American Industrial Hygiene Association Journal

Volume 29 MAY-JUNE, 1968 Number 3

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION JOURNAL, published bi-monthly by the American Industrial Hygiene Association. Dohrman H. Byers, *Editor in chief;* Richard F. Scherberger, *Editorial Manager;* James O. Pierce, II, Allen E. Dooley, Thomas T. Mercer, Bruce A. Hertig, and John W. Clayton, Jr., *Associate Editors.* Editorial offices, 1014 Broadway, Cincinnati, Ohio 45202. George D. Clayton, Publications Manager. Business office, 14125 Prevost, Detroit, Michigan 48227. The subscription price is $15 per year in U.S.A., and $16 elsewhere. Single copies, when available, may be purchased from the business office at $3 per copy. Library of Congress Catalogue No. 57-3191.

Second class postage paid at St. Paul, Minnesota

Printed for the American Industrial Hygiene Association by
THE BRUCE PUBLISHING COMPANY, SAINT PAUL, MINNESOTA, 55114

as 2500 B.C. or 4,500 years ago people in Finland knew how to add fine asbestos fiber to raw material for pottery. The technical significance of this discovery is obvious. In the same way that asbestos is now used to improve tensile strength (in the armoring of cement products, for example) so it was once used to strengthen the sides of lightly fired pottery. When the material had been strengthened, the sides of the vessels could be made thinner. In this way cooking utensils were produced which were not only lighter in weight but in which food could also be cooked more quickly. This surprisingly mature technical invention found also a practical adaptation which commands respect for the economic instincts of those forefathers whom we often regard as very primitive people. Asbestos pottery was not limited to being a provincial specialty of eastern Finland; it spread over a wide area of Finland, Scandinavia, and Russia. The asbestos pottery as found in Finland and in neighboring countries is unique—nowhere else have discoveries of that kind been made!

This use of asbestos also illustrates that exposure of man to occupational asbestos in handicrafts has at least a 4,500-year-old history in Finland as well as the non-occupational exposures in asbestos areas. But only since 1918 have we had a modern industrial exposure of workers in quarry, mill, and factories. Our eastern neighbor, Russia, started the production of asbestos as early as 1712 during the reign of Peter the Great. Their production at present is already approximately two million tons per year, half the total of world production per year and twice as much as the United States annually uses.

Finnish Asbestos

The present production in Finland is only 11,000 metric tons per year of anthophyllite asbestos. The asbestos dust in the quarry and mill mineralogically contains:

Anthophyllite	30-75%
Talc	20-60%
Chlorite	3-13%

The theoretical chemical composition is $(Mg, Fe^{2+})_7\ [(OH)_2\ (Si_4O_{11})_2]$. There are small amounts, perhaps smaller than in Canadian asbestos, of some metals such as Ni, Cr, Co, which might have some cancerogenic interest.

Levels of Exposure to Asbestos Dust

Unfortunately the exposure levels at plants have been systematically measured only during recent years. Twenty years, ago, before the management of the quarry and mill changed, the dustiness was, especially in the mill, rather great. One could only see a few meters ahead. The level of dust was surely many times higher than what our threshold limits indicate it should be. This great exposure reflects in the frequency and severity of our asbestosis cases, which will be presented later.

The present situation of dustiness will be reflected in the morbidity of the next ten to twenty years. In the entire asbestos industry approximately 225 different jobs have been examined. In three-fourths of them the level of dust is under the threshold limits, but it is higher in the remaining one-fourth.

We have used: (a) gravimetric samples taken with electrostatic precipitators (MSA) and/or with membrane filter field monitors (Millipore Filter Corp., Type AA), and (b) breathing zone samples taken with an impinger (MSA) for particle counting and sizing under the microscope. X-ray diffraction methods are used also.

In the mill and quarry the total quantity of dust varies from 7.5 to 100 mg/m^3. In other working places the level of dust varies from 0.3 to 10.6 mg/m^3 or 11 to 2,400 particles/cm^3. Only 1% to 5.4% of the total dust (impinger-method) has been fibrous particles, *i.e.*, 5 μ in length, the length being three to four times the width. In this connection I would like to mention that in eastern Europe (the Soviet Union, East Germany) the threshold limits are somewhat lower than the western ones: 2 mg/m^3 or 100 to 150 particles/cm^3.

The level of industrial hygiene in Finland is not yet satisfactory, and unfortunately we must expect still more asbestosis cases.

Medical Findings

The first medical survey in our asbestos industry was made in 1946 by C. Wegelius.