

readily conceded that counting only fibers longer than 5 μm enumerates just a fraction of the total number of fibers present, there is incomplete awareness that the fraction counted is highly variable, depending upon the fiber type, the process or products used, and even the past history of the asbestos material (e.g., old versus new insulation material), among other factors. For example, the fraction of chrysotile fibers longer than 5 μm in an aerosol can vary by a factor of 10 (from as little as 0.5 percent of the total number to more than 5 percent). When amosite aerosols are counted, the fraction longer than 5 μm may be 30 percent, extending the variability of the fraction counted to two orders of magnitude

Nicholson 1972; Nicholson 1976; Whittaker 1979.

Even if consideration is restricted to fibers longer than 5 μm , many are missed by optical microscopy. Using electron microscopy, Rendall and Skikne (1980) measured the percentage of fibers with a diameter less than 1-4 μm (the approximate limit of resolution of an optical microscope) in various asbestos dust samples. (Skikne et al. 1971; Rendall and Skikne 1980) In general, they found that more than 50 percent of the 5 μm or longer fibers are less than 0.4 μm in diameter and thus, are not visible using a standard phase contrast optical microscope." (Nicholson 1986a)

Asbestos fiber counting is a "tip of the iceberg" phenomenon because fibers are counted by light microscopy. Since chrysotile fibers split longitudinally, some of the fibers are too narrow to be seen and are not counted. The first steps of the textile process are specifically designed to split fiber bundles; therefore textile exposures involve a higher percentage of thin (invisible fibers) than mill or mine exposures. As a result of increased fiber splitting in the textile process each counted fiber represents many more uncounted fibers than is so in the mining and milling process. (Nicholson 1991)