

Health Administration. These sources were reviewed for cases of heat stress and heat stroke. Contacts with the Environmental Protection Agency and labor unions and a visit to the Hazardous Waste Abatement Training Center operated by the International Union of Operating Engineers provided additional information that heat stress is an emerging problem in this growing national effort.

Results: These workers, who belong to the construction industry, perform physically demanding tasks, often in hot environments, while wearing complete encapsulating chemical protective clothing and respiratory protection. The number of workers employed in hazardous waste management has grown from 80,000 in 1980 to > 1,000,000 in 1990. Between 1975-1985, heat stroke was the tenth most frequent type of construction-worker illness reported into workers' compensation. It has been estimated that for each heat stroke case, more than 10 heat exhaustion cases occur. However, heat exhaustion, a major stage of heat stress, was not a classified category within the compensable cases. If it were, then heat exhaustion would rank as the leading reported worker illness in Heavy Construction (Standard Industrial Classification [SIC] 16) and be second in Residential (SIC 15) and Special Trades (SIC 17) Construction. Heat stress is a common hazard to construction waste-abatement workers because of four factors: mandatory use of vapor-barrier clothing, outdoor exposure to hot environments, high level of energy expenditure, and lack of specific work-and-rest strategies.

Conclusions: Heat stress is a major health concern in this fast-growing population. Hazardous-waste-abatement work must be evaluated to determine variation of the body core temperature with workload. This should lead to the

development of work-and-rest cycles as well as state-of-the-art engineering controls and monitoring devices to warn of impending heat stress to workers.

A National Overview of Occupational Falls in the United States' Construction Industry: 1980-1988

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Objectives: To identify construction workers at high risk for occupational falls (E880-E888).

Methods: National death-certificate analyses were conducted on all fatal occupational falls in the construction industry via the National Traumatic Occupational Fatality database at NIOSH, DSR. Fatality rates were calculated by geographic location (state and region) and Standard Industrial Classification (SIC) categories.

Results: From 1980-1988, occupational falls in construction represented 48.3% of fatal occupational falls across all industries. Within the construction industry, there were 2,498 deaths due to occupational falls. Most of these incidents occurred among young white males. By geographical location, fatality rates were higher within the South region of the United States. Sixty-six percent of the fall victims died on the same day as the injury. By SIC codes, employees of special trade contractors (SIC 17) were at highest risk of having an occupational fall (86.5/100,000 workers). The three categories within SIC 17 with the highest fatality rates (per 100,000 workers) were: roofing, siding; and sheetmetal work (112.4); structural steel erection (105.9), and glass and glazing work (699.6). People employed as roofers

(70.5% in SIC 1761) and ironworkers (81% in SIC 1791 and 92.5% in SIC 1793) had the highest percentage of fatalities.

Conclusions: Based on the analyses, it was observed that construction workers in SIC 17 are at highest risk for having an occupational fall. Further research is needed to identify the circumstances surrounding these falls and how preventive strategies could reduce injuries and fatalities.

A Symptom and Job Factors Survey of 15 Construction-Worker Trade Groups

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Objectives: To quantify the relationship between worker job-factor perceptions and reported musculoskeletal symptoms resulting in missed work.

Methods: Unionized construction workers (526) from 15 unions in the Midwest completed a two-part symptom survey and job-factors analysis. Odds ratios (OR) providing estimates of relative risk were determined for reported symptoms resulting in missed work and job-factors perceptions. Comparisons of significant OR trends were made between five selected trade groups.

Results: Comparisons of results across trade groups identified differences in both symptom- and job-factor trends. For example, carpenters showed a high prevalence of musculoskeletal symptoms in the back, knees, and feet and ankles relative to the overall group of construction workers while pipefitters indicated equal prevalence of symptoms with the knees but fewer symptoms with the back and feet and ankles. In the second part of this survey, trade-specific patterns of problems with certain job

factors were evident. For example, an insufficient number of breaks was not reported as a problem for plumbers while it was perceived as at least a minor problem by >40% of the iron workers.

Conclusions: Use of this survey has identified specific trade-related ergonomic problem areas and will permit more expedient intervention in the reduction of musculoskeletal disorders.

Occupational Fatalities Associated with Steel-Mill Demolition in Pittsburgh, 1989-1992

Kuntz JG, Garrison HG, University of Pittsburgh, United States (C06)

Objectives: To describe a recent series of construction worker deaths, and associated activity and physical hazards, occurring during the demolition of steel production structures in Pittsburgh.

Methods: All police records of industrial deaths occurring in Pittsburgh between 1982-1992 were reviewed. In addition, OSHA citations for each case were examined.

Results: A total of four separate cases resulting in death during steel-mill demolition were found in the review. All occurred between 1989-1992. These cases accounted for a significant percentage of industrial deaths in Pittsburgh during this three-year period. All four of the deaths were associated with the activity of cutting and weakening a structure with a blow torch in order to make the structure collapse. In all four cases structures collapsed prematurely and crushed the construction worker operating the blow torch. In two of the cases an open hearth was being dismantled; in the other two cases a coal hopper and storage-house flooring were being dismantled, respectively. In

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