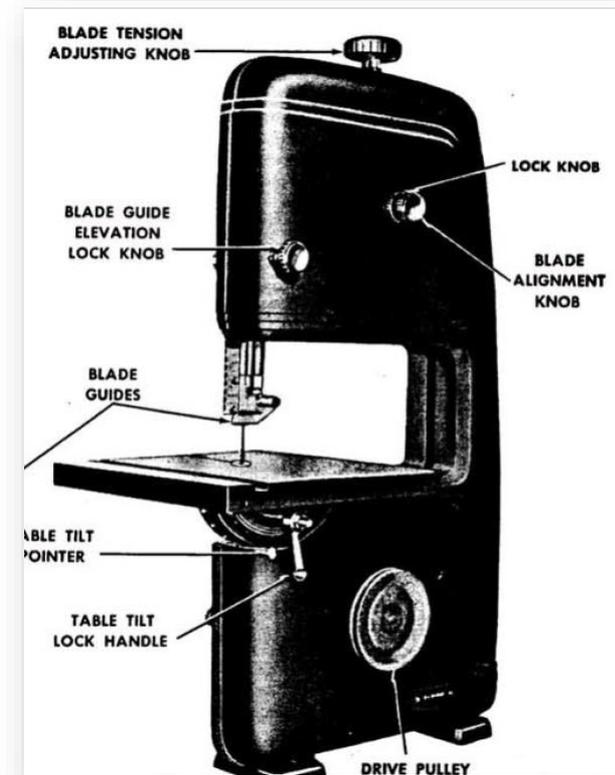
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JOAN BEDFORD

*From the Slough Industrial Health Service  
and the Occupational Health Unit, the London School  
of Hygiene and Tropical Medicine*

*“A special type of external local exhaust ..... is being developed in the hope that it .... control the dust .... As the dust concentration is so near the accepted maximum limit the continued wearing of a suitable mask has been recommended as a temporary measure”.*



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# Occupational hygiene and a modern carcinogen



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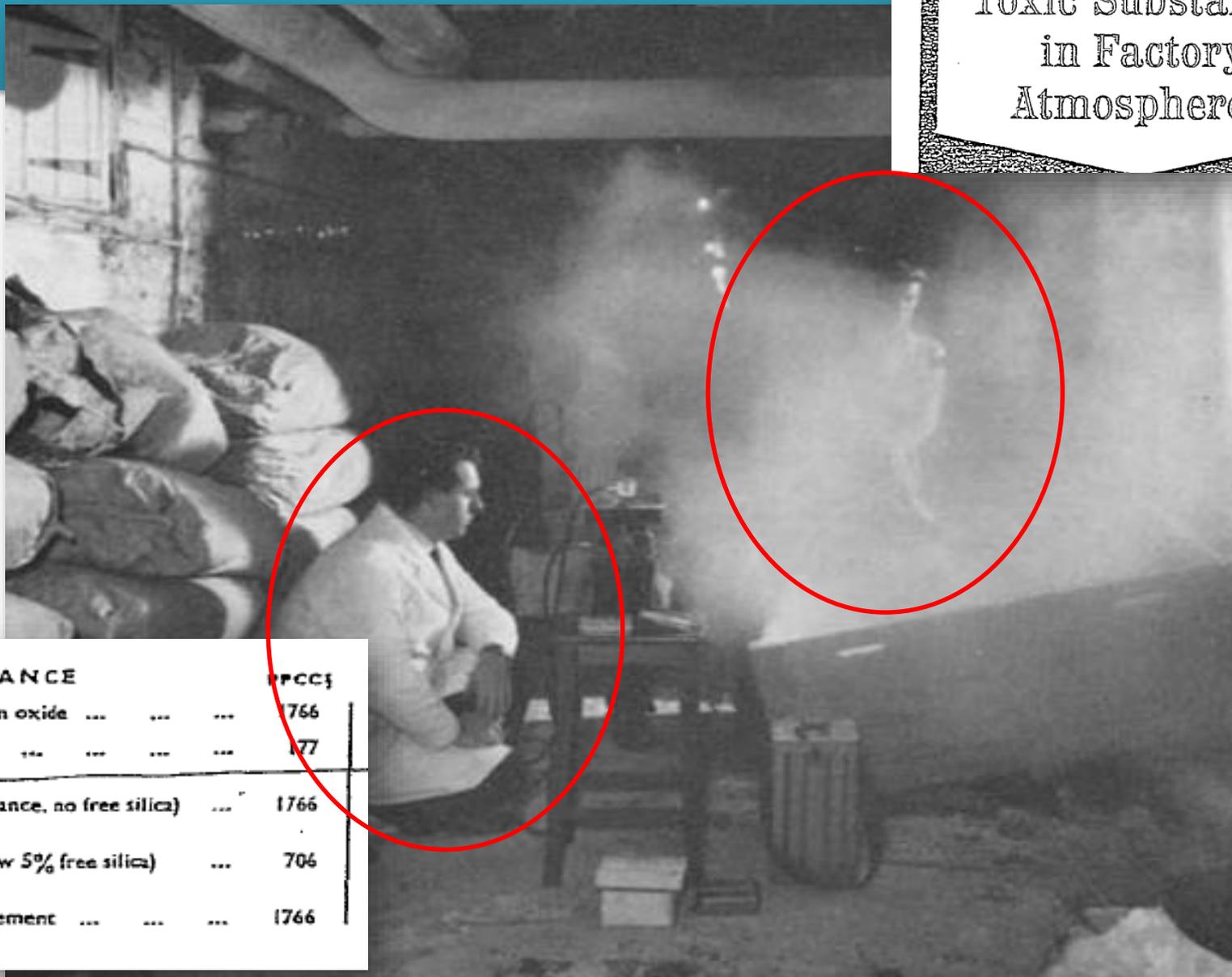
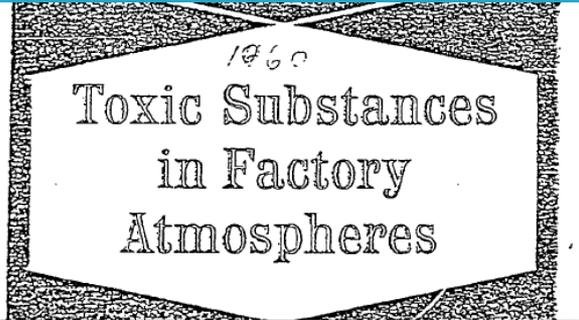
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# Pre-Newhouse and Thompson (1965)



