

Use of dust suppression controls alone may not reduce workers' exposures to silica below the permissible exposure level during some crushing and chipping work

Characterization of Occupational Exposures to Respirable Silica and Dust in Demolition, Crushing and Chipping Activities

Anila Bello, Christopher Mugford, Amanda Murray, Susan Shepherd, and Susan R. Woskie. Annals of Work Exposure and Health, 2018.

Overview

Demolition, crushing and chipping work is common in construction and can expose workers to respirable crystalline silica (RCS) dust. This study was conducted to measure exposure to RCS and respirable dust during these tasks and to evaluate the effectiveness of selected dust suppression methods on reducing exposures. Exposure monitoring was conducted of operating engineers at demolition and crushing sites, laborers at demolition sites, crushing machine tenders at crushing sites, and chipping workers at substructure bridge repair sites. A total of 51 personal breathing zone samples and 33 area samples were collected. Exposures with and without dust suppression methods were compared when possible.

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See abstract:

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Key Findings

- Chipping workers had the highest exposures to RCS, with 80% exposed above the OSHA permissible exposure level (PEL) of 50 µg/m³. All of the workers wore half-face N95 cartridge respirators. Use of an 'air curtain' reduced respirable dust exposures but did not significantly reduce exposures to RCS.
- About half of crushing tenders' personal breathing zone samples were above the PEL and those with the worst exposures would have exceeded limits after two hours. All of the workers used N95 dust masks. Use of a water spraying system reduced exposures to under the PEL. This supported the Table 1 specification in OSHA's silica standard that additional respiratory protection is not needed when using crushing equipment with water spraying systems at transfer points. Use of a water cannon appeared to be less effective in reducing exposures, however, due to the small sample size the results were not conclusive.
- Exposures below the PEL were recorded in the breathing zones of operating engineers working in enclosed, ventilated cabs at the demolition and crushing sites, and laborers at the demolition site where dust suppression methods were continuously used.
- Area exposures at demolition and crushing sites were lower than personal exposures, but varied widely due to the variety of site activities, their duration per day, sample locations, and dust controls used. Significantly higher RCS levels were found at the perimeter of the crushing site compared to the perimeter of the demolition site.



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