NCDOL
N.C. Department of Labor

HAZARD ALERT

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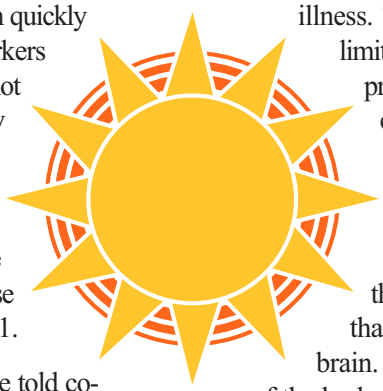
Heat Stress and Working in Hot Conditions

NCDOL Urges Employers and Employees to Be Aware of the Dangers of Working in Hot Conditions

Working during the hotter months of the year can quickly develop into a life-threatening situation when workers forget to take frequent breaks from the heat and do not drink enough water. Heat exhaustion can rapidly progress to heat stroke and death if appropriate measures are not taken to maintain the body's core temperature at a safe level.



The following examples illustrate situations where working in excessive heat resulted in fatalities. These fatalities occurred in North Carolina during 2011.

- An employee was working outside paving. He told co-workers that he was too hot and not feeling well. He went to get some water and to lie down on the grass. After about 30 minutes, co-workers checked on him and found him unresponsive/unconscious. He was taken to the emergency room and later died from hyperthermia. His temperature reached 108.4 degrees F.
- An employee was conducting tree service activities when he fell unconscious due to heat-related conditions. The ambient temperature was above 100 degrees F. He was transported to a local hospital where his condition was diagnosed as a heat-related illness. He was later transferred to a larger hospital where he died almost two months later.
- A worker was gathering eggs in a turkey house. A co-worker noticed that he seemed confused and appeared light-headed. Several co-workers moved him to another area and called EMS. He died after EMS transported him to a local hospital.
- An employee who was working on a residential roofing project began feeling ill. It was the employee's first day on the job, and he required frequent breaks. During lunch, co-workers noticed him shaking and acting incoherently. They sat the employee in the shade and later returned to find him unresponsive. The victim was transported by EMS to a local hospital where he was pronounced deceased.

To understand how heat-related medical emergencies can arise, employers and employees need to know how heat affects the body and how to recognize the signs and symptoms of heat-related illness. To keep internal body temperatures within safe limits, the body must get rid of its excess heat. It does this primarily by varying the rate and amount of blood that circulates through the skin, as well as the release of fluid onto the skin in the form of perspiration or sweating. Evaporation of sweat from the skin helps by cooling the skin.

These are automatic responses that occur when the blood temperature exceeds 98.6 degrees F and that are controlled and maintained in balance by the brain. However, other factors can also affect the ability of the body to regulate the effects of heat. These include the work rate (light, moderate or heavy), age, body size, condition of heart and skin, and fluid and salt intake.

Other factors that affect the body's ability to cool off by sweating include air temperature and humidity, limited air movement, and constant exposure to direct heat sources, such as the sun or an industrial furnace or oven.

When the amount of heat from all sources—outside plus heat generated within the body, i.e., metabolic heat—becomes more than the body can control through perspiration, heat stress can develop. This can range from heat rash or heat cramps to heat exhaustion and heat stroke. If appropriate measures are not taken, death can quickly follow. Recognizing symptoms of heat-related illness and taking appropriate action can prevent deaths.

Below are descriptions, symptoms and recommended first aid measures for heat stroke and heat exhaustion as described by the National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention (CDC).

Heat stroke is the most serious heat-related disorder. It occurs when the body becomes unable to control its temperature: the body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. When heat stroke occurs, the body temperature can rise to 106 degrees F or higher within 10 to 15 minutes. Heat stroke can cause death or permanent disability if emergency treatment is not given.

Symptoms of heat stroke include:

- ☼ Hot, dry skin or profuse sweating

- Hallucinations
- Chills
- Throbbing headache
- High body temperature
- Confusion/dizziness
- Slurred speech

Take the following steps to treat a worker with heat stroke:

- Call 911 and notify the worker's supervisor.
- Move the sick worker to a cool shaded area.
- Cool the worker using methods such as:
  - Soaking the worker's clothes with water.
  - Spraying, sponging or showering the worker with water.
  - Fanning the worker's body.

Heat exhaustion is the body's response to an excessive loss of the water and salt, usually through excessive sweating. Workers most prone to heat exhaustion are those who are elderly, those who have high blood pressure, and those working in a hot environment.

Symptoms of heat exhaustion include:

- Heavy sweating
- Extreme weakness or fatigue
- Dizziness, confusion
- Nausea
- Clammy, moist skin
- Pale or flushed complexion
- Muscle cramps
- Slightly elevated body temperature
- Fast and shallow breathing

Take the following steps to treat a worker with heat exhaustion:

- Have the worker rest in a cool, shaded or air-conditioned area.
- Have the worker drink plenty of water or other cool, non-alcoholic beverages.
- Have the worker take a cool shower, bath or sponge bath.

A good heat-related illness prevention program would likely contain the following elements; however, each work environment or situation may not require all elements.

1. Responsibilities of the employer and employees regarding working in hot, humid environments.
2. Environmental factors and personal health factors that contribute to heat-related illnesses.
3. Procedures for measuring air temperature and documenting effects of other environmental factors (humidity, wind strength, work location) by determining the wet bulb globe temperature (WBGT) index or heat index using any tool or resource available, including the OSHA Heat Safety Tool smart phone app.
4. Guidelines for implementing a heat acclimatization process.
5. Daily water/fluid requirements and management of the water/fluid allocation process.
6. Training on the recognition of the signs and symptoms of heat-related illnesses.
7. Reporting process when employees with heat-related illness symptoms are observed.
8. Establishing first aid procedures.
9. Establishing emergency response procedures.
10. Training for supervisors and employees on the requirements established in the heat stress prevention program.

During any heat-related compliance inspection, the employer's heat-related illness prevention program will be evaluated on a case-by-case basis to determine its effectiveness.

With proper training and supervision of employees working in hot conditions, you can prevent such an unnecessary tragedy from occurring at your workplace. NCDOL offers free training to employers on occupational safety and health standards and requirements. Copies of safety and health standards for general industry (29 CFR 1910), construction (29 CFR 1926) and agriculture (29 CFR 1928) are available from NCDOL/OSH/ETTA. Publications can also be found online at **www.labor.nc.gov**.

For more information concerning education, training and interpretations of occupational safety and health standards contact:

Education, Training and Technical Assistance Bureau

Fourth Floor, Old Revenue Building, Raleigh, N.C.
Telephone: 919-707-7876, Fax: 919-707-7965

For more information concerning occupational safety and health consultative services contact:

Consultative Services Bureau

Third Floor, Old Revenue Building, Raleigh, N.C.
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Printed 4/12

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