CCB C 1

March 11, 1976



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Subject: Notes on Environmental Asbestos Meeting with New York Transit Authority, New York Air Resources, and Representatives from Environmental Sciences Laboratory at Mt. Sinai Hospital

On Thursday, 2/26/76, I had occasion to attend a meeting with representatives of the above organizations to review plans for subway air sampling for asbestos. Although a portion of the meeting was devoted to comments and questions related to air sampling procedures and the need for actual physical testing of the RPG brake shoe, there were some formal and informal comments made which are of direct interest to the Friction Products Group.

The Environmental Sciences Laboratory at Mt. Sinai Hospital headed by Dr. Selikoff has for a number of years been accumulating data on asbestos levels in the environment, first as related to occupational exposures and more recently as they relate to total environmental exposure. Their most well known recent study was the determination of exposures during brake shoe relining activities in repair shops. However, the occupational limit of 5 fibers per cubic centimeter greater than 5 microns in size was used as the index of exposure. Submicron asbestos concentrations were not publicized. This is now being followed by an urban street level study containing submicron fiber data which will be published in Environmental Technology next month.

In a side conversation with Mt. Sinai representatives, the reason for their strong interest in submicron brake shoe emissions became apparent. With the integration of some final data into their research, they feel that they will be able to demonstrate conclusively the carcinogenic response of the body to asbestos fibers, particularly those in the submicron and Angstrom (10^{-7} millimeters) ranges. The research developed because of the fact that asbestos fibers, being relatively indestructible, will fracture and separate into uncountable numbers of minute fibrils in the environment, continuously multipyling due to the increasing contribution from man-made sources. The fibers have minimal terminal velocity because

of their size and aerodynamic characteristics, and remain suspended indefinitely. The Mt. Sinai representatives stated that they have regularly been finding street level concentrations of from 4 to 100 fibers per cubic centimeter. As a comparison, the tentative ambient air quality criteria proposed by the EPA is .04 fibers per cubic centimeter. They were emphatic in their assertions that braking systems which they have investigated to date do not readily convert all the asbestos through dehydroxylation to forsterite. They claim that micron and submicron particles are readily detectable both under laboratory and street conditions. This would suggest braking surface temperatures of around 500°C or below. This is counter to previous research which has revealed light braking temperatures of 800-900° C and heavy braking temperatures of 1700-1800°C.

Although I have not yet been able to confirm their assertion, it appears that the Federal Government has extended a large grant to Mt. Sinai with which to complete their causative study of cancer induction by asbestos. With the grant, Mt. Sinai has recruited researchers from a wide variety of disciplines to concentrate their efforts to this end. This not only includes medical research teams, but environmentalists as well to document the pervasiveness of the problem.

They are also very aware of the problems associated with the use of baghouses for asbestos collection purposes. The statement was made that they have observed high levels of submicron particles in the vicinity of asbestos manufacturing plants utilizing these systems. The explanation is as follows.

When considering baghouse efficiency on a weight basis, it is relatively easy to get high efficiency with particles whose size is in excess of 5 microns. However, efficiency falls off with a decrease in particle size, and apparent high efficiencies are much less meaningful in terms of numbers of fibers. It can be assumed that 10^3 average fibers of asbestos weigh approximately 1 nanogram. If 1 gram of asbestos material approaches a baghouse filter rated even as high as 99.999% efficiency, then the quantity passing through will be 0.00001 grams or 10^4 nanograms. And since 1 nanogram is approximately equal to 10^3 fibers, then a <u>total</u> of 10^7 (10 million) fibers will pass through the filter for every 1 gram

of material impinging upon it. Thus quoting in terms of mass efficiency has no real meaning. It bears no obvious relation to the numbers of fibers being emitted.

The view held by the Federal occupational health authorities to date has been that the medical evidence as to the size of fiber responsible for adverse health effects is not positive nor is the question of whether fibrils or fibers are most hazardous, and that it would be premature to impose inflexible or overly rigid regulations. If and when the Mt. Sinai research establishes the causation of cancer induction by asbestos, this view will change, particularly since the incidence of lung cancer in the general population has sharply increased over the past several years. The ramifications are readily apparent. As long as the problem has remained one of limited occupational and ancillary exposure, the stress has been placed on containment and protection of exposed employees. If the problem becomes one of national or worldwide proportions, affecting the population at large, demands for a ban on the use of asbestos can be anticipated. This would apply particularly to the brake shoe industry which would be hard pressed to find a suitable material replacement within an acceptable time limit. There is little likelihood that complete collection of brake shoe emissions at the point of release would be practical or acceptable, although this possibility was raised during the meeting.

One final point should be made. The present 5 fiber/M^3 occupational exposure limit (2 fibers/M^3 as of July, 1976) was established as an index to contain exposure not only to fibers above 5 microns in size, but those below that size as well. An unexpected and controversial proposal to reduce the limit to 0.5 fibers per cubic centimeter was recently published by OSHA. Although conjecture at this point, it is possible that this proposed legislation was not based on inadequately documented and poorly defined British studies set forth in the document, but was based on prior knowledge of the potential disposition of present research efforts.

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