

**State-of-the-science review of the occupational health hazards of crystalline silica in abrasive blasting operations and related requirements for respiratory protection**

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Excessive exposures to airborne crystalline silica have been known for over 100 years to pose a serious health hazard. Work practices and regulatory standards advanced as the knowledge of the hazards of crystalline silica evolved. This article presents a comprehensive historical examination of the literature on exposure, health effects, and personal protective equipment related to silica and abrasive blasting operations over the last century. In the early 1900s, increased death rates and prevalence of pulmonary disease were observed in industries that involved dusty operations. Studies of these occupational cohorts served as the basis for the first occupational exposure limits in the 1930s. Early exposure studies in foundries revealed that abrasive blasting operations were particularly hazardous and provided the basis for many of the engineering control and respiratory protection requirements that are still in place today. Studies involving abrasive blasters over the years revealed that engineering controls were often not completely effective at reducing airborne silica concentrations to a safe level; consequently, respiratory protection has always been an important component of protecting workers. During the last 15–20 yr, quantitative exposure response modeling, experimental animal studies, and in vitro methods were used to better understand the relationship between exposure to silica and disease in the workplace. In light of Occupational Safety and Health Administration efforts to reexamine the protectiveness of the current permissible exposure limit (PEL) for crystalline silica and its focus on protecting workers who are known to still be exposed to silica in the workplace (including abrasive blasters), this state-of-the-science review of one of the most hazardous operations involving crystalline silica should provide useful background to employers, researchers, and regulators interested in the historical evolution of the recognized occupational health hazards of crystalline silica and abrasive blasting operations and the related requirements for respiratory protection.

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