PLAINTIFF'S EXHIBIT

UC-2909

In the research that led to these data, it was reported that peak exposures could be extremely high. It was not uncommon, for example, for two-to-five-minute concentrations of asbestos to range between 50 f/ml and 100 f/ml during the mixing of cement. This mixing, however, would consume only a few minutes' time and be done perhaps once an hour. Thus, exposures measured during that hour, including the mixing, would seldom average more than 5 f/ml. Similar experiences were subsequently reported by Cooper,[30] at Lyon, who stated, "Peak concentrations may be high for brief periods, while time-weighted averages are often deceptively low."

We have direct information on asbestos-fiber concentrations, measured by the currently prescribed analysis procedures during recent years only. Insulation materials have changed from earlier years. Fibrous glass has found extensive use, but work with cork is seldom seen today. Moreover, changes in the asbestos composition of insulation products have taken place. Pipe covering and insulation block may have had twice the asbestos content in past years as they have today. During this period, however, work practices were virtually identical to those of past years, and during the period of these measurements, few controls of significance were in use. Thus, dust concentrations measured under these conditions have relevance for the estimate of levels of past years. Considering the possible doubling of asbestos content of insulation materials, and considering that workers may have used asbestos materials more often in the past than now, the data from these three studies would suggest that the insulators' average exposures in the United States during past years could have ranged from 10 to 15 f/ml.

The only early research of note on asbestos-dust concentrations in past insulation work is the 1945 study of Fleischer and his colleagues,[31] who reported asbestos dust levels during insulation application in four United States shipyards. In this study, dust concentrations were assessed with use of a konimeter (an instrument widely used at that time, but no longer employed), and both total dust and fiber levels were recorded. The study is difficult to evaluate, since the average dust levels reported in different shipyards varied by nearly 100 times. In two yards, average dust concentrations of about 1 f/ml were found; in a third yard, 90 f/ml; and in the fourth, 35 f/ml. During 1965 and 1966, the fourth yard was resurveyed by personnel of the Department of Industrial Hygiene, Harvard School of Public Health.[32] In the resurvey, a time-weighted average exposure of about 8 f/ml was determined.

These fiber counts represent all fibers visible in the field of view of a konimeter. Fibers perhaps as short as 1.5 μ would be enumerated. Supplementary data[33] on the size distribution of amosite aerosols in shipyards suggest that this overestimates the number of fibers longer than 5 μ by a factor of two. If we take this factor into account, and simply average the data from the four shipyards studied by Fleischer in 1945, an estimate of from 15 to 20 f/ml is obtained for average asbestos concentrations in insulation work during this period. Similar considerations would yield a value of 4 f/ml for the shipyard survey by Murphy in 1965. It must be emphasized, however, that averages are highly subjective and depend strongly on the vagaries of the particular work practices selected for sampling and the conditions present at that time.

These summaries of asbestos concentrations from 1945 through 1971 by five different research groups in two countries are summarized in TABLE 7. The estimate of from 10 to 15 f/ml for past insulators' average asbestos exposures

A23922

UCC 016012