PLAINTIFF'S EXHIBIT

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Pleural Plaques and Cigarette Smoking in Asbestos Workers

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In a survey of 45 men aged 40 or over who had worked five years or more in an asbestos manufacturing plant, the prevalence of pleural plaques was studied with respect to age, duration of asbestos exposure, estimated cumulative asbestos dose, and smoking habit. Plaques were found in 38 to 53% of the men, depending on the interpretation of the chest film reader. Cigarette habit appeared to be the most important factor; the prevalence was lowest in nonsmokers, intermediate in current smokers, and particularly high in exsmokers. There was some confounding of this relationship by estimated cumulative asbestos dose but such confounding did not seem to be sufficient to explain fully the relationship between the prevalence of plaques and smoking habit. Both factors must be considered in studies of the risk of pleural plaques in asbestos workers.

In a previous report Weiss and Theodos[1] described the results of a 1975 chest x-ray survey in two asbestos products manufacturing plants. Plant A had used only chrysotile asbestos throughout its history while Plant B had used both chrysotile and amosite from 1950 to 1964 but only chrysotile before and after this period. The prevalences of both pulmonary fibrosis and pleural disease were higher in Plant B. Cigarette smoking was a factor in the prevalence of pulmonary fibrosis and perhaps also of pleural disease at Plant B.

Pleural thickening was found in only one of 10 nonsmokers and in 42% of the 38 current and exsmokers of cigarettes at Plant B. This difference was not quite statistically significant ($p = 0.074$ by Fisher's exact test), but it has stimulated further investigation of the problem by the authors. This paper analyzes the results of the 1977 and 1978 surveys with respect to the relationships between the prevalence of pleural plaques in men aged 40 or over and the factors of age, duration of asbestos exposure, estimated cumulative dose of asbestos, and cigarette habit.

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Method

A detailed description of the products and processes in Plant B was provided in the previous report,[1] a summary of which follows.

In 1935 this facility was manufacturing asbestos textiles, compressed sheet packing, paper, millboard, and molded thermal insulations. Textiles were made of chrysotile asbestos in a dry, dusty process; this operation was discontinued in 1951. Sheet packing was also made only of chrysotile and, because of milling the asbestos, the operation was dustier before the 1950s than it was in later years. Paper and millboard operations were very dusty prior to 1960, but after 1960 process improvements led to better conditions. Molded insulation was made of chrysotile from 1935 to 1950; thereafter, amosite, which had to be milled dry, was added to the chrysotile until manufacture of these products was discontinued in 1964. In 1948 the plant began to produce corrugated and monolithic asbestos cement boards made of chrysotile and portland cement.

Asbestos fiber counts were not made until 1972 but have been generally under 2/cm³ in recent years. Because of the lack of counts prior to 1972, the cumulative asbestos exposure (dose) for each employee in this study had to be estimated on a semiquantitative basis. A job index was devised at a meeting of the industrial hygienist (R.L.) with three foremen who had begun work at this plant between 1941 and 1947. Each job was rated as to degree of asbestos exposure on a scale of 1 to 3 (largest exposure). To take into account the change in conditions over time, job ratings were multiplied by three during the period prior to 1951, by two during the period 1951 through 1963, and by one from 1964 on. The employment record of each man was reviewed and an index of cumulative asbestos exposure was computed by multiplying the job rating, the period rating, and the number of years worked at each job during each period. The maximum index recorded in this group of men was 159.

Pleural plaques were noted only in men aged 40 or over. There were 69 such employees eligible for examination between 1977 and 1978, and 56 (81%) had 110 kv 36X 43 cm postero-anterior chest films during one or both of

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