

ALUM ROCK UNION ELEMENTARY SCHOOL DISTRICT



HEAT STRESS PREVENTION PLAN

Updated July 27, 2021

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Scope: This Plan covers employees who are exposed to heat or hot conditions at or above the threshold levels for work areas and activities identified in the heat stress hazard assessment.

Policy: This organization is committed to protecting employees from the hazards of hot conditions and to preventing heat-related illnesses at the workplace. We will identify, evaluate, and control potential exposure of our employees to extreme temperature, humidity, and other heat-related factors.

PLAN ADMINISTRATION

Plan Administrator. The Plan Administrator, Ed Villarreal, Director of Maintenance and Operations is responsible for implementing the Heat Stress Prevention Program, monitoring work area heat conditions and for ensuring that employees are trained to recognize the signs and symptoms of heat stress illnesses or injury and what to do if these occur.

The Administrator may designate and authorize other personnel to implement specific components of the Plan.

Supervisors. Supervisors are responsible for encouraging employees to frequently consume water or other acceptable beverages to ensure hydration.

Employees. Employees are responsible for monitoring their own personal factors for heat-related illness including consumption of water or other acceptable beverages to ensure hydration.

Plan Review and Update

This Plan will be periodically reviewed and updated when:

- New activities or equipment that creates heat stress are introduced into the workplace.
- Evaluations of heat stress hazards, injuries, and illnesses demonstrate that the current Plan is outdated or not effective.
- Regulatory or applicable national consensus standards change that require this Plan to be updated.

DEFINITIONS

Acclimatization or acclimate is the physiological (i.e., physical, mechanical, and biochemical) change that allows the human body to adapt or get used to the effects of a new physical environment or climate. After a period of acclimatization, the same physical activity will produce fewer cardiovascular demands. The worker will sweat more efficiently, causing better evaporative cooling, and thus will more easily be able to maintain normal body temperatures.

Calorie is the amount of heat required to raise 1 gram of water 1°Celsius (C) (based on a standard temperature of 16.5 to 17.5°C).

Conduction is the transfer of heat between materials that contact each other. Heat passes from the warmer material to the cooler material. For example, a worker's skin can transfer heat to a contacting surface if that surface is cooler, and vice versa.

Convection is the transfer of heat in a moving fluid. Air flowing past the body can cool the body if the air temperature is cool. On the other hand, air that exceeds 35°C (95° Fahrenheit (F)) can increase the heat load on the body.

Dry bulb (DB) temperature is the measurement of the heat content of freely exposed air measured by a thermal sensor that is shielded from direct radiant energy sources.

Evaporative cooling takes place when sweat evaporates from the skin. High humidity reduces the rate of evaporation and thus reduces the effectiveness of the body's primary cooling mechanism.

Globe temperature is the temperature inside a blackened, hollow, thin copper globe.
Heat is a measure of energy that is transferred by a difference in temperature.

Metabolic heat is a by-product of the body's activity.

Natural wet bulb (NWB) temperature is measured by exposing a wet sensor, such as a wet cotton wick fitted over the bulb of a thermometer, to the effects of evaporation and convection. The term "natural" refers to the movement of air around the sensor.

Radiation is the transfer of heat energy through space. A worker whose body temperature is greater than the temperature of the surrounding surfaces radiates heat to these surfaces. Hot surfaces and infrared light sources radiate heat that can increase the body's heat load.

Heat-Related Illnesses

Illness as defined by OSHA is generally not instantaneous and occurs some time (hours or days) after the initial exposure to an occupational hazard. For example, an instantaneous reaction such as a burn after touching a hot surface is considered an injury; whereas a delayed reaction to a hot environment such as heat exhaustion that occurs hours after the initial exposure is considered an illness.

Heat collapse is a condition where the brain does not receive enough oxygen because blood pools in the extremities, resulting in a loss of consciousness (fainting or syncope). This reaction is similar to that of heat exhaustion and does not affect the body's heat balance. However, the onset of heat collapse is rapid and unpredictable. Heat syncope is a fainting 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.

Heat cramps are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. Cramps can be caused by both too much and too little salt. Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution ($\pm 0.3\%$ sodium chloride), excess salt can build up in the body if the water lost through sweating is not replaced. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments. Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur. Recent studies have shown that drinking commercially available carbohydrate-electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

Heat exhaustion is a condition with symptoms of headache, nausea, vertigo, weakness, thirst, and giddiness. Fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, a medical emergency.

Heat fatigue is a temporary state of discomfort and mental or psychological strain arising from prolonged heat exposure. It is generally caused by fluid loss. Workers unaccustomed to the heat are particularly susceptible and can suffer, to varying degrees, a decline in task performance, coordination, alertness, and vigilance. There is no treatment for heat fatigue except to remove the heat stress before a more serious heat-related condition develops. The severity of transient heat fatigue will be lessened by a period of gradual adjustment to the hot environment (heat acclimatization).

Heat rash is “prickly” heat manifested as red papules (i.e., small, inflammatory, irritated spots on skin) and usually appears in areas where the clothing is restrictive. It is the most common problem in hot work environments. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs on skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

Heat stroke is a condition when the body’s system of temperature regulation fails and body temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict. Heat stroke is a medical emergency. The primary signs and symptoms of heat stroke are confusion, irrational behavior, loss of consciousness, convulsions, a lack of sweating (usually), hot and dry skin, and an abnormally high body temperature (e.g., a rectal temperature of 41°C (105.8°F)). If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of work load and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict.

HAZARD ASSESSMENT

The Administrator or designee will conduct an initial inspection and hazard assessment of all work areas and environments where hot conditions are anticipated or may occur. He or she will periodically conduct follow-up inspections to ensure compliance with this Plan and to evaluate the effectiveness of heat stress control measures.

