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New Reports from the NIOSH Health Hazard Evaluation Program

With each issue, the *International Journal of Occupational and Environmental Health* publishes a selected set of abstracts of important Health Hazard Evaluations from the National Institute for Occupational Safety and Health (NIOSH) of the US Centers for Disease Control and Prevention. These abstracts and the full HHE reports are also available on the NIOSH web site (http://www.cdc.gov/niosh/hhe/).

Evaluation of Potential Exposure to X-ray Radiation
Chandran Achutan, PhD
Charles Mueller, MPH

The HHE Program responded to an employee and management request at twelve airports throughout the United States to investigate employees' potential exposure to x-radiation during baggage screening. HHE Program investigators observed baggage screening practices and took x-radiation measurements at explosive detection system (EDS) machines in airports. Investigators also asked screeners at some airports to wear personal monitoring devices to measure their exposure to x-radiation. The investigators found that baggage screeners were using unsafe work practices and that some of the EDS machines were not well-maintained. HHE Program investigators also found that most EDS machines emitted low levels of x-radiation, and a few exceeded the Food and Drug Administration's limits. Measurements showed that there were low doses of x-radiation among baggage screeners in most airports. Investigators recommended that x-radiation safety programs be developed and that regular training on x-radiation and safe work practices be provided to baggage screeners. HHE Program investigators also recommended improved maintenance of equipment and that managers work with manufacturers to improve the design of EDS machines. Additionally, investigators recommended that health and safety communication between managers and employees be improved at each airport. The final report is available at http://www.cdc.gov/niosh/hhe/reports/pdfs/2003-0206-3067.pdf.

Evaluation of Work Stress
Richard J. Driscoll, PhD, MPH
Randy L. Tubbs, PhD

NIOSH responded to a management and union request at a police department concerning work stress and noise exposure to dispatchers and 911 emergency phone operators. NIOSH researchers interviewed managers and employees, administered questionnaires examining workplace stressors and health-related outcomes, took saliva samples to assess physiologic reactions to stress, and evaluated noise exposure levels in the work area. NIOSH found that over 35% of employees self-reported symptoms consistent with major depression and 25% reported symptoms consistent with anxiety. Testing showed that salivary cortisol levels were not associated with self-reported data concerning work stressors. Further testing found that ambient noise levels measured in the work area were acceptable for office communication. NIOSH personnel recommended that social support systems be improved within the organization and that employees work with management to remedy routine problems in order to improve job satisfaction and reduce stress levels. Researchers also recommended that non-work related conversations be limited in the call room to minimize distraction and reduce background noise. The final report is available at http://www.cdc.gov/niosh/hhe/reports/pdfs/1999-0199-3053.pdf.

Evaluation of Potential Exposure to Carbon Monoxide and Metals
Scott E. Brueck, MS, CIH
Lilia Chen, MS

The HHE Program responded to a request at a state vehicle maintenance garage. The request concerned potential exposure to carbon monoxide (CO) and metals such as arsenic, cadmium, and lead that may have accumulated on work surfaces throughout the garage. HHE Program investigators measured CO when vehicles were running in the garage and collected surface wipe samples for metals on work and non-work surfaces. The investigators found that CO concentrations were well below occupational exposure limits. Arsenic was not detected in any of the surface wipe samples. Low concentrations of cadmium and relatively high surface lead concentrations were detected on the bench grinder and chain saw sharpener workbenches. Lead was either not detected or detected in trace concentrations on other work and non-work surfaces. HHE Program investigators recommended that vehicles not be permitted to idle in the garage and that both garage doors

be kept open and exhaust fans used when vehicles are running. Investigators recommended that managers ensure that the bench grinder and chain saw sharpener workbench surfaces are cleaned each day after use. Investigators recommended that employees remove personal protective equipment before using the break or kitchen areas and store it in a clean area when not in use. Employees should wash hands before eating, drinking, or smoking to prevent ingestion of lead and other metals. The final report is available at http://www.cdc.gov/niosh/hhe/reports/pdfs/2006-0336-3059.pdf.

