ASBESTOS EMISSIONS

PROJECT	AUTHORS	SUMMARY	CONCLUSIONS
Brake & Clutch Emissions Generated During Vehicle Operation. SAE May 14-18,1973	M.G. Jacko-Bendix R.T. Du Charme-Bendix J.H. Somers-EPA	This report outlines the study conducted on disc & drum brakes & clutches utilizing dynamometer testing & actual driving cycles in the Detroit area. On the average greater than 99.7% of the asbestos is converted to fosterite, olivine, polymeric & carbonaceous materials. The contribution to the atmosphere is 3.2% of the total asbestos emissions.	The combined total to brake and clutch friction material worn away annually is 117 million lbs. for brakes & 6.56 million lbs. for clutches. The total debris is 123.6 million lbs. Assuming the asbestos content is a maximum of 6% by wt. the amount of asbestos worn away as friction material debris is approximately 74 million lbs. Observations relating to emission trends were the following: • Asbestos emissions were higher for new friction surfaces and decreased with use. • Drum brakes produced more asbestos emission than the disc brake with the difference decreasing as the friction materials continued in use. • Heavy duty did not necessarily give a higher percent of asbestos; the large amount of debris produced, however, gave a significant rise in asbestos emissions. • For the disc pads there was an increase in asbestos emissions with increased asbestos content. No such trend existed for the drum materials.
Asbestos Emissions from Brake Dynamometer Tests. SAE May 14-18,1973	A.E. Anderson, R.L. Gealer, R.C. McCune and J.W. Sprys- Ford Motor Co.	This report concludes that most of the lining asbestos was found to be converted to a non fibrous material by the high flash temp. of the braking surface. Less than .02% of the lining wear was released as asbestos fibers. The concentration of asbestos fibers in the urban atm. due to brake usage, was estimated at less than $.07 \times 10^{-9} g/m^3$.	Observations: • Interfacial temperatures during braking could be high enough to decompose the chrysotile asbestos into non fibrous thermal degradation products. • Asbestos crudes (large bundles) were calculated to reach their rapid decomposition temperature during normal braking speeds between 18-56 mph. and above. • Local flash temperature and severe mechanical action are major factors in the breakdown of asbestos fibers for brake usage. Examination of lining surfaces revealed the presence of non fibrous magnesium silicate in both crystalline (forsterite) and amorphous phases.
Asbestos Exposure During Brake Lining Maintenance and Repair. Dec. 10, 1975 Project Re-Funded	A.N. Rohl, A.M. Langer, M.S. Wolf, & J. Weisman- Mt. Sinai School of Medicine	The project demonstrated the presence of unaltered fiber & fibrils of chrysotile ranging from 2-15% in brake drum dusts (av. 3-6%).	Shear causes structural strain & substructural fragmentation producing material fatigue which, with binder pyrolysis, can cause lining disintegration at temp. far below those required for chrysotile dehydroxylation (650-680°C). At lower temperature forsterite has been noted to form during prolonged static heating Vehicle Materials Engineering December 1977

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