ENVIRONMENTAL HEALTH AND SAFETY
University of Nebraska-Lincoln

Safe Operating Procedure

(Revised 7/24)

HEAT STRESS

Although outdoor workers are more likely to think about possible heat stress, the condition is also of concern to workers in any area prone to heat build-up such as warehouses, storerooms, kitchens/baking areas, laundry areas, etc. This SOP provides guidance on risk factors, mitigation strategies, and recognizing signs and symptoms as an aid to avoid heat stress and illnesses.

Working in the heat stresses the body and can lead to illness or even death in severe cases. Exposure to heat can also increase the risk of other injuries because of sweaty palms, fogged-up safety glasses, dizziness, and burns from hot surfaces. Every year thousands of workers become sick from heat exposure and a number of workers die.

Risk Factors

- **Weather/Working Conditions.** The risk of heat stress is relative to temperature, humidity, sunlight, and wind speed. High temperature, high humidity, direct sunlight and low wind speed make the worst combination. Working indoors in areas where heat is generated and/or is not easily dissipated can be a risk factor. If possible, schedule outdoor heavy work for the cooler parts of the day. Indoors, enhance ventilation/air movement.
    - The United States Occupational Safety and Health Administration (OSHA) has published a proposed heat injury and illness prevention regulation. The following heat triggers are established in the proposed rule:
        - Initial heat trigger: heat index of 80^0 F[i]
        - High heat trigger: heat index of 90^0 F[ii]
    - OSHA's proposed rule excludes short duration employee exposures at or above the initial heat trigger of 15 minutes or less in any 60-minute period as well as sedentary work activities at indoor work areas that only involve some combination of sitting, occasional standing and walking for brief periods of time (e.g., walking to the restroom or copier), and occasional lifting of objects weighing less than 10 pounds.

- **Personal Factors and Physical Demands**. The risk of heat stress increases with physical demands. For example, a worker who is walking is at higher risk than a worker who is riding in a vehicle. A worker who is lifting and carrying heavy items is at the greatest risk. Certain persons may also be at greater risk for heat illness, such as those

with diabetes, obesity, heart disease, high blood pressure, aged, and those taking certain medications, such as diuretics.

Signs and Symptoms

- **Heat rash** is a skin irritation marked by small clusters of pimples or blisters caused by excessive sweating during hot, humid weather.

- **Heat cramps** occur when excessive sweating results in loss of normal levels of body moisture and salts. Heat cramps often occur in the abdomen, arms, or legs and may be an early symptom of a more serious heat illness- heat exhaustion or heat stroke. If you experience heat cramps, stop the strenuous activity, get to a cooler environment, drink fluids, and do not resume the strenuous activity for several hours after the cramps subside. Seek medical attention if you have an underlying health condition.

- **Heat fainting** (heat syncope) is a fainting (syncope) episode or dizziness that usually occurs with prolonged standing or sudden rising from a sitting or lying position. Factors that may contribute to heat syncope include dehydration and lack of acclimatization. If you feel dizzy, seek a cool spot to rest and drink fluids. Slowly acclimate to the work and stop if the symptoms recur. Seek medical attention if you have an underlying health condition

- **Heat exhaustion** is often identified with several of the following symptoms: heavy sweating, extreme weakness, dizziness, confusion, nausea, clammy skin, muscle cramps, elevated body temperature, and/or fast and shallow breathing. Left untreated, heat exhaustion can quickly progress to heat stroke. Persons with symptoms of heat exhaustion should seek a cool place to rest and drink fluids. Often a cool shower or bath will help reduce the body temperature. Persons with underlying health conditions should seek medical attention.

- **Heat stroke** occurs when the body temperature rises about 104 degrees F. In the case of heat stroke, the body's natural ability to cool itself is compromised and internal body organs may be damaged. Symptoms may include hot, dry skin or profuse sweating, rapid pulse, throbbing headache, dizziness, hallucinations, slurred speech, nausea, confusion, loss of consciousness, and seizures. If heat stroke is suspected, call 911 immediately and begin first aid by moving to a cool location, removing excess clothing, wetting the body with cool water, and fanning.