SUBSTANCE	PPCC§
Aluminium oxide ... ..	1766
Asbestos ... ..	177
Dust (nuisance, no free silica) ...	1766
Mica (below 5% free silica) ...	706
Portland cement ... ..	1766

ace  
ment  
ns

# Leathart (1963), “Some observations on asbestosis”

*“The workers say that the mixing of powdered magnesia/asbestos plaster with water, and the stripping off of old lagging, are the dustiest processes. Mixing is done in a bucket, dust bin, or large box, depending on the amount required, and is illustrated in Fig. 4. The mixing process takes 5-15 min and is repeated every 2-4 hr. Usually the mixing is all done by one person, often by the apprentice who has just started work. **Knowing that asbestosis is slow to develop one might suggest that it would be better if this dusty work were to be done by the elderly worker nearing retirement**”.*



# Newhouse and Thompson 1965



This could throw important light on the clinical disease for it seems that a very brief exposure to the dust can prove lethal in man.



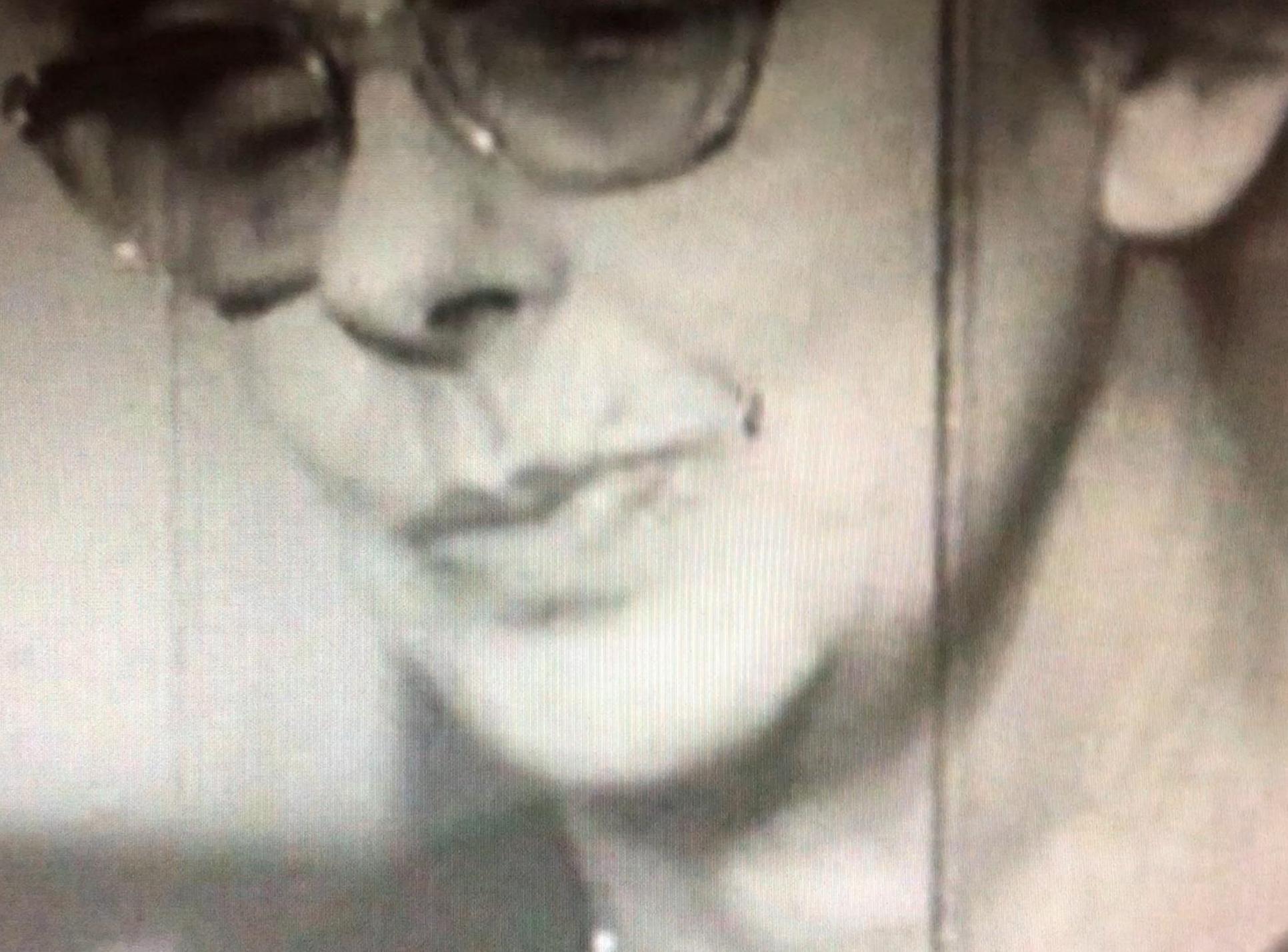
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Marinite Ltd.

