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Addendum to the Testimony

of

J. P. Leineweber, Ph.D.

House of Representatives
Committee on Education and Labor
Subcommittee on Elementary, Secondary,
and Vocational Education

During my oral testimoney before the House Committee on Labor and Education, I deviated somewhat from the written testimony which had been submitted to the Committee. I felt that this was necessary to clarify certain points which had been made by those who had testified before me. The major points were:

1. Not all asbestos fibers in the environment can be considered to be biologically active.

2. Not every fiber which is inhaled will remain forever entrapped in the lung.

3. Asbestos related diseases have been shown to follow a dose-response.

4. Concentrations of asbestos fiber as found in the general environment and inside public buildings are below those occupational and para-occupational concentrations which elicit a biological response.

I believe that a consideration of these main points, which have been thoroughly documented in the scientific literature, should serve to reduce the understandable inordinate concern which has been expressed by certain individuals with limited information. The following are more detailed explanations of these points including the pertinent references to the articles in the scientific and medical literature.

Not All Fibers Are Biologically Active

A considerable amount of research has been carried out in recognized laboratories on the toxicological properties of asbestos and other fibers. By far the most thorough, and pehaps the most significant, is the work which has been done by Dr. Merle S. Stanton of the National Cancer Institute. He has studied the ability of a variety of fibrous materials to induce cancer in rats in the laboratory. His experimental

technique involves implantation in the pleural cavity which is not at all representative of natural inhalation. Because of its artificial nature it can only be used to screen materials for potential biological activity. He has found that all fibers, regardless of their chemical composition, can be biologically active provided they meet two requirements; (a) they are durable in the biological system and (b) they fall within certain critical size limits. These size limitations, as defined by Dr. Stanton's latest work, are defined as fibers less than 1.5 micrometers in diameter and longer than 8-10 micrometers in length as the most biologically active.

For your information, I am enclosing copies of two of Dr. Stanton's publications which describe his work in detail. The first (Exhibit 1) was a paper on asbestos presented at a meeting of the International Agency for Research on Cancer in Lyon, France in October of 1972. The second (Exhibit 2) was published in the March 1977 issue of the Journal of the National Cancer Institute. Although this paper refers strictly to the carcinogenicity of fibrous glass, it is pertinent in that it represents a most recent work refining the influence of fiber dimensions

Several other studies have been published by other researchers which essentially confirm this work. These publications include those by George W. Wright, M.D., consultant; William E. Smith, M.D., Director of the Health Research Institute, Fairley-Dickenson University, Madison, New Jersey; and J. C. Wagner, M.D., Pneumoconiosis Unit, Llandough Hospital, Penarth, Wales.

An additional point in this regard is the fact that airborne fibers found in the general environment and in the air in commercial buildings are generaly extremely small, i.e. significantly less than 10 micrometers in length. Thus, the vast majority of the small number of fibers which would be inhaled by the occupants of the building containing asbestos spray coatings cannot be considered in the biologically active size range. This is one reason why I have objected strongly to the reporting of fiber concentrations simply in terms of nanograms per cubic meter. This type of reporting tells nothing about the size range of the fibers encountered and, therefore, eliminates a critical piece of information that is necessary to evaluate the risk. Most analysts and biological researchers now agree that it is important to report the size distribution as well as the total mass of fibers.

Not All Fibers Remain Forever in the Lung

Several of the witnesses at the hearings attempted to leave the impression that once an asbestos fiber is inhaled, it remains

forever lodged in the lung where it can do its damage. This is patently false. It is true that asbestos fibers are extremely durable and cannot be dissolved by the fluids present in the lung. It is also true, however, that the human lung has the ability to clear itself of foreign material, a fact which is known by everyone, even remotely associated with the biological sciences. Even if a foreign particle should reach the most distant portions of the lung where the muco-ciliary mechanism cannot operate, there is a good probability that it will be ingested by a mobile cell called a macrophage. This cell can carry its burden out to the bronchi where the other clearance mechanisms can operate. Only those who wish to overdramatize environmental exposure to asbestos fiber choose to ignore this very important defense mechanism of the human body. For a very complete discussion of this subject, I call your attention to a book entitled, "Respiratory Defense Mechanisms, Vol. 2" edited by Joseph D. Brian, et al, published by Marcel Dekker, Inc., New York, New York in 1977.

