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Abstract
The Pliofilm cohort is the most intensely studied group of workers chronically exposed to benzene. Information on this cohort has been the basis for regulations and/or guidelines for occupational and environmental exposure to benzene. Rinsky et al. (1986, 1987) and Crump and Allen (1984) developed different approaches for reconstructing the exposure history of each member of the group. The predicted levels of exposure, combined with the data on the incidence of disease, have been used to estimate benzene's carcinogenic potency. In this paper, recent information from worker interviews and historical records from the National Archives and elsewhere were used to evaluate the accuracy of prior exposure estimates and to develop better ones for the cohort. The following factors were accounted for: (1) uptake of benzene due to short-term, high-level exposure to vapors, (2) uptake due to background concentrations in the manufacturing building, (3) uptake due to contact with the skin, (4) morbidity and mortality data on workers in the Pliofilm process, (5) the installation of industrial hygiene engineering controls, (6) extraordinarily long work weeks during the 1940s, (7) data indicating that airborne concentrations of benzene were underestimated due to inaccurate monitoring devices and the lack of adequate field calibration mated due to inaccurate monitoring devices and the lack of adequate field calibration of these devices, and (8) likely effectiveness of respirators and gloves.

Our estimates suggest that Crump and Allen (1984) overestimated the exposure of workers in some job classifications and underestimated others, and that Rinsky et al. (1981, 1986) almost certainly underestimated the exposure of nearly all workers. Airborne concentrations of benzene at the St. Marys facility during the years of its operation were found (on average) to be about half those of the two Akron facilities. Our analysis indicates that short-term, high-level exposure to benzene vapors and dermal exposure significantly increased (by about 25-50%) the total absorbed dose of benzene for some workers. One of the key findings was that, unlike prior analyses, the three facilities probably had significantly different airborne concentrations of benzene, especially during the 1940s and 1950s.