# Example 1: Brake Servicing, late 1960s

- Exposure as a shift average low, but high instantaneous peak exposures from the use of airlines
- Exposures probably below TDN13 standards
- AIC (1968) –  
*"The amount of asbestos fibre found is minute ..but the dust is very fine and it is good practice to remove it by vacuum, rather than by an air blast".*
- Dose – 0.0017 f/ml yrs [1 day exposure at 0.4 fibres/ml for mechanic]



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# Example 1: Brake Servicing, late 1960s

830  
**ASBESTOS-  
SAFETY AND  
CONTROL**

## **Introduction**

**This booklet has been prepared for the management and staff of the asbestos industry to help them answer questions which they may be asked in relation to the possible risks associated with asbestos and health.**

**Asbestos is a vital raw material with a unique combination of**



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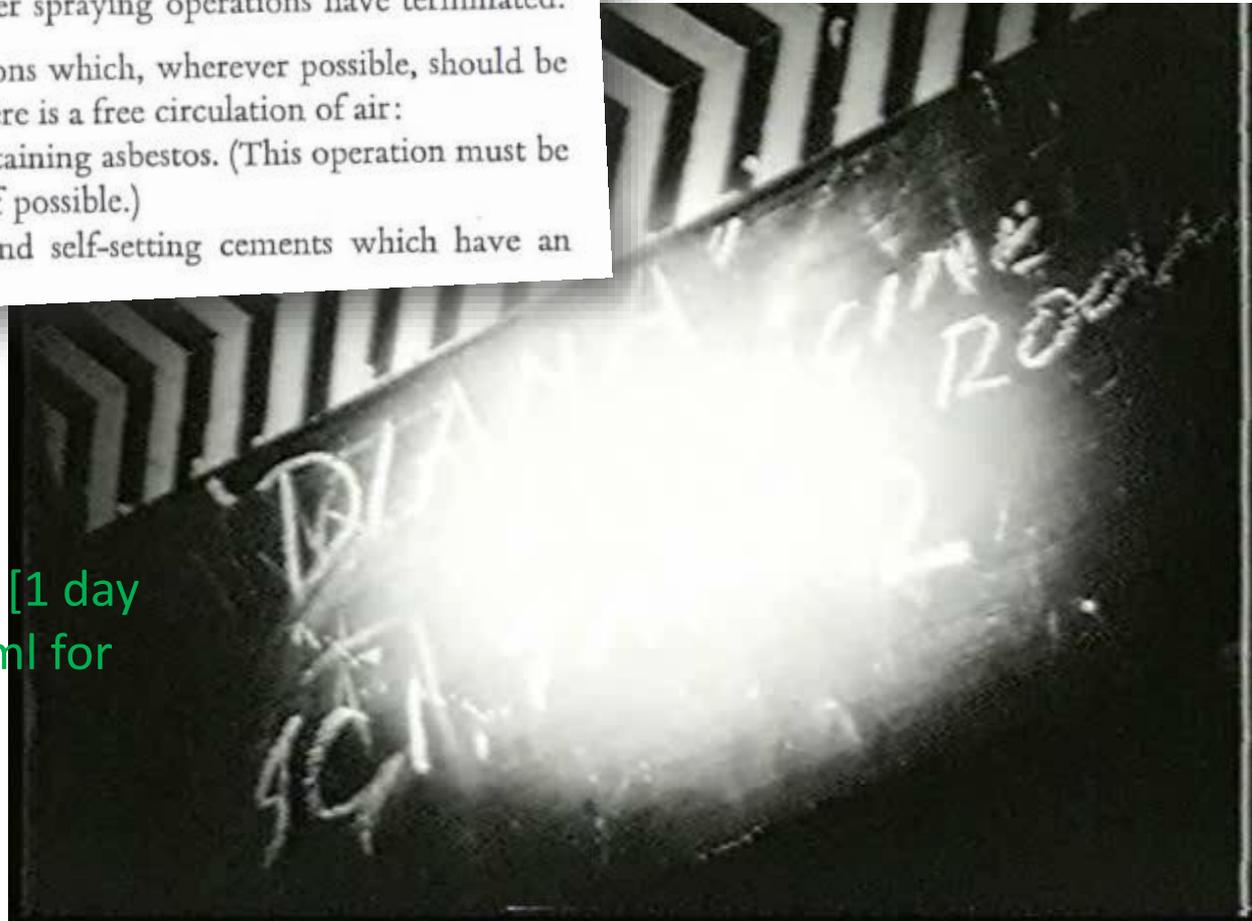
## Example 2: Mixing asbestos

### Use and Care of Respirators

Respirators should be worn by all employees at all times when:

