

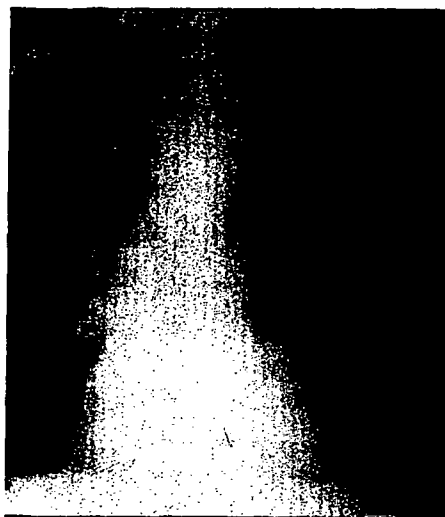


Fig. 1 S.P. & J.M. Extensive bilateral pleural calcification in former shipyard workers. Asymptomatic. No part of pleura is immunecostal; diaphragmatic, mediastinal, pericardial. Bilateral calcification of this sort rarely seen except with prior asbestos exposure.

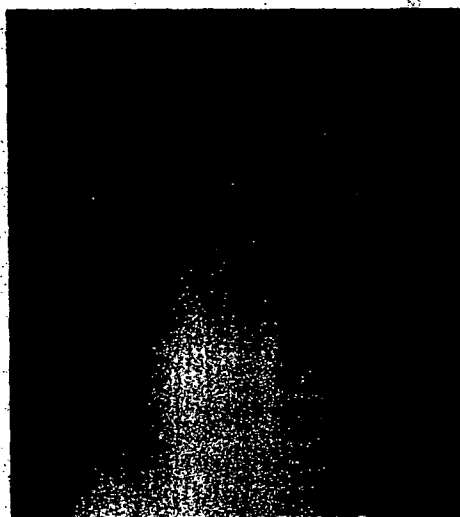


Fig. 2 J.B. Both fibrotic plaques and pleural calcification in x-ray of former shipyard worker. Asymptomatic. Their presence is merely evidence of prior asbestos exposure and not indicative that mesothelioma will necessarily follow.

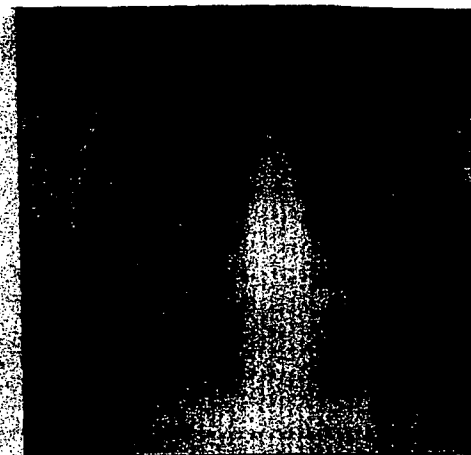


Fig. 3 J.W. Age 49, 1975. Truck driver until 1960, when he became "pipe coverer" in a shipyard. X-ray, fifteen years later, shows reticular (irregular) opacities of moderate profusion (2/2 in the ILO U/C Classification). Some shortness of breath on exertion. Note: infiltrate in lower lung fields, upper lobes clear. This is common.

Even wives and children of the employed workers showed evidence of asbestos disease, indicating that exposure of lesser intensity might be seriously hazardous as well.¹⁷

RECENT SURVEY OF SHIPYARD WORKERS, GROTON, CONNECTICUT

Cases of asbestos-associated disease among workers employed in a shipyard in Groton, in 1974-1975, were brought to our attention. Against the background of what was already known concerning the potential for asbestos disease in shipyards, it appeared useful to obtain information concerning whether there was the likelihood of a high incidence of such disease or whether the cases seen were isolated, random exceptions.

Lung cancer, mesothelioma, extensive asbestosis and other serious complications of asbestos exposure are late findings. Limited X-ray change (parenchymal, with-

in the lung, or pleural) often precede these serious consequences. While such changes may occur to an extent visible by X-ray without subsequent cancer or disabling asbestosis, their appearance among a group of workers provides evidence of prior significant asbestos exposure. Absence of such X-ray changes is no guarantee that important asbestos exposure has not occurred. Many workers may have had asbestos exposure sufficient to cause death from mesothelioma, for example, without showing X-ray change. Nevertheless, taken as a whole, absence of X-ray change in a group of workers suspected of having been exposed to asbestos provides some evidence that the exposure was limited. On the other hand, the presence of characteristic asbestotic X-ray abnormalities is prima facie evidence that, overall, there was important asbestos exposure in the group.

In light of this, we sought to ascertain whether there was significant prevalence of asbestotic X-ray abnormalities among Groton shipyard workers. Examinations

were largely limited to those whose employment had begun 15 or more years before; all were volunteers. A caveat is in order: there is no way of knowing, under these circumstances, whether those who volunteered were necessarily representative of the entire work force, or even of their specific employment category. Altogether, 1,000 men were examined, including 157 boilermakers, 121 pipefitters, 73 insulators, 82 painters, 69 carpenters, 117 welders, 104 electricians, 108 outside machinists, as well as laborers, molders, lead bonders, office workers, draftsmen, guards, and decontamination technicians.

Films were categorized using the International Classification of Radiographs of Pneumoconioses (ILO U/C) (Appendix 1).

Overall, approximately half of the workers examined showed X-ray evidence of pulmonary and pleural changes of the sort regularly seen following direct or indirect occupational exposure to asbestos (pulmonary asbestosis, pleural asbestosis). The findings are outlined in Tables 9 and 10. One or another abnormality was

present in 274 of 636 workers with less than 20 years from onset of exposure (43.1 percent) and among 185 of 364 shipyard workers 20 or more years from onset (50.8 percent). Parenchymal disease was seen in 29.6 percent of the former group and 36.8 percent of the latter. Pleural changes were found in 23.1 percent of the less experienced workers and in 29.7 percent of the men with longer experience. The high prevalence of pleural changes was not unexpected, having been found previously among shipyard workers in Britain and elsewhere.¹⁸

The importance of duration from onset of exposure is clearly seen in Table 10, where it is found that among 303 workers who began work only in 1961 or later, 115 (38.0 percent) had abnormalities on X-ray. In contrast, among 166 workers whose employment began in 1950 or before, 85 (51.2 percent) were abnormal.

No trade was immune to changes. Tables 11 and 12 indicate that this was as true for painters as it was for electricians, for carpenters as for machinists, and for