Asbestos Related Diseases Have Been Shown to Demonstrate A Dose Response Relationship

The petition which was filed by the Environmental Defense Fund requesting immediate action from the Environmental Protection Agency includes the following statement, "... once a qualitative presumption of carcinogenicity has been established for a substance, any exposure to that substance can be considered to be attended by risk when considering any given population. No exception to this point has yet been demonstrated...". This statement summarizes succinctly the feelings of those who would eliminate all possible exposure to asbestos fiber regardless of its intensity.

There is ample evidence at the present time to demonstrate that asbestos related diseases do indeed exhibit a well-defined dose response effect. This effect would be manifested in two ways. At lower doses, a smaller group of the exposed population will be affected and the latency period will be longer. The latency period is defined as the time between the onset of exposure and appearance of disease.

In support of this dose response hypothesis, I have attached copies of two papers. The first, which is attached as Exhibit 3, is by J. C. McDonald, et al, who studied a large population of people who have been employed in the Quebec asbestos mining industry. In this study, an attempt was made to quantify the exposure for each of the workers and relate it to the incidence of various diseases. They found that the overall mortality was not significantly different from the general population for those exposed to low dust levels, but was significantly higher (20%) for the group which was exposed to the higher concentrations of asbestos fiber.

The next paper, which is attached as Exhibit 4, is by F. Whitwell, et al, from the Department of Pathology, Broadgreen Hospital, Liverpool, England. In this study, the amount of asbestos fiber found in lung tissue was correlated with the incidence of mesothelioma. There is a clear cut conclusion that (a) there is a definite dose relationship between asbestos exposure and mesothelioma formation, and (b) levels of asbestos exposure that do not contribute to the formation of asbestosis are not implicated in the formation of lung cancer.

The above citations are representative of several which establish beyond a reasonable doubt that all diseases normally associated with excessive asbestos exposure, i.e. asbestosis and mesothelioma, are subject to a dose response relationship. Bronchogenic cancer, which is very intimately associated with cigarette smoking, is also subject to a dose response relationship.

Environmental Concentrations of Asbestos Fiber Are Below Those Which Elicit a Response

In the previous section, evidence was cited to show that asbestos related diseases are subject to a dose response relationship. As the concentration of fiber decreases, the incidence disease will decrease. There has been considerable debate in recent years as to whether or not a level exists below which there will be no incidence of disease. There is an increasing body of evidence that, in a very practical sense, such a level does exist. In the attached paper by Whitwell, et al, (Exhibit 4), it is quite clearly indicated that those persons with low lung burdens of asbestos fiber are not at risk for development of mesothelioma.

At the June 1978 meeting of the New York Academy of Sciences, Dr. Hammond and Dr. Selikoff presented a paper which reviewed the mortality experiences of residents in the neighborhood of an asbestos plant. This paper, which is attached as Exhibit 5, show quite clearly that the people who lived in the immediate vicinity of this plant but were not employed there, were at no greater risk for asbestos related diseases than a similar group who lived several miles from the plant. It is most interesting to note that the first attempts to clean this particular dirty plant were to blow the asbestos dust around the neighborhood with no filtration. Samples taken in the attics of houses in the vicinity of the plant indicate that the dust concentrations must have been relatively high, very likely higher than the concentrations experienced in buildings where asbestos spray coatings are in use.

I feel that it is extremely important that all concerned should be aware of the information that is discussed in the preceeding paragraphs. Unfortunately, all too much of the discussion regarding the situation has ignored the existence of this body of literature. What has been done is to take the information available from high level occupational exposures and from relatively high level para-occupational exposures and extrapolate, in an unwarranted manner, to the conditions which exist in the environmental situation. The only logic for this is the belief that the lay public is incapable of assimilating scientific or technical data. I, however, believe that the opposite is true. If given all of the information in an objective manner, the educated layman is quite capable of assimilating the facts and reaching a logical conclusion. I further believe that if all of us who are concerned with this particular problem could be given the opportunity to discuss all of the ramifications in the proper environment, it would be a simple matter to reach a logical conclusion regarding the facts and also to determine a rational course of action.

JFL 2/14/79