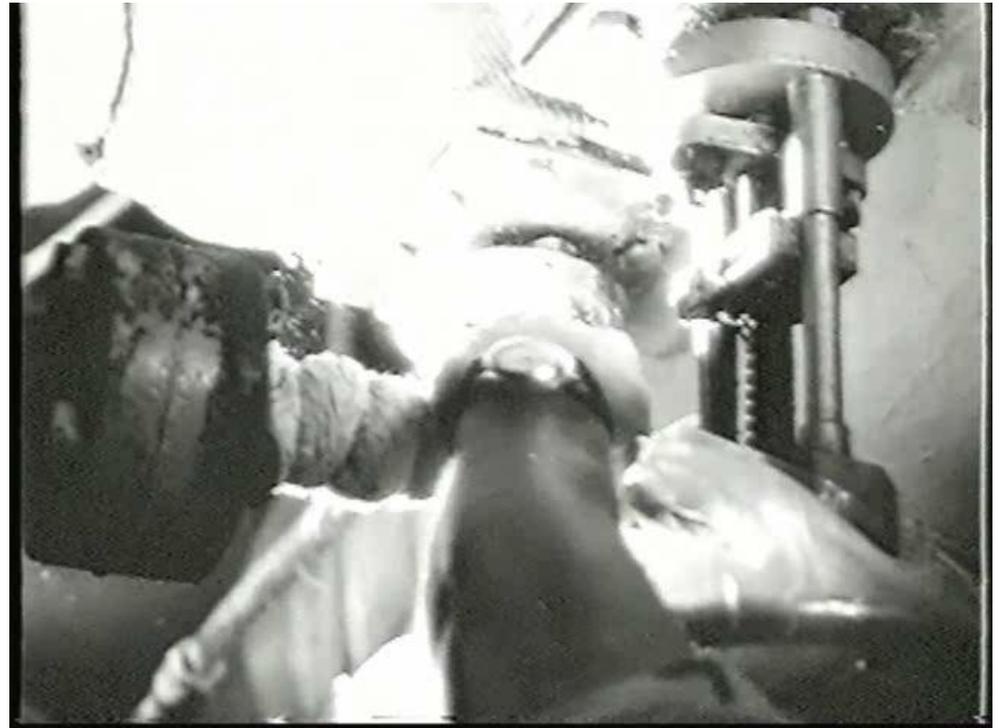
- (1) Spraying asbestos and feeding hoppers on sprayed asbestos work. Respirators should be worn by both operator and attendant during the full period that work is being carried out and by any employee remaining in the dusty atmosphere for a limited period after spraying operations have terminated.
- (2) Carrying out the following operations which, wherever possible, should be carried out in open spaces where there is a free circulation of air:
  - (a) The mixing of any material containing asbestos. (This operation must be carried out in segregated areas if possible.)
  - (b) The mixing of compositions and self-setting cements which have an asbestos content.

- Dose – 0.008 f/ml yrs [1 day exposure at 2 fibres/ml for bystander]



# Asbestos Regulations 1969

- Chrysotile, amosite and fibrous anthophyllite
  - 2 fibres/ml 4hr TWA
  - 12 fibres/ml ten minute TWA
- Crocidolite
  - 0.2 fibres/ml ten minute TWA



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# BOHS 1968

## HYGIENE STANDARDS FOR CHRYSOTILE ASBESTOS DUST

from the  
Committee on Hygiene Standards  
of the

BRITISH OCCUPATIONAL HYGIENE SOCIETY

COMMITTEE ON HYGIENE STANDARDS

### CANCER

The primary danger of inhaling asbestos dust is asbestosis. It is generally recognised that there is also significant risk of lung cancer associated with asbestosis, A risk of mesothelioma of the pleura and peritoneum exists in connection with the inhalation of crocidolite dust in particular.

There can be little doubt that these risks will be least in the lowest concentration (KNOX, DOLL and HILL 1965), but the quantitative relationship between asbestos and

cancer risk is not known, nor is it known exactly why these two are related, nor even whether all kinds of asbestos present a risk. Consequently it is not possible, at this time to specify an air concentration which is known will be free of risk in this respect.



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# Probable asbestos dust concentrations at construction processes

## INTERPRETATION

These results originate in the main from samples collected over about  $\frac{1}{2}$  hour—1 hour and therefore take some account of varying and intermittent activity. When considering the need for precautions, discretion is possible if the activities are only occasional and for short duration. In a similar way if a normally steady job is interrupted for some time, it may be possible to average an exposure over a four hour period before passing judgment.

When concentrations of dust exceed the Hygiene Standard of 2 fibres/ml averaged over a 4 hour period, or a 10 minute exposure to greater than 12 fibres/ml, or 0.2 fibres/ml in the case of crocidolite (blue asbestos), then HM Inspectors of Factories will require precautions to be taken so as to gain compliance with the Asbestos Regulations 1969.



