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Occupational and Environmental Exposures of Skin to Chemicals - 2005

Abstract for Poster 57

Engineering controls for preventing dermal exposures

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Background

Engineers conducted a study to address dermal exposures from an engineering perspective and offer industry assistance in the development, evaluation, or identification of engineering controls designed to prevent dermal exposures. Historically, recommendations to prevent dermal exposures in the workplace have focused on personal protective equipment (PPE) as the primary intervention. The objective of this study was to work with the selected industries to develop or identify engineering solutions to dermal exposures that go beyond PPE.

Methods:

Several industries that pose a high risk for skin exposure to hazardous chemicals were selected to determine if engineering controls could be used as the primary means of preventing the dermal exposure. Three of the industries or areas selected were composite manufacturing of fiberglass boats, composite manufacturing of utility scale wind blades, and equipment to protect mail handlers from dermal and inhalation exposure to biological agents in mail processing and distribution plants. For composite manufacturing of boats and wind blades, engineering controls were assessed qualitatively for their effectiveness in preventing worker skin contact time and area of exposure to wet epoxy resins. In mail processing centers engineering controls were evaluated using sulfur hexafluoride as a tracer gas to determine acceptable levels of contaminant capture. A biological detection system monitored exhaust air for possible contamination and was designed to stop mail processing equipment before workers physically contact any potentially contaminated mail.

Results:

Successful engineering control interventions for preventing dermal exposures were introduced in two of the three identified industry areas. A closed mold method for manufacturing fiberglass boats successfully eliminated dermal exposure to styrene and other chemicals in the resins by removing the worker from the process through

automation. A successful engineering control to prevent mail handlers in mail processing and distribution plants from dermal or inhalation exposure to biological agents such as anthrax in mail showed greater than 95% contaminant capture capabilities for detecting a potential exposure. Although a successful engineering intervention was identified for mail handlers and composite boat manufacturing workers, an engineering intervention for the composite wind blade manufacturing process was not successfully identified, and the company is currently reducing dermal exposures through PPE.

Conclusion:

Engineering controls can be used to successfully prevent worker skin exposure to hazardous chemicals in two of the selected industry categories. In addition to the reduction in dermal exposures, process improvements gained from the implementation of the engineering controls also had the added benefit of a reduction in inhalation exposure. An effective engineering control is not currently available for preventing exposure to the epoxy resins in wind blade manufacturing and will likely require significant capital expenditure for research and development.

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This conference follows the success of the first [International Conference on Occupational and Environmental Exposures of Skin to Chemicals: Science and Policy](#), which was held near Washinton, DC, in September, 2002.

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