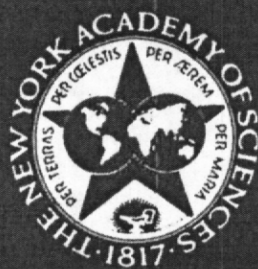


ANNALS OF  
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# HEALTH HAZARDS OF ASBESTOS EXPOSURE



*Editors*

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## THE EFFECT OF ASPECT RATIO ON FIBER COUNTS: A PRELIMINARY STUDY

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The "Naturally Occurring Inorganic Fiber Task Group" in ASTM Committee E14 (Occupational Health and Safety) has been developing an ASTM standard for fibers that include asbestos. The method of counting fibers, the NIOSH technique,<sup>1</sup> was determined to have a high degree of variance. This was confirmed at a recent workshop of the National Bureau of Standards. The technique, however, is the best available for the purpose at this time, and has two advantages; it is relatively simple and can be easily learned. If the precision of the method were to be increased, and simultaneously if the "fibers" counted were truly asbestos, then the disadvantages of this relatively simple method would be overcome to a large degree.

The NIOSH technique has adopted the criteria of a 3:1 aspect ratio and  $>5 \mu\text{m}$  in length for identifying and counting of fibers. Specialists in grinding techniques have shown that particulates of 3:1 aspect ratio could be created with some minerals. As well, nonasbestos fibrous materials were known to occur in association with asbestos materials, e.g., nemalite and brucite with chrysotile. Specificity of asbestos fibers is therefore very important.

Electron microscopic studies by the U.S. Bureau of Mines<sup>2</sup> showed that of the nonasbestiform varieties, such as anthophyllite, tremolite and hornblende, 95% produced cleavage fragments with an aspect ratio smaller than 10:1 and 70% smaller than 3:1. On the other hand, the majority of commercially milled chrysotile asbestos had an aspect ratio greater than 10:1. This would suggest that increasing the aspect ratio to  $>3:1$  could significantly improve the discrimination between true fibers and fibrous particulates for counting purposes.

A study to observe the effect of increasing the aspect ratio was suggested. It was hoped that this increase would allow greater discrimination between true fibers and fibrous particulates.

A round robin series was begun to test this hypothesis. Objectives of the initial series were to indicate problem areas and also to point the way to a more refined round robin series that would be statistically designed to allow for an analysis of variance. A parallel study of fiber count and identification on the same samples was included in the initial series. Two government, three research, and six industrial laboratories participated in the study.

### COUNTING CRITERIA AND EXPERIMENTAL METHOD

The technique for counting generally followed the NIOSH method using a membrane filter. Two samples from each of six plants were obtained on membrane