## TDN35 (1972) – “Control of asbestos dust”

*“Asbestos is used in many industries and it has to be handled in many ways and subjected to many different operations. Most of these give rise to dust and the Asbestos Regulations 1969 require protection against such dust in various ways. This Technical Data Note deals with the suppression of dust by engineering control. The standards which HM Factory Inspectorate will apply to determine whether the dust is adequately controlled or not will be found in Technical Data Note 13.”*



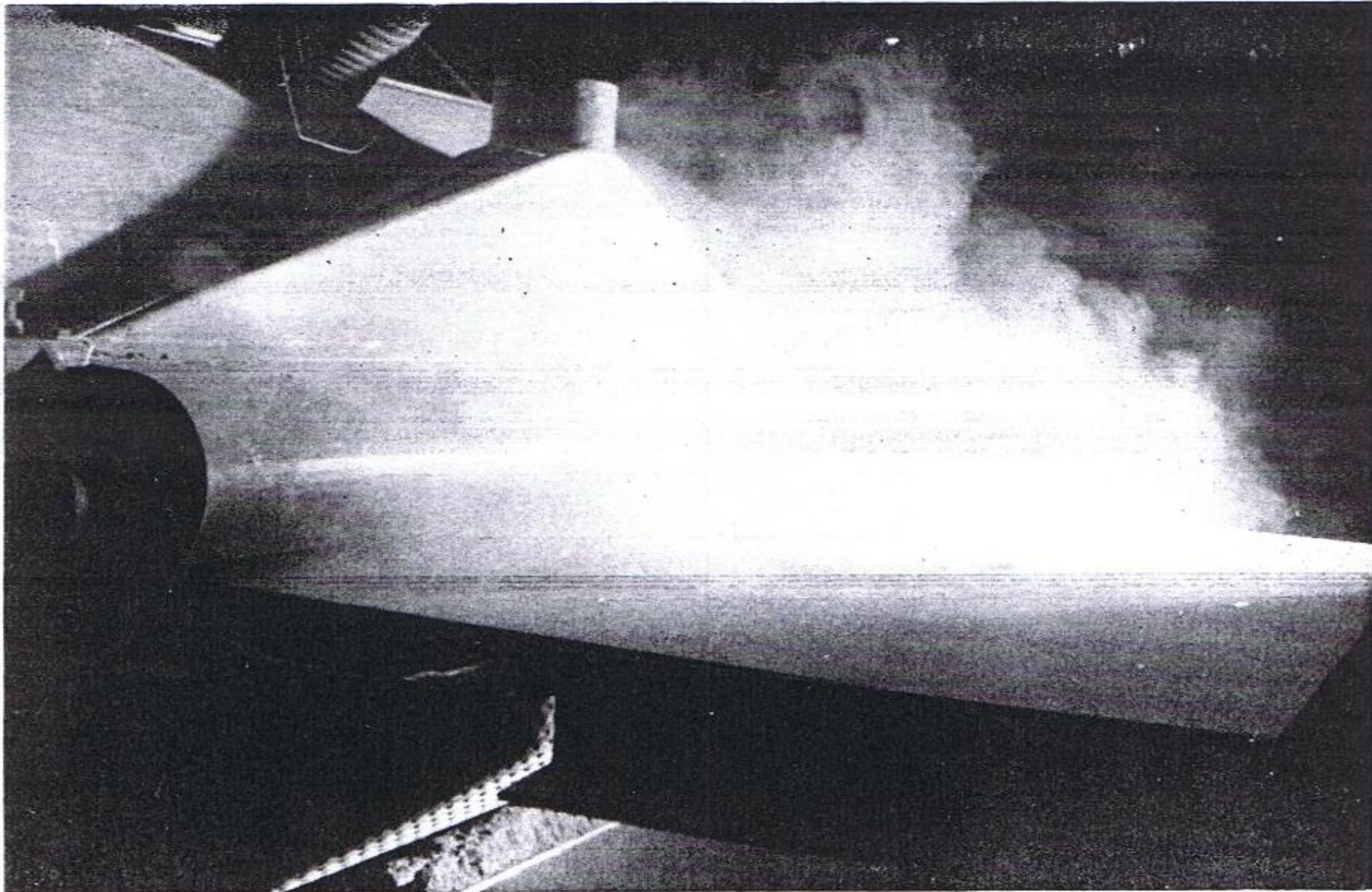
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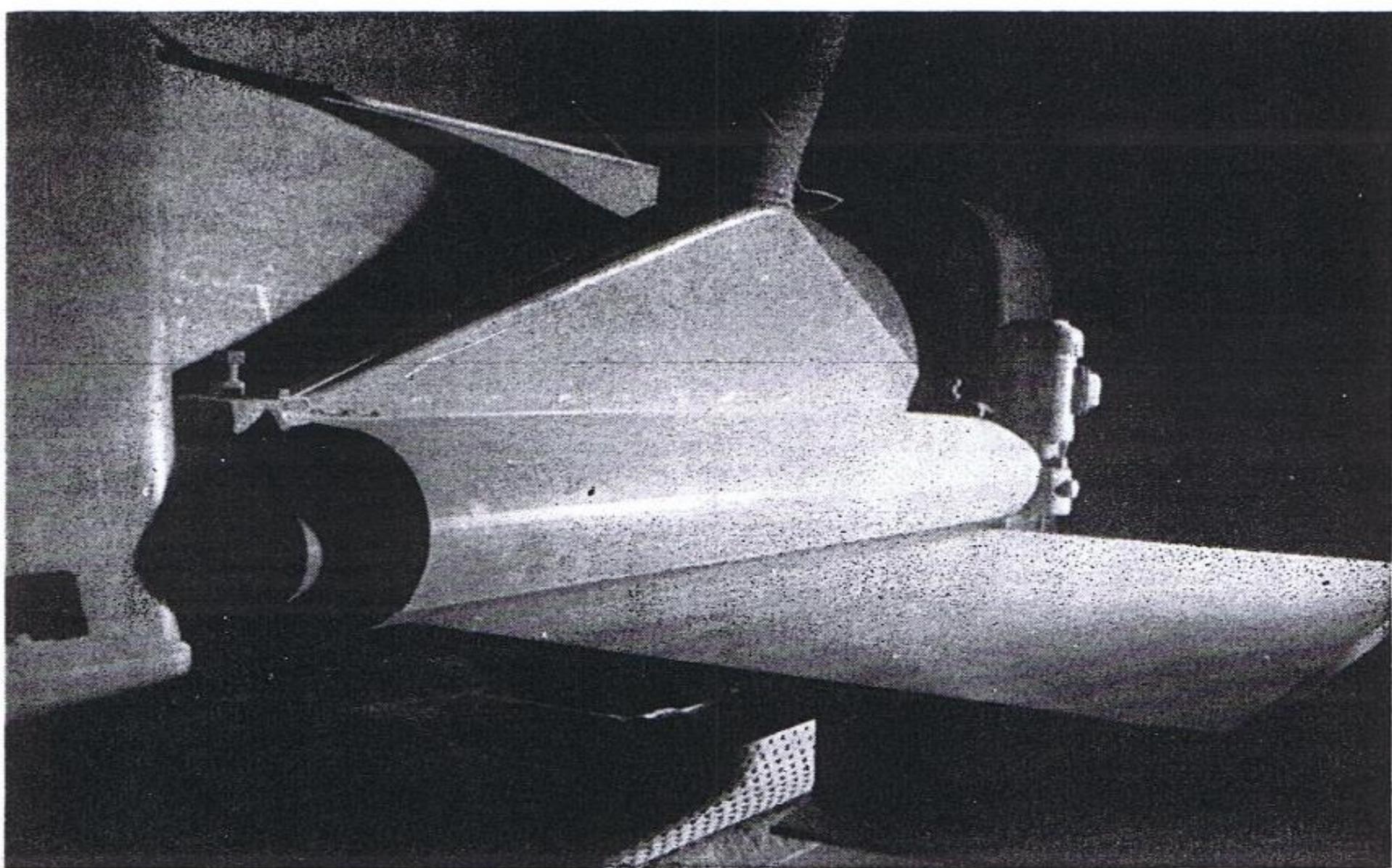