Mitigation Strategies

- **Acclimation.** Tolerance to the heat can be increased through a process of acclimation that involves gradually increasing exposure time and work load. New employees and workers returning from an absence of two weeks or more should take care to re-acclimate to the conditions. OSHA proposed the following acclimatization protocols when the heat index is 80^0 F or more:

- For new employees, restrict exposure to heat to no more than 20% of the normal work shift on the first day; 40% on the second day; 60% on the third day; 80% on the fourth day.
- For returning employees, restrict exposure to heat to no more than 50% of the normal work shift on the first day; 60% on the second day; 80% on the third day.

- **Appropriate Clothing.** Wear light, loose clothing and a hat (when in the sun). In some cases, personal cooling devices (such as water circulating cooling vests) may be advisable. If cooling Personal Protective Equipment (PPE) is provided, the supervisor must ensure that it is properly maintained at all times during use.

- **Hydration**. Pre-hydrate by drinking 8-16 ounces of water *before* working in the heat. Avoid alcohol, coffee, tea, or soda, which act as diuretics and further dehydrate the body. Monitor your urine output. Large volumes of relatively clear or light-colored liquid indicate proper hydration. Small volumes and/or dark urine may be indicators of dehydration. Under OSHA's proposed rules, employers are required to provide at least 1 quart of cool drinking water per employee per hour when the heat index is 80^0 F or more. Drinking containers are not to be shared between employees; nor shall employees potentially contaminate shared drinking water sources by "dipping" cups or similar activity. Employees are encouraged to consume water in the indicated quantity.

- **Adequate Rest Periods.** Avoid overexertion and work at a steady pace. Heed the body's signals. Take plenty of breaks in shaded or cooler areas. OSHA's proposed standard includes the following provisions:
  - For outdoor work sites when the heat index exceeds 80^0 F, employers must provide access to break areas that have natural or artificial shade or air-conditioning. For indoor work sites, break areas are to be air-conditioned or have increased air-movement and dehumidification, if appropriate, and provide relief from radiant heat, if applicable.
  - Employers must encourage and allow employees to take unscheduled rest breaks as needed to prevent overheating when the heat index exceeds 80^0 F.
  - In addition to unscheduled rest breaks, employers are required to provide employees with a 15-minute rest break at least every two hours to be taken at the designated rest location when the heat index exceeds 90^0 F.

- **Communication.** Indoor work areas that present risk of heat-related illness should have signage warning of the hazard. When possible, work in pairs so that co-workers can observe each other for signs of heat related illness. OSHA's proposed standard includes the following provisions:
  - When the heat index is 80^0 F or more, the employer must maintain effective and frequent (every few hours) two-way communication (personal, phone, radio) with employees so that employees are reminded of heat illness prevention strategies and can report heat-related symptoms.
  - When the heat index is 90^0 F or more, the employer must:

- Issue hazard alerts prior to the work shift (or when the heat index reaches 90^0 F) to remind employees of the importance of drinking plenty of water; taking both scheduled and unscheduled rest breaks; procedures for seeking help for symptoms of a heat emergency (e.g., fainting, disorientation, elevated heart rate, vomiting, etc.).
- Observe employees for signs and symptoms of heat related illness through a buddy system or observation by a supervisor or heat safety coordinator. For employees who are alone at a work site, employers must maintain a means of effective, two-way communication and make contact with the employee at least every 2 hours.

- **Education.** Heat stress can manifest as a number of conditions, all to be taken seriously and some requiring medical assistance to avoid permanent aftereffects. Workers should be trained to recognize the signs and symptoms of heat stress, strategies for reducing risk of heat-related illness, and proper actions to take in response to potential heat-related illness. Training should occur at the time of assignment to work in a hot environment and at least annually thereafter. For outdoor work, training should be provided shortly before the hot season begins.

  The National Institute for Occupational Safety and Health (NIOSH) developed a Heat Safety Tool App available in both English and Spanish. The app provides reminders about protective measures that should be taken at the indicated risk level to protect workers from heat-related illness, for example, reminders about drinking enough water, recognizing signs and symptoms of heat-related illness, planning for and knowing what to do in an emergency. (https://www.cdc.gov/niosh/topics/heatstress/heatapp.html).

[i] Or a wet bulb globe temperature equal to the NIOSH Recommended Alert Limit.
[ii] Or a wet bulb globe temperature equal to the NIOSH Recommended Action Limit.