

1. Nine per cent of 869 diatomite workers showed changes consistent with a diagnosis of pneumoconiosis, while 9.3 per cent had chest films with doubtful changes.

2. When individuals with previous dust exposures or missing occupational histories were excluded from the positive and doubtful groups, presumptive diagnoses of diatomite pneumoconiosis were made on 8.3 per cent of the employees examined, and diagnoses of borderline or doubtful stages on 6.9 per cent.

3. Of 286 employees with experience of five years or over in the diatomite industry, 22 per cent were diagnosed as positive.

4. The prevalence of abnormal chest films was particularly high in employees who had worked for over five years in the mills, about half of whom had a positive diagnosis.

5. Exposures in the quarries were less hazardous, only one of 25 employees with more than five years of exposure had a pneumoconiosis diagnosis. No quarry employees showed confluent changes.

6. Symptoms of respiratory distress or dysfunction correlated poorly with the x-ray changes, except with confluent lesions.

7. Workers with massive confluent lesions showed reduced pulmonary ventilatory function, but those with only linear or nodular changes showed no consistent pattern of disturbed function by these tests.

8. No evidence was obtained to indicate that tuberculosis, histoplasmosis, or coccidioidomycosis are related to either the linear-nodular or confluent lung changes in employees studied. Clinically active tuberculosis was not found in any workers with confluent x-ray changes. It should be noted that Smart and Anderson⁸⁷ had found nine active cases in these groups several years earlier, but these were not limited to the confluent cases.

In regard to environmental control, it was agreed after all data had been correlated that the maximal allowable concentration for crude or amorphous diatomite could safely be placed at 20 million particles per cubic foot, but that atmospheric concentrations for cristobalite-containing dust should be kept under 5 million particles per cubic foot of air. It was recommended that preplacement and periodic medical observations continue, including chest x-ray films and lung function studies.

In the writer's opinion, this was one of the most complete and conclusive occupational disease surveys made by the United States Public Health Service thus far. The suggested x-ray classification is an unusually realistic one and warrants study for its possible application to other dust diseases of the lungs.

E. COAL WORKERS' PNEUMOCONIOSIS (ANTHRACOSILICOSIS; ANTHRACOSIS)

The lung changes associated with coal mining vary markedly owing to the great differences in amount of quartz dust to which coal miners are exposed along

with the coal dust. At one extreme are the advanced cases of anthracosilicosis of the hard coal miners who have had high-grade quartz-dust exposure.⁸⁹ At the other extreme are the minimal micronodular x-ray changes in coal trimmers (ship loaders) attributed to pure coal-dust exposure (less than 1 per cent silica).¹⁰⁰ Practically all hard or anthracite coal lies between quartz veins, as does some soft or bituminous coal also. Most soft coal mines also have had another source of silica-dust exposure: the sand used on the rails to improve the traction of the mine locomotives. In general, it may be stated, however, that soft coal miners have had considerably less free silica exposure than have hard coal miners and many have very little, especially the sorters and loaders who do not work underground.

In the past, coal dust itself generally was thought to be innocuous. As a matter of fact, it was considered by many to have beneficial properties, in that it tended to prevent tuberculosis. However, after World War I, the increasing use of chest x-ray films revealed roentgen abnormalities in the South Wales soft coal miners that in many cases differed from the characteristic silicosis pattern. The term "reticulation" began to be used for the fine lacelike pattern seen in so many miners and trimmers. Compensation for silicosis in coal miners, under the Workmen's Compensation Act, was first granted in Britain in 1931. During World War II there was a tremendous increase in cases certified for compensation, particularly since the Act was revised in 1943 to include a disabling form of pneumoconiosis, which was not recognizable as silicosis.

In 1938 the Industrial Pulmonary Committee of the Medical Research Council began its investigations in South Wales to determine the nature of the lung disease found in coal miners. An x-ray survey was carried out in sixteen mines by Hart and Aslett,¹⁰¹ and pulmonary changes were found that resembled silicosis by x-ray, but differed from it in many ways. It was recognized from this study that many coal miners had advanced and disabling disease, and that a serious hazard existed, especially in the anthracite mines, but to some extent also in the bituminous mines. A special Pneumoconiosis Research Unit was set up in 1945 in Cardiff to make more detailed studies of the epidemiology of the disease and to try to find "safe dust levels" to which men may be exposed without developing serious pneumoconiosis.

It was realized early by Fletcher¹⁰² and his staff at the Unit that there was little agreement on methods of x-ray classification of the pneumoconioses, and that little progress toward a better understanding of the dust diseases could be expected until a system of classification was devised that would be acceptable internationally. Such a classification was set up and has been widely accepted

⁸⁹ J. Gough, Pneumoconiosis of coal workers in Wales, *Occupational Med.*, 4, 86-97 (1947).

¹⁰⁰ P. A. Hart and E. A. Aslett, Chronic pulmonary disease in South Wales coal miners: A medical studies: B. Medical survey, *Special Rept. Series 243*, Med. Research Council, London: H. M. S. O., 1942.

¹⁰² C. M. Fletcher, Classification of roentgenograms in pneumoconiosis, *Arch. Ind. Hyg. and Occupational Med.*, 11, 17 (1955).

⁸⁷ Anthracosilicosis among hard coal miners, *U. S. Pub. Health Bull.* No. 221, 1935.