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RESEARCH & DEVELOPMENT
LABORATORY

PLAINTIFF'S
EXHIBIT
FD-354

September 29, 1980

John L. McDermott, Esq.
McDermott and McGre
64 Main Street
Millburn, New Jersey 07041

Re: Raybestos-Manhattan, Inc. - Asbestos Litigation

Gentlemen:

You have asked that I review the function of brake lining and the contribution of asbestos to that function. You have also asked whether there have, over the years, been reasonable substitutes for asbestos in brake linings. In addition, you have asked me to identify the type of asbestos used by Raybestos-Manhattan in its brake products.

Simply stated, the function of brakes is to stop the vehicle or machine. The brake lining, a major component of the brakes, performs that function by converting the energy of momentum into heat and dissipating that heat into the atmosphere. The key is heat because the power input under emergency conditions can lead to serious safety problems unless the brakes are properly designed and in good working order. While brakes are unseen by most drivers, their function is critical for both commercial and personal vehicles. This reliance on brakes to perform safely even under conditions of severe thermal and mechanical stress requires extensive development effort and thorough testing before the products are released to production.

This critical safety related function of brake lining has lead the federal government and several states to establish rigid standards for brake effectiveness on cars and trucks. In addition to the requirements for strength and heat resistance, brake lining must possess several other characteristics to perform effectively. The hardness must be carefully controlled so that the lining material will wear and regenerate the surface during use. The rate of wear must be sufficiently low that the linings exhibit good durability. The material must have adequate friction level to stop the vehicle and this friction must be stable under a wide range of conditions. In addition, the material must be formulated in such a manner that it will be quiet and not wear or score the drum.

Most brake lining materials consist of a mixture of a fibrous reinforcement, a variety of friction/wear/noise modifying agents and a heat resistant binder to hold the composite together. The raw materials are mixed together and molded to a final shape under heat and pressure. Finally, the part is baked at high temperature to develop optimum strength and heat resistance. The importance of strength and heat

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