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USE OF GLOVEBOX GLOVES AND ITS ERGONOMIC IMPACTS. W. Liu, P. Sung, L. Arias, UCLA Department of Environmental Health Sciences, Los Angeles, CA; J. Hollander, J. MacDonald, Los Alamos National Laboratory, Los Alamos, NM

The primary goal of this study was to determine how glovebox gloves are used in a facility handling radioactive materials. In addition, contact area and contact force between the glovebox gloves and six common household hand tools were determined through laboratory simulation. The glove/tool contact area was estimated by coating the tool handles with paint. Glove/tool contact force was determined with a thin-film force sensor.

Laboratory task simulation with six common household tools showed that the index finger, middle finger, distal phalanx of the thumb, second and third metacarpal, and upper edge of the thenar eminence were in contact with most of the tools. The maximum peak contact forces, ranging from 0.8 to 4.4 pounds, occurred at the tip of the thumb for holding a paintbrush, the middle phalanx of the index finger for using a ball-pin hammer, and the upper portion of the proximal phalanx of the middle finger.

An ergonomic evaluation of the effect of wearing glovebox gloves was also conducted. Based on existing literature on the effects of wearing gloves and data collected in this study, it is concluded that glovebox gloves may decrease dexterity and tactility, reduce hand motion, and cause the exertion of extra force. And, prolonged forceful exertion and awkward postures are recognized risk factors for the development of musculoskeletal discomfort/disorders of the hand and/or wrist.

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DESIGN AND IMPLEMENTATION OF THE NOISE AND VIBRATION REDUCTION SOLUTIONS IN THE MINNTAC FACILITIES — PART 1. D. Allaei, D. Tarnowski, QRDC, Inc., Excelsior, MN; J. Scipioni, R. Tomassoni, L. Potter, U.S. Steel - MINNTAC, Mt. Iron, MN

The presence of high levels of noise and vibrations may affect not only the health of maintenance and operating crews, it may also influence the performance of the machinery and production of a plant. One of the most effective methods to address noise and vibration issues is to identify the sources of energy and the energy flow paths. Based on the identified energy paths, a cost-effective and efficient solution may be recommended. This approach was implemented in a pilot site at the MINNTAC division of U.S. Steel in Minnesota, where a practical four-stage solution was executed.

This paper focuses on the findings related to the first part of the four-stage solution, namely the removal of excess structural couplings in screen areas, vibration measurements, and levels of improvements.

The vibration and noise data were measured before and after the structural couplings were modified or removed. Vibration measurements were partitioned into three stages: 1) overall vibration levels at 56 points across the deck; 2) operating mode shapes (OMS) of the floor; and 3) modal characteristics of the floor.

The overall acceleration levels were measured at three points across each screen. The variation in the measured acceleration levels across the floor was observed to be about 0.06G (i.e., 67% of peak). The overall mean acceleration level was reduced by about 36%, while the overall peak acceleration was reduced by about 24%.

Based on the analysis of the collected baseline noise and vibration measurements, it was found that the overall vibration levels were significantly reduced due to modification and/or removal of unnecessary structural couplings. No significant change was observed in the overall noise level.

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EXPOSURE EVALUATION IN NEW RESIDENTIAL CONSTRUCTION. M. Methner, J. McKernan, NIOSH, Cincinnati, OH; J. Dennison, Century Environmental Hygiene, Inc., Fort Collins, CO

The purpose of this study was to identify and characterize potential chemical, physical, and ergonomic hazards associated with various work tasks performed at five new residential construction sites in the Denver, Colorado area.

Tasks to be sampled were selected using information gathered during preliminary walk-through surveys of residential construction work sites, and information gained from the use of a newly developed exposure assessment tool. An evaluation of the identified potential health hazards was then conducted using a task-based exposure assessment method. Thirteen trades were selected for quantitative exposure assessment including: excavators; foundation pourers; framing carpenters; masons; roofers; plumbers; electricians; HVAC workers; insulation installers; drywall workers; painters; interior finishing carpenters; and flooring installers.