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*Fig. 25 Delivery end of parallel drum sander working on asbestos board without exhaust system showing considerable leakage of dust. (cf. Fig. 24.)*



*Fig. 24 Delivery end of parallel drum sander working on asbestos board – showing the close hood over rotating brush and the 6½" dia. duct. Exhaust system operating and dust under complete control. (cf. Fig. 25.) Exhaust system as for Fig. 22.*

# Health & Safety at Work - 44

## SUBSTITUTES

In the search for safe conditions for a process in which a harmful substance is used, consideration should first be given to the possibility that a safe or less harmful substance may serve the purpose of the process. The physical and chemical properties of asbestos have been of such outstanding value for many technical purposes that alternative materials have not been readily found which would serve a particular purpose as well as asbestos. Sometimes the less harmful chrysotile has been used to replace crocidolite, but the properties of the several minerals falling within the designation of asbestos are not all exactly the same. While the resistance of chrysotile to intense heat is good, that of crocidolite is relatively poor and it tends to fuse at high temperature; on the other hand the resistance of chrysotile to acids is poor while

HSW 44—C

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## Example 3: Hand sawing AIB

- TDN42/EH35 – 5 to 10 fibres/ml
  - 30 mins – 1.25 fibres/ml
  - 45 mins – 1.88 fibres/ml
  - 60 mins – 2.50 fibres/ml
- Industry data higher

6.2.2.4 Hand sawing. Under normal site conditions this is an intermittent process where precautions are not required but the sawdust should be cleaned up regularly.

THE ASBESTOSIS RESEARCH COUNCIL

**Asbestos-based Materials for the  
Building and Shipbuilding Industries  
and Electrical and Engineering  
Insulation**

CONTROL AND SAFETY  
GUIDE—No. 5

*Revised September 1975*



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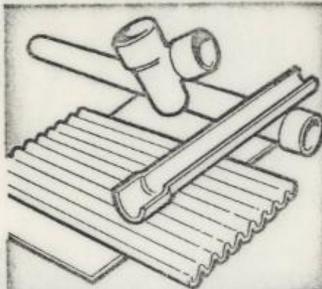
# Example 3: Hand sawing AIB

## SAFE WORKING WITH ASBESTOS

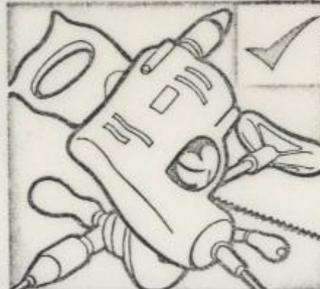
The 1969 Asbestos Regulations require precautions to be taken to protect workers from high levels of asbestos dust. This leaflet explains what this means to building workers who work with asbestos-based materials.

### ASBESTOS CEMENT

is a hard surfaced material, in which the asbestos fibre is "locked in" by the cement. Very little asbestos dust arises from normal working with this material.



Asbestos-cement is generally used for roofing and cladding in corrugated or flat sheets, as pipes and gutters for rain water and as pipe flues.



Work can be carried out quite safely on asbestos-cement materials with power drills, hand saws and other hand tools.



