

Respirable silica dust exposure amongst foundry workers in Gauteng, South Africa: A task-based risk assessment.

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Silicosis is a problem in South African foundries; the problem has been exacerbated by inadequate dust control and neglect of occupational health in foundry industries. Because of the extent of the problem, the Department of Labour revised its occupational exposure limit of silica dust from 0.4 mg/m³ to 0.1 mg/m³ in 2008; however, cases of diseases associated with crystalline silica dust are still reported to the compensation commissioner every year, with unknown exposure levels. For this reason this study aimed to determine the exposure levels of foundry workers to respirable crystalline silica dust and rank tasks with high exposure.

A total of 56 personal samples were collected from a population of 148 (N=148) workers exposed to dust. Personal sampling data was collected at a breathing zone for three consecutive days for approximately eight hours per day. All sample analyses were carried out in the CSIR Centre for Mining Innovation's Laboratory SANAS accreditation (ISO 17025) for both x-ray powder diffraction (XRD) and particle size analysis methods.

The overall TWA mean and median respirable silica dust concentration was 0.184 mg/m³ and 0.167 mg/m³ respectively in foundry two. The maximum exposure concentration was 0.835 mg/m³ and minimum exposure was 0.010 mg/m³. Data were analysed by using SPSS version 18.

The highest exposed occupations were moulders, sand mixers, furnace operators, shake-out operators, shot blasters, grinders, closers, and casting operators. The majority of workers (62%) are exposed to respirable silica dust above the RSA OEL in both foundries, and the mean and the median exposures were also above the RSA OEL. Workers are over-exposed to silica dust and are potential at high risk of contracting silicosis and other occupational diseases associated with silica dust. It is recommended that a dust control programme be implemented and a baseline study be done.