

## Session: G3.0

### Title: Injury Hazards I

Moderator: Timothy Pizatella

#### G3.1

##### ***Title: An Acute Fatality While Applying a Spray-On Truck Bed Liner***

Authors: Chester D, Hanna E, Pickelman B, Rosenman KD

There has been an increased concern about the health effects of a new application of isocyanates; spray-on truck bed liners. The spray-on truck bed liners are a 2-component system mixed at the spray nozzle. The most popular spray-on liners are polyurethane (isocyanate and polyol) and polyurea (isocyanate and amine resin). The application is commonly occurring, not during the manufacture of the truck, but as an aftermarket accessory item by small businesses. The Michigan Fatality Assessment and Control Evaluation (MIFACE) research program recently investigated a work-related death of an individual who died while applying a polyurethane spray-on truck bed liner. We will present the results of our investigation, including the medical history of the individual, autopsy findings, results of interviews with fellow workers, results of interviews of next of kin, our on-site findings and recommendations to prevent a similar occurrence.

#### G3.2

##### ***Title: Safety Hazards to Workers in Modular Home Installation***

Authors: Becker, Paul E, ScD, Fullen, Mark D, MS, Takacs, Brandon C, MS

The process of installing (setting) a modular home is an entirely different process from that of a traditional stick-built house. The safety hazards that are created from these activities alone create a high hazard site. This presentation will describe the results of pilot research that addressed safety hazards to exposed workers installing (setting) modular homes. The pilot research was conducted by West Virginia University Safety and Health Extension through the Center to Protect Workers' Rights Small Study Program funded by NIOSH.

While conducting safety training for a modular home installer, WVU recognized the unique and serious safety hazards involving modular home installations. The purpose of this study on the installation of modular homes was to identify problems, make recommendations for improvement and suggest further research that is needed.

Of all of the industrialized housing market segments, modular home production has seen the greatest growth, although it currently holds the smallest percentage. Modular building

production is not exclusive to residential construction. Modular manufacturers build everything from storage outbuildings to large hotel resorts.

Through the years, manufactured and modular housing operations have experienced a high frequency of workplace incidents and injuries. They have remained among the top 10 high-risk industries, as measured by Bureau of Labor Statistics annual surveys of occupational injuries and illnesses.

WVU conducted Job Safety Analyses on four separate modular home installations. WVU had employees and employers completed questionnaires to obtain data about the experience and knowledge of the workers and companies involved in the pilot study. WVU also interviewed the companies' on-site personnel to better determine the industry relationships and how they all interact. This pilot study accomplished its goal of determining the hazards of this process and recommending controls that could reduce the risk of injury or death to a construction worker in this industry.

#### G3.3

##### ***Title: Occupational Injury Events Leading to Hospitalization***

Authors: Tyler KL, Jackson LL

Objectives: To estimate the number of nonfatal occupational hospitalized injuries and illnesses treated in emergency departments and to characterize the injury events.

Methods: Data were obtained from the National Electronic Injury Surveillance System (NEISS). NEISS is a national probability sample of United States 24-hour hospital emergency departments.

Results: In 1999, there were  $69,800 \pm 16,800$  ( $\pm 95\%$  confidence interval) nonfatal occupational injuries and illnesses treated in emergency departments that resulted in hospitalization among workers 15 years and older. These hospitalized injuries occurred at a rate of 5.3 per 10,000 full-time equivalent workers (FTE). Males accounted for  $57,100 \pm 14,300$  (81%) of hospitalized injuries and had a rate ( $7.5 \pm 1.9/10,000$  FTE) that was about 3 times higher than for females ( $2.3 \pm 0.6/10,000$  FTE). Overall, 70% of injury events leading to hospitalization involved contact with objects and equipment ( $26,200 \pm 5,400$ ) and falls ( $22,700 \pm 6,500$ ), and predominantly occurred to males (89% of all contact with objects; 79% of all falls). Manufacturing injuries most commonly involved contact with objects and equipment ( $6,500 \pm 2,300$ ) and falls ( $1,500 \pm 900$ ), although falls were less prevalent. Among construction workers, who had the highest number of falls, the proportion of falls was greater ( $6,500 \pm 3,300$ ) than contact with objects and equipment events ( $5,300 \pm 2,000$ ). Falls among males were usually to a lower level (74%) and most commonly occurred within the construction industry. Most falls

among females took place on the same level (63%) and predominantly in the services and wholesale/retail trades industries.

