

ESTIMATION OF BRAKE LINING ASBESTOS DILUTION IN URBAN ATMOSPHERE

The concentration of asbestos fiber from the brake lining wear debris is assumed to be the same as was found in the "normal usage" dynamometer test and to be dispersed and have the same residence times as the lead emitted from the engine. Assume an average mileage of 15 MPG from cars which emit 75% of the lead to the atmosphere.

When gasoline averaged 2.52 grams of lead per gallon, the typical lead concentrations in urban atmospheres were about $2 \mu\text{g}/\text{m}^3$ (JAPCA, Sep. 1969, 19, p. 684). Typical U. S. cars wear 202 grams of lining per year and drive 10,000 miles per year. The "normal use" dynamometer tests provided asbestos fiber amounting to 0.0023% (2.3×10^{-5}) of the brake lining worn.

Allowing a factor of ten to provide an upper bound in this determination, the asbestos concentration in urban atmospheres from brake wear should be less than

$$10 (2.3 \times 10^{-5}) \left(\frac{202 \text{ g}}{10,000 \text{ mi}} \right) \left[\frac{2 \mu\text{g Pb}/\text{m}^3 (15 \text{ MPG})}{2.52 \frac{\text{g Pb}}{\text{gal}} (.75)} \right] \text{ or } 0.07 \frac{\text{ng}}{\text{m}^3}$$

Urban atmospheres vary in asbestos fiber concentration from city to city, within a city, and from one time to another. This variation does not correlate with expected automobile brake usage. The concentration has been reported to reach $100 \frac{\text{ng}}{\text{m}^3}$ (2). Thus it appears that the wear of brake lining produces, at most, a small fraction of the asbestos fiber in urban air. This is not surprising when one considers that brake lining wear involves only 1.5% of U. S. asbestos usage and that brake usage converts over 99.95% of this to non-fibrous dust.