The task-based exposure evaluation included data from worker interviews, inspections of work practices, collection of MSDSs for products used, and a qualitative assessment of potential exposures. A sampling plan, utilizing NIOSH sampling and analytical methods, was formulated to monitor potential health hazards. Sampling involved the collection of 60 personal breathing zone samples to characterize exposure to 111 potential chemical and physical agents.

Qualitative ergonomic evaluations were also performed by observing the tasks performed by the 13 selected trades. Results indicate that exposures in four trades (drywall workers, insulation installers, painters, and plumbers) exceeded the ACGIH TLVs®, NIOSH RELs, or OSHA PELs for particulates, solvents, and metal fume.

Noise exposures exceeding the OSHA action level of 85 dBA were observed for six construction trades (framing carpenters, roofers, flooring installers, foundation pourers, plumbers, and HVAC workers). The most predominant ergonomic hazards observed were hand-arm and whole-body vibration.

A general lack of personal protective equipment (PPE) was observed for all trades. These results suggest that residential construction workers need to receive training on the importance and use of PPE, as well as other controls, to reduce exposures to selected chemical and physical agents.

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IDENTIFICATION OF RISK FACTORS ASSOCIATED WITH DRYWALL INSTALLATION THROUGH THE ANALYSIS OF TRAUMATIC INJURIES. S. Chiou, C. Pan, NIOSH, Morgantown, WV

Drywall installation involves many strenuous tasks that can place extraordinary stress on the worker. To identify the leading causes of injuries for further ergonomic study, an analysis of traumatic injuries among drywall installers was performed.

Data from the annual survey of occupational injuries and illness conducted by the Bureau of Labor Statistics (BLS) were analyzed for 1992 through 1995. During this period, 16,023 traumatic injuries involved days away from work.

Three "nature of injury" categories — sprains, strains, and tears (43.9%); cuts and lacerations (11.1%); and fractures (10.4%) — resulted in nearly 66% of injuries among drywall installers. The most frequently injured body part was the back, followed by the legs (10%). The leading types of incident were overexertion (23.1%), fall to lower level (21.2%), bodily reaction (11.9%), struck by an object (12%), struck against an object (9.9%), and fall on the same level (9.8%).

Overexertion and all types of falls accounted for 54% of traumatic injuries among drywall installers. Drywall installers seemed to be at high risk for overexertion and falls. Three sources of injury were responsible for 44.5% of the total injuries: floor of building (17%), drywall board (15.1%), and bodily motion or position of injured and/or ill worker (12.4%).

An analysis of the median days away from work indicates that between 1992 and 1995, drywall installers had median days away from work of 8 to 10 days. Median days away from work for drywall installers were greater than median days away from work for construction workers and all industries combined. More than a fourth of the injuries of drywall installers involved at least 31 days away from work.

To reduce traumatic injuries, future ergonomic studies are needed to help develop proper work procedures and/or assistive devices.

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REMOVAL OF VINYL ASBESTOS FLOOR TILE USING MODIFIED WORK PRACTICES. L. Johnson, University of Florida, Gainesville, FL

The OSHA construction regulations for asbestos removal changed in August 1994. The revised regulations allow flexibility in designing projects for the removal of materials containing asbestos. This is especially true for Class II projects. Under these revised regulations, the University of Florida has been removing vinyl asbestos floor tile for four years using work practices based on the recommendations from the Resilient Flooring Institute. These work practices have dramatically lowered the cost of removing floor tile, while maintaining employee safety. University maintenance departments and building occupants have both demonstrated a preference for the modified removal technique over traditional removal techniques.

Employees use a putty knife with wet technique to work the tiles loose. High efficiency particulate air filtered vacuums are used to clean the work site before and after tile removal. Because the tiles are essentially intact when they are removed, there is little measurable exposure to asbestos fibers. The tile mastic is leveled and left in place rather than removed with grinding or solvents.

The OSHA requirements for training are not as lengthy for workers whose only asbestos work is tile removal. Under the negative exposure assessment for this work, respirators and protective clothing is

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