Evaluation of Potential Exposures Related to Mixing Clays and Glazes

Lilia Chen, MS
Scott E. Brueck, MS, CIH
Jessica Ramsey, MS

The HHE Program responded to a request at a pottery shop which concerned potential exposures to silica, volatile organic compounds, and dry materials mixed there. HHE Program investigators collected personal breathing zone, area air, and surface wipe samples, measured carbon monoxide (CO) during forklift use, and performed an ergonomic assessment of work practices. Investigators found that one employee's exposure for silica was at the NIOSH recommended exposure limit of 0.05 mg/m^3. They also found that some samples taken during high dust-generating tasks exceeded the excursion limit for silica. CO levels measured in the facility exceeded the NIOSH ceiling limit of 200 parts per million during forklift use. Investigators also noticed that some workers were not wearing their respirators properly. HHE Program investigators recommended that facility managers install local exhaust ventilation in high dust-generating task areas and improve the central building ventilation to increase overall air mixing. Investigators also recommended that managers ensure that employees wear respirators and that employees use respirators when needed. HHE Program investigators also recommended that employees properly store and maintain all personal protective equipment. The final report is available at http://www.cdc.gov/niosh/hhe/reports/pdfs/2007-0127-3068.pdf.

Evaluation of the Effectiveness of Gaseous Chlorine Dioxide

Nancy Clark Burton, PhD, MPH, CIH

The HHE Program responded to a management request from an urban rehabilitation company. The request concerned evaluating the effectiveness of using gaseous chlorine dioxide (ClO_2) treatments to reduce microbial contamination in a house under renovation. HHE Program investigators collected air samples, sticky tape samples from surfaces, and wipe samples before and after ClO_2 treatment. Investigators found that culturable bacteria and fungi concentrations were significantly decreased after the ClO_2 treatment. There were no significant differences in airborne endotoxin and betaglucan concentrations before and after ClO_2 treatment. Investigators also found that microscopic analyses of tape samples collected after treatment showed that fungal structures were still present on surfaces. HHE Program investigators recommended that managers use additional clean-up techniques, such as using high efficiency particle air filter vacuums in order to reduce concentrations of spores and microbial components before re-occupancy is permitted. The final report is available at http://www.cdc.gov/niosh/hhe/reports/pdfs/2004-0387-3071.pdf.

Evaluation of Respiratory and Skin Problems

Kristin J. Cummings, MD, MPH
Randy J. Boylstein, MS
Jean Cox-Ganser, PhD

The HHE Program responded to a request from machine shop workers in a facility that produces aluminum wheels. Workers reported recurrent pneumonias, asthma, and other symptoms that they related to metalworking fluid (MWF). HHE Program investigators conducted phone interviews with workers, company officials, and treating physicians. Investigators reviewed medical records and records of MWF and air monitoring. They also analyzed samples of the MWF using culture, endotoxin and fungal glucan assays, and polymerase chain reaction for mycobacterial DNA. Investigators found that some workers had work-related respiratory and skin problems, including occupational asthma and a constellation of symptoms concerning for hypersensitivity pneumonitis. Monitoring records demonstrated air levels of MWF above the NIOSH recommended exposure limit and no or low detection of bacteria and fungi in MWF. Culture of MWF showed minimal bacterial growth and no mycobacterial or fungal growth. Endotoxin levels were very low (52-150 EU/ml), but glucan levels were detectable (133-266 ng/ml). Nearly all (11/12) samples had mycobacterial DNA, specifically *M. immunogenum*. Negative MWF cultures do not preclude the occurrence of MWF-related symptoms. Non-culture analytic methods can provide useful information about microbial presence in MWF. The final report is available at http://www.cdc.gov/niosh/hhe/reports/pdfs/2007-0263-3069.pdf.

Evaluation of Potential Ergonomic Hazards

Jessica Ramsey, MS
Ming-Lun (Jack) Lu, PhD

The HHE Program responded to a request at a postal processing and distribution center. The request concerned potential ergonomic hazards for workers performing sorting and loading tasks at the facility. HHE Program investigators watched workers loading and sorting mail; investigators then

used special equipment to re-create these jobs in the lab to see if the tasks could injure workers. Investigators found that the current sorting job did not pose as much risk to workers as former methods that had been previously evaluated, but could be further improved to reduce ergonomic risks. Investigators also found that workers loading general-purpose mail containers had a high risk of developing low back pain. HHE Program investigators recommended that managers move shelving in the sorting area to make space for empty containers and move the tray management system conveyor to a location in front of the sorters; both recommendations would eliminate 180° lifts. Investigators recommended that employees not lift tubs or trays over the front conveyer onto the back conveyor in the loading zone, in order to minimize reach distance. It was also recommended that the number of workers in the loading and sorting areas be increased to allow for job rotation. Investigators recommended that employees take the time to work safely and lift properly, and promptly report injuries and unsafe work conditions. The final report is available at http://www.cdc.gov/niosh/hhe/reports/pdfs/2007-0170-3070.pdf.