Conclusion: Prevention of the most severe workplace injuries must focus on contact with objects and equipment and falls, taking industry into account.

### G3.4

**Title: Development of a New Electrical Injury Protection System-Selection of RF Transmitter Mounting Location on the Human Body**

Authors: Zeng S, Powers JR, Jackson LL, Conover DL

To protect electrical workers near an energized electrical circuit, a new electrical injury protection system is being developed that measures how close a worker is to a live circuit by using a worker-worn low-power radio-frequency (RF) transmitter and a receiver that is plugged into the live electrical circuit. The transmitter emits RF electromagnetic waves through a worker's body to the energized electrical circuit allowing the receiver to judge the worker's proximity or electrical contact by analyzing the RF signal strength. The uniformity of the RF emission strength through the body, which is mainly determined by body-mounting location of the RF transmitter, affects the accuracy of the RF-receiver proximity/electrical contact measurement.

After the approval by the CDC/NIOSH Human Subject Review Board, nine human subjects were tested to measure the strength of RF emissions through different parts of their bodies to an electrical circuit. Two practical RF-transmitter-mounting locations, wrist and upper-arm, were tested by attaching an RF signal source (100-150 kHz). The RF signal path is: RF signal source – body transmitter-mounting location – body extremity/forehead – air (omitted in electrical contact simulation) – electrical circuit – RF spectrum analyzer. Non-uniform RF emission levels were observed through hands and forehead to an electrical circuit. The greatest RF signal strength difference of 9.47 dB (mean) was observed between the left-hand emission and right-hand emission when the RF signals were transmitted from the subject's right wrist. As the RF transmission location was moved from right-wrist to right-upper-arm, the above RF emission strength difference was reduced to 4.20 dB (mean). This RF-emission-uniformity difference may be attributed to the different electrical-path lengths between the signal transmitter location and RF-emitting parts of the body.

Thus, continued development of the protection system will use the upper-arm as the RF-transmitter mounting location to most accurately measure human-to-electrical-circuit proximity and electrical contact.

### G3.5

**Title: Welding-Related Ocular Injuries**

Authors: Lombardi DA, Pannala R, Sorock GS, Wellman H, Courtney TK, Verma GS

**PURPOSE:** Welders are exposed to multiple sources of ocular injury. There are few published studies of US data examining the activities and processes proximal to a welding-related eye injury. This study describes a one-year sample of welding related injuries from a large US-based provider of workers' compensation (WC) insurance.

**METHODS:** For the year 2000, 26,413 WC claims with eye as the primary body part injured were abstracted. Using a narrative text search we identified 1,349 claims where occupation was listed as welder. Additionally, 826 non-welders injured while engaged in a welding-related activity (e.g., pipe fitters) were identified using a narrative search of the injury and accident description, manual class and SIC code data fields.

A coding system was developed with categories for activity when injured, initiating process, mechanism of injury, object or substance causing injury and any mention of personal-protective equipment use (PPE). Descriptive analyses of demographics, injury and occupational characteristics, and the narrative coding categories were conducted.

**RESULTS:** Welders accounted for 5.2% of all eye injury claims. Most cases were male (97%) with an average age of 35 years and were from manufacturing (70.4%), service (11.7%), and construction (8.4%) related industries. Eye injuries were predominantly unilateral (82.3%). Foreign bodies (72.7%) and flash burns (19.4%) were the most frequent natures of injury. At the time of injury, welding (31.7%) and grinding (22.5%) were the common activities. In 56.3% of cases, the mechanism of injury was 'struck by a propelled or airborne object'. Injuries occurred most often during normal mechanical processes (70.6%). Results for non-welders were generally similar, however flash burns (38.5%) and bilateral injuries (34.9%) were more frequent in this group.

**CONCLUSIONS:** Workers performing welding-related tasks should be trained to recognize all potential ocular hazards. To prevent ocular injury, the effective use of proper safety equipment (PPE) should be stressed.

# NOIRS 2003 ABSTRACTS

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