

Evaluation of bystander exposures to asbestos in occupational settings: A review of the literature and application of a simple eddy diffusion model.

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Abstract: This article presents a review of the publicly available information as it relates to airborne asbestos concentrations at varying distances from a source in an occupational environment. Personal and area samples collected 5–75 feet from the primary worker from workplace surveys conducted in the 1970s and area samples collected 5–50 feet from the primary worker during more recent simulation studies were identified, compiled, and analyzed. As expected, airborne asbestos concentrations generally decreased with distance from the worker who performed a given task. Based on this review, however, the authors found that no systematic research to quantitatively relate fiber concentration with distance from the source (including consideration of fiber length, dilution ventilation, and initial momentum of the particle) has been conducted to date. A simple mathematical model was therefore used, and the results were considered, along with available published data comparing exposure data for both workers and persons/areas near workers. From this analysis, the authors offer guidance for estimating airborne asbestos concentrations at distance from a source. Based on the available data and our modeling results, the authors propose the following approach as a rule of thumb: for persons 1–5 feet from the source, airborne asbestos concentrations can be roughly approximated at 50% of the source concentration; 35% at >5–10 feet, 10% for >10–30 feet, and less than 1% at distances greater than 30 feet. This approach should be helpful for bracketing the range of likely exposures to bystanders being evaluated in asbestos-related dose-reconstruction analyses.

Keywords: *Asbestos; bystander exposure; exposure assessment; indirect exposure; industrial hygiene; near field*