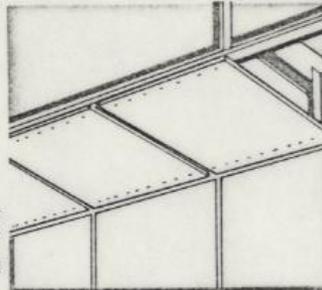
Occasional power sawing presents no problem, particularly if it is done in the open air.



But for longer periods dust extraction equipment *must* be used.

### ASBESTOS INSULATING BOARD

is a softer surfaced material with a higher content of asbestos fibre and is used to provide fire resistance and fire protection. It is likely to give off more asbestos dust while being worked.



Asbestos insulating board is mainly used internally in partitions, ceilings, doors and to clad structural steel work.



On small jobs the dust created by nailing, screwing and drilling with hand tools will be below the laid down limit.



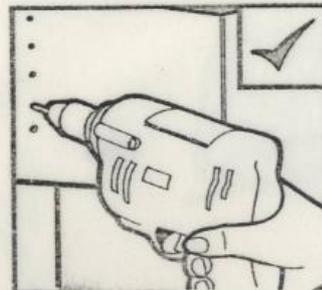
Care must be taken to avoid too much dust accumulating on the floor of the work area; it should not be brushed up dry.



The best method of cleaning is by vacuum cleaners. If these are not available the dust *must* be thoroughly damped down before being swept up and put in dust-proof bags.

### For further information contact:

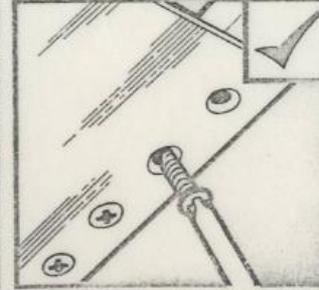
The Secretary,  
Environmental Control Committee  
The Asbestosis Research Council,  
114 Park Street, London W1Y 4AB  
or your supplier, quoting ref. L1



Power drilling on vertical panels, such as when fitting partitions or cladding, is not likely to cause excessive asbestos dust.



Where overhead power drilling is being done portable dust extraction equipment *must* be used.

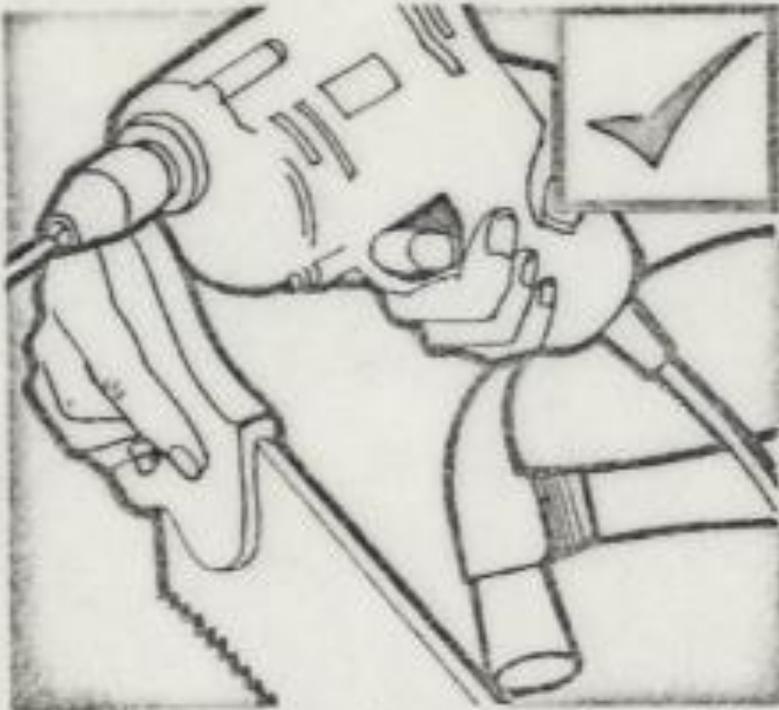


Better still, boards, panels or tiles for fixing overhead should be pre-drilled and fixed with TEKS screws.



Portable dust extraction equipment *must* be used when asbestos insulating board is being cut by circular saws or even jig-saws in confined spaces.

## Example 3: Hand sawing AIB



On small jobs the dust created by nailing, screwing and drilling with hand tools will be below the laid down limit.



Care must be taken to avoid too much dust accumulating on the floor of the work area it should not be brushed up dry.



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# SAFE WORKING WITH ASBESTOS

The 1969 Asbestos Regulations require precautions to be taken to protect workers against high levels of asbestos dust. This leaflet explains what this means to people working on the stripping of old insulation materials.

## STRIPPING ASBESTOS THERMAL INSULATION



Whenever stripping asbestos lagging, however low the dust level appears, don't use make-shift protection.



For small amounts of stripping, a full overall and ori-nasal mask are adequate.



Full protective clothing, including hat or hood, and positive pressure respirator must be used in high concentrations, and *always* when working with crocidolite.



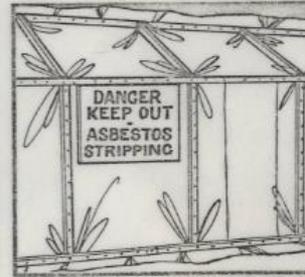
In very difficult conditions it may sometimes be necessary or preferable to use direct air-line breathing apparatus.



Wherever possible, any asbestos material should be thoroughly wetted before stripping.



Before stripping large areas penetration with water probes can ensure thorough soaking of the asbestos lagging.



