

# Occupational Exposure to Hot Environments: Florida Workers Need Help

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## Abstract

*This article draws the attention of the Florida community - employees, employers, public health practitioners, and policy-makers - to an occupational hazard particularly relevant to Florida, namely, exposure to hot environments in the workplace. Heat stress disorders adversely affect worker safety and productivity. In extreme cases, they may endanger the life of a worker. The Occupational Safety and Health Administration (OSHA) has not set a standard for heat stress requiring employers to control exposure. More than 30 years after the recommendations of the Standards Advisory Committee on Heat Stress, the time for such a standard is overdue.*

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## Introduction

Working in a hot environment induces a physiological strain on workers. Extreme variations from the internal body temperature of 37°C (98.6°F) interfere with body functions and normal homeostasis. Heat stress disorders include heat stroke, heat exhaustion, and heat rash. They adversely affect worker safety and productivity because they can cause distraction, reduce concentration, and lead to fatigue (Bishop, 1997). In acute cases, they may cause brain damage or death.

Heat stress disorders may be a workplace hazard in certain industries (e.g., foundries) located anywhere in the country. However, Florida workers are especially susceptible to incidents of heat stress due to climatic conditions that include high temperatures combined with high relative humidity. The average temperature in Florida for the hottest months, July and August, is approximately 27°C (81°F) (Southeast Regional Climatic Center, n.d.-a). Daytime temperatures are higher. The average maximum temperature in Orlando in the central part of the state is 33°C (92°F) for July and August (Southeast Regional Climatic Center, n.d.-b). Historical records show that temperatures in excess of 32°C (90°F) have occurred in Florida every month of the year (National Climatic Data Center, n.d.). Average relative humidity can be as high as 95% depending on the location and time of the day (Southeast Regional Climatic Center, n.d.-c). In 2000, exposure to environmental heat was implicated in three work-related fatalities in Florida (Bureau of Labor Statistics, 2002).

### *Exposure Control*

There are ways to control exposure to heat stress in the work environment: (1) decreasing the temperature, (2) reducing the humidity, (3) increasing the air velocity, (4) reducing the work load, (5) adjusting the clothing, (6) providing shields against radiant heat, and (7) implementing work practices such as suitable work-rest intervals, fluid replenishment, acclimatization, and worker training (Eastman Kodak

Company, 1983). Many of these controls can be applied in various work situations, indoor or outdoor. The lack of governmental regulation requiring employers to adopt one or more of these steps means, however, that less conscientious employers lack the incentive to act to alleviate the problem, and thus, afford workers sufficient protection.

## Nonexistence of Occupational Safety and Health Administration Standard

Under the Occupational Safety and Health Act (1970), two federal agencies are responsible for promoting occupational safety and health in the United States. The National Institute for Occupational Safety and Health (NIOSH) conducts research and recommends occupational safety and health standards. The Occupational Safety and Health Administration (OSHA) is responsible for the promulgation and enforcement of standards.

NIOSH (1972) developed the first criteria document for recommended standards related to occupational exposure to hot environments. It suggested that work practices should be instituted when exposure of an employee was continuous for one hour or intermittent for two hours at a time-weighted average wet bulb globe temperature (WBGT) that exceeded 26°C (79°F) for men or 24°C (76°F) for women. The WBGT is the most commonly used index for limiting thermal exposure levels in occupational environments (Bishop, 1997). Subsequently, NIOSH (1986) revised the criteria so that the exposure limit calculations are 1-hour time-weighted averages that do not differ for women and men. Other recommendations include alert limits for unacclimatized workers, recommended exposure limits (REL) for acclimatized workers, and ceiling limits beyond which appropriate heat protective clothing and equipment would be required. The ultimate objective is to limit the level of health risk associated with the total heat load imposed on a worker in a hot environment.

OSHA established a Standards Advisory

Committee on Heat Stress in 1973. Although the committee recommended a standard similar to the one proposed by NIOSH, as of March 2004 there is no specific OSHA standard for heat stress.

### **Standards and Guidelines Established by Other Institutions and Countries**

The American Conference of Governmental Industrial Hygienists (ACGIH) suggests threshold limit values (TLV) for thermal stress. The TLVs are the WBGTs at which it is believed that nearly all adequately hydrated, unmedicated, healthy workers may be exposed repeatedly without adverse health effects (ACGIH, 2003). The values take into consideration environmental heat factors and metabolic heat production. The values are similar to the NIOSH recommendations. The American Industrial Hygiene Association (AIHA) recommends industrial heat exposure limits (AIHA, 1975). The International Organization for Standardization (ISO) first adopted a standard on heat stress in 1982. Its current standard is the result of a revision (ISO, 1989). The limits set by ACGIH, AIHA, and ISO are comparable.

The ISO standard was approved by a majority of its member nations. Many nations (e.g., France, Germany, Belgium, Sweden, South Africa, Australia, and Japan) have their own official standards or unofficial guidelines on heat stress limits.

### **The Danger of Heat Stress Among Workers in Florida**

The fact that many institutions within and outside of the United States recommend limit values in hot working environments exemplifies the importance of worker protection against exposure to heat stress. Workers in numerous industries may be exposed to a hot environment. Those working outdoors in a subtropical climate in Florida are especially susceptible to heat stress disorders. Occupational roles such as shipyard laborers, maintenance workers and members of construction crews, delivery employees, and hazardous waste cleanup personnel comprise a non-exhaustive list of potentially affected workers.

Nearly 390,000 Florida workers are employed in agriculture, mining, and construction (Bureau of the Census, n.d.). This number does not include the self-employed or those working in manufacturing, waste management, or food service where exposure to hot environments is also common. According to the Environmental Protection Agency (n.d.), worker compensation claims for heat illness experienced by agricultural workers are among the highest of any occupation. Pesticide handlers in farming are at particular risk. The special personal protective equipment they use to guard against pesticide exposure

restricts the body's natural way of cooling by evaporation of sweat. Pesticides are absorbed through hot, perspiring skin more quickly than through cool skin. The same situation applies to workers in mining or waste management industries as they also use personal special gear for protection against chemical exposure.

As the regulatory agency for worker safety and health, OSHA has not promulgated a heat stress standard in spite of the recommendations offered by an advisory committee three decades ago. Consequently, OSHA compliance officers must rely on section 5(a)(1) of the Occupational and Safety Act (1970) known as the "general duty clause" that requires employers to furnish a place of employment free of recognized hazards that are causing or likely to cause death or serious physical harm to the employees. OSHA has the burden of establishing all the elements of a section 5(a)(1) violation. Even then, the penalty assessed against the employer may be minimal. For example, in the case of *Secretary of Labor v. The Duriron Company, Inc.* (1983), the penalty was \$200. Setting a standard for heat stress and stipulating procedures to enforce the standard increase awareness and compliance of employers and enhance the safety and health of workers.

### **Conclusion**

The time for OSHA to promulgate a standard for heat stress is overdue. Such a standard is imperative to protect workers in hot climates such as is that found in Florida, where the environmental factors exacerbate other physical and mental strain caused by the workload itself. Scientific methods for the recognition, evaluation, and control of heat stress have been developed. Employers should be required to apply them. Unlike some other states that have their own safety and health programs, Florida has no state-level program and depends on OSHA to set and enforce standards for the benefit of the workers.

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