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Estimation of Quantity and Form of Asbestos Consumed During Brake Lining Wear

1. It is estimated that no more than about 30 g of crysotile asbestos per car per year are consumed as a result of brake lining wear. This is based on the following assumptions:

Weight of one full-size-car secondary lining: ~200 g
Primary linings may be slightly lighter.
Disc pads are about half as heavy. Approximate upper limit (drum brakes front and rear): 8 × 200 = 1600 g of lining per car set. Assuming that the asbestos content of the average lining is 60%, that the average set of linings lasts 2½ years, and that 80% of the thickness is used, then $\frac{0.8 \times 0.6 \times 1600}{2.5}$ = 307 g of asbestos per car per year would be consumed.

2. There is little, if any, asbestos fiber in lining wear debris. The asbestos is mostly in the form of non-fibrous decomposition products. Two articles are attached which report on work which demonstrates this. The study at the National Center for Urban and Industrial Health is more thorough. In addition, our own X-ray diffraction analyses of "drum dust" have not indicated the presence of undecomposed crysotile asbestos. If, based on the NCUIH article, it is assumed that as much as 1% of the inorganic 70% of a typical lining ends up as fibrous wear

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debris (since up to 1% of the debris may be fibrous), then at most $\frac{0.7 \times 0.8 \times 1600 \times 0.01}{2.5} = 3.6$ g of asbestos fiber per car per year would be expected in the wear debris

3. Crycotile asbestos fiber has been implicated as a carcinogen. I know of no studies on the carcinogenic properties of asbestos decomposition products. However, it seems to me that the non-fibrous decomposition products would be less tenacious and easier to expel from the lungs if inhaled, and thus would be less likely to be a persistent source of localized irritation.

Roy L Geisler
Dec. 2, 1969.

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