ENGINEERING AND
MANUFACTURING STAFF

November 19, 1971

Intra Company

To: Mr. J. U. Damian
Mr. S. H. Simpson

cc: Mr. W. M. Brehob
Mr. D. A. Jensen
Mr. H. L. Misch
Mr. R. C. Ronzi
Mr. G. W. Schwartz

Subject: Fibrous Asbestos Emissions

On October 19, 1971, the State of Illinois held a public hearing concerning the banning of asbestos in brake-linings beginning with the 1975 model year. At this hearing, the State of Illinois requested a statement from Ford Motor Company regarding the banning of asbestos. Mr. Damian is in the process of preparing a statement for filing on November 22, 1971. The purpose of this letter is to provide a summary of available information concerning asbestos, for background or reference use, covering the following topics:

1. The effects of asbestos on health
2. Sources of ambient fibrous asbestos
3. Automotive uses versus total asbestos consumption
4. Ford studies to determine asbestos emission rates
5. Alternatives for asbestos in brake-linings

1. Health Effects

Inhalation of fibrous asbestos has been considered the source of asbestosis and mesothelioma (rare form of cancer frequently observed in asbestos workers). Non-fibrous asbestos, on the other hand, is believed to be harmless to human health. The mechanism by which fibrous asbestos promotes cancer formation has not been determined, however, it is conjectured that synergistic effect of asbestos with various pollutant (such as cigarette smoke) is the major cause. Asbestos induced cancer is limited to those who work in asbestos mines or industries which produces asbestos products or those who live in the vicinity of asbestos mines and asbestos processing industries (e.g. industrial processes in which workers actually come in contact with fibrous asbestos). A high prevalence of asbestosis has also been observed among consturction workers who specialize in spray insulation of buildings. The contraction of this type of cancer usually results from a 15-30 year of exposure and the frequency of cancer occurrence is related to the dosage of fibrous asbestos which is many orders of magnitude higher than that observed in ambient background air.

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2. Sources

The fibrous asbestos content of Detroit's ambient air is estimated to be about 1×10^{-8} grams/m^3. A recent literature review by the Public Health Service states that the bulk of airborne asbestos originates from natural sources such as soil dust and locally from asbestos mines and processing plants. Limited amounts of fibrous asbestos are also emitted from the use of asbestos cement used often as spray building insulation. According to another review by the National Research Council, automotive contribution from brake-linings is believed to be negligible because asbestos fibers are destroyed by the intense heat created by the braking process (about 1400°F) to a non-fibrous state.

3. Uses

The total U. S. asbestos production in 1965 was 8×10^5 tons. Cement, floor tile, paper, and other building construction materials accounted for about 90% of asbestos consumption. Friction materials - - primarily brake linings - - accounted for 2.8×10^4 tons or 3.5% of the total asbestos production.

4. Brake Lining Emission Rates

Attempts have been made at Ford to determine the fibrous asbestos emission rates from a laboratory brake-lining test stand. An elaborate electron microscope technique is used to identify the tiny fibers (about 1×10^{-6} inches diameter). Our preliminary experiments indicate that there is very little fibrous asbestos present in brake dust. The fibers are less than 0.5 u in length and most of them are converted to a non-fibrous state by the process of braking. Our emission rate estimate is very close to the background ambient concentration levels.

5. Brake Lining Alternate Materials

Alternatives for asbestos based linings are few and all have some disadvantages in terms of either performance, cost, or both. Ford has been using cermet linings (sintered metal) for heavy duty trucks and semi-met (metal strand and carbon mixture) for police cars, both containing no asbestos. Beginning with the 1971 model year , Ford has been supplying optional semi-met front-end brakes for police car fleets. Semi-met linings are superior in performance to conventional brake-linings (about equivalent in terms of cold-wear and noise), but the cost penalty is severe ($1.25/car just for front-end brakes). Ford is experimenting with semi-met linings for rear wheels. However, there are some cold-stopping and wear difficulties associated with rear wheel semi-met linings in their present form and may necessitate major redesigning of the rear wheel brake systems.

J. S. Ninomiya

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