Areas to be stripped should be enclosed with polythene sheeting and a warning notice displayed.



Stripped material should be placed directly into polythene bags and not allowed to create dust by dropping on the ground.



Never clear up by dry sweeping.



Always thoroughly wet before sweeping.



Stripped material and floor clearings must be put into dust-proof polythene bags securely fastened for properly authorised disposal. Blue asbestos waste must be clearly labelled.



The use of a suitable industrial vacuum cleaner is recommended to ensure that the site is left free of asbestos dust. Note particularly overhead structures and ledges.

**For further information contact:**  
Environmental Control Committee,  
Asbestosis Research Council,  
P.O. Box 18, Cleckheaton,  
West Yorkshire BD19 3UJ  
or your supplier, quoting ref. L6



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## Example 4: Power sawing AIB

- TDN42/EH35 – 20 fibres/ml
  - 20 mins – 1.7 fibres/ml
  - 30 mins – 2.5 fibres/ml
- Industry data higher

6.2.2.3 Power sanding—local exhaust ventilation required.

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*Revised September 1975*



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**EH10 (1976) - "Asbestos - Control Limits, Measurement of Airborne Dust Concentrations and the Assessment of Control Measures"**

***"All exposures to asbestos should be reduced to the lowest level reasonably practicable"***

## Example 5: Segregation

- Does Bussey mean that all exposures should be ALARP – stop visitors entering the factory unless they wear RPE?

### 2.2. Additional Hygiene

2.2.1. The best standards of good factory housekeeping and hygiene should apply to factory mechanical cutting areas. Such areas are best segregated and used for no other purpose. In addition to dust exhaust on machines, a good standard of general room ventilation should be maintained.

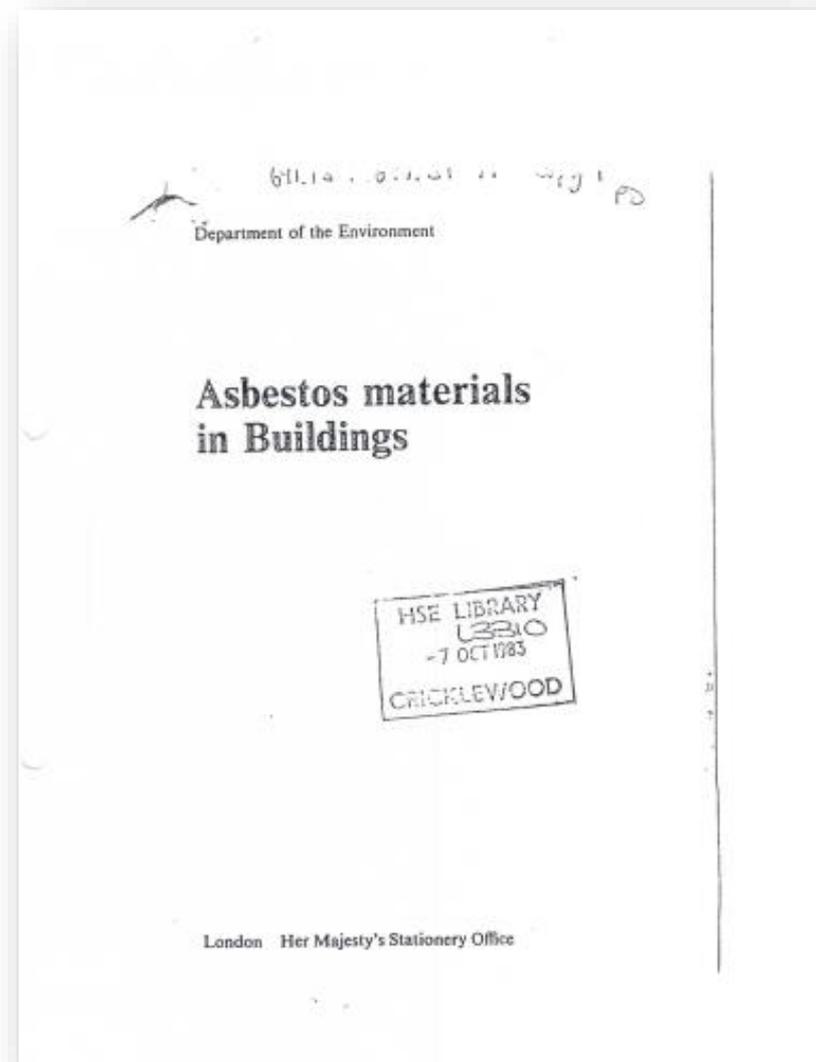
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ARC, 1967



# EH10 (1984) – clearance indicator established

*“For most situations, it is considered to be reasonably practicable to undertake the work in such a way that the ambient level outside the enclosure and inside the enclosure after final clean up does not exceed 0.01 fibre/ml when measured by the method set out in Annexe 3.”*



# Background Exposure

Most indoor air concentrations of asbestos are below 0.0002 f/ml, which rises to around 0.0005 f/ml in buildings which contain asbestos in good condition

*"Fibrous materials in the environment, a review of asbestos and man made mineral fibres"*, The Building Research Establishment (BRE) / Institute for Environmental Health (IEH) (1997)

**Asbestos  
warning as  
Glasgow fire  
forces  
Sauchiehall  
Street  
evacuation**



**The fire service  
warned those  
nearby to remain  
indoors and keep  
their windows  
closed over  
asbestos fears.**