During the assessment the inspector will:

- Determine building and facility operating characteristics that may cause, contribute to, or alleviate hot conditions.
- Determine whether engineering and administrative controls are functioning properly.
- Verify information obtained from employee interviews.
- Perform temperature measurements and make other determinations to identify potential sources of heat stress.

Investigators will discuss any operations that have the potential to cause heat stress with engineers or other knowledgeable personnel. A walk-around inspection will cover all affected areas. Heat sources such as furnaces, ovens, and boilers, and relative heat load per employee will be noted.

Heat Stress Factors

The following workplace factors will be considered in the assessment for heat stress:

- Air temperature
- Radiant heat sources
- Conductive heat sources
- Humidity
- Direct physical contact with hot objects
- Workload activity and duration
- Semipermeable or impermeable protective clothing

The following worker heat sensitivity factors will also be considered in evaluating the potential for heat stress:

- Age
- Weight
- Degree of physical fitness
- Degree of acclimatization
- Metabolism
- Use of alcohol or drugs
- Medical conditions such as hypertension
- Prior heat injury (predisposes an individual to additional injury)

HEAT STRESS PREVENTION PROGRAM

This Heat Stress Prevention Program describes controls and work practices to protect employees from heat stress while working in hot conditions.

Program Implementation Criteria

The Administrator or designee will implement the Heat Stress Prevention Program when the action levels for hot conditions in the WBGT are exceeded.

Heat Stress Engineering Controls

The following engineering controls will be implemented before and in combination with work practices.

General Ventilation

General ventilation will be used where feasible and practical to dilute hot air with cooler air. Portable or local exhaust systems will be provided for small areas where general ventilation is not feasible or practical. If the dry bulb temperature is higher than 35°C (95°F) and the air is dry, evaporative cooling may be improved by air movement. When the dry bulb temperature exceeds 35°C and the relative humidity is 100%, air movement will make the worker hotter and forced ventilation will not be used to alleviate heat stress.

Fans

Fans will be provided where general ventilation is insufficient or impractical and when evaporative cooling will be improved by air movement.

Air Cooling or Conditioning

Air cooling or conditioning systems will be provided where feasible and practical.

Insulation

Heating pipes will be insulated or otherwise shielded to reduce radiant heat.

Cool Room

Cool rooms will be used as a recovery area near hot jobs.

Heat Stress Prevention Work Practices

Work practices will be implemented to reduce the risk of elevating an employee's core body temperature. Heat stress prevention practices that may be implemented individually or in combination include:

- Employee work and rest intervals.
- Continual personal monitoring of physiological signs of heat stress.
- Provide cool liquids.
- Establish and implement acclimatization schedules.
- Use warm-weather cooling garments.
- Reduce the physical demands of work, e.g., excessive lifting or digging with heavy objects.
- Provide recovery areas such as air-conditioned enclosures and rooms.
- Use shifts such as early morning, cool part of the day, or night work.
- Use intermittent rest periods with water breaks.
- Use relief workers.
- Use worker pacing.
- Assign extra workers and limit worker occupancy, or the number of workers present, especially in confined or enclosed spaces.
- Schedule work in hot conditions for the cooler part of the day.
- Schedule routine maintenance and repair work in hot areas for the cooler seasons of the year.

Employee Work/Rest Intervals

The Administrator or designee will determine the work/rest intervals and communicate them to employees by *meeting with them in the morning*. Work/rest intervals are adjusted throughout the work shift as needed and communicated to each employee at the conclusion of an applicable rest period, prior to reentry into a work area.

Fluid Replacement

Since dehydration is a primary cause of heat illness, employees on each site will be reminded on the importance of liquid consumption. One cup (8 oz.) every 20 minutes is recommended. Ample supplies of liquids are available at each site.

Personal Protective Equipment

The Administrator or designee will determine the types of PPE that may be used to minimize heat stress after engineering controls and work practices have been implemented and workers are still exposed to heat stress hazards.

Reflective Clothing

Reflective clothing varies from aprons and jackets to suits that completely enclose the worker from neck to feet and can stop the skin from absorbing radiant heat. Because most reflective clothing does not allow air exchange through the garment, the reduction of radiant heat must more than offset the corresponding loss in evaporative cooling. For this reason, reflective clothing should be worn as loosely as possible. In situations where radiant heat is high, auxiliary cooling systems can be used under the reflective clothing.

Wetted Clothing

Wetted clothing is effective when reflective or other impermeable protective clothing is worn. The clothing may be wetted terry cloth coveralls or wetted two-piece, whole-body cotton suits. This approach is effective under conditions of high temperature and low humidity where evaporation from the wetted garment is not restricted.

EMERGENCY RESPONSE

The Administrator or designee will implement the following emergency response procedures for the type of heat stress indicated.

Heat Stroke

If a worker shows signs of possible heat stroke, professional medical treatment will be obtained immediately. The supervisor or co-workers will take the following steps to treat a worker with heat stroke:

1. Call 911 and notify the supervisor.
2. Move the sick worker to a cool, shaded area.
3. Cool the worker using methods such as soaking his or her clothes with water, spraying, sponging, or showering him or her with water, and fanning his or her body.

The worker should be placed in a shady area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first-aid treatment. Regardless of the worker's protests, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

Heat Exhaustion

Heat exhaustion responds readily to prompt treatment. A worker suffering from heat exhaustion should:

- Rest in a cool, shaded, or air-conditioned area.
- Drink plenty of water or other cool, nonalcoholic beverages.
- Take a cool shower, bath, or sponge bath.

Workers suffering from heat exhaustion will be removed from the hot environment and given fluid replacement. They will also be encouraged to get adequate rest.

Heat Syncope (Fainting)

Workers who exhibit signs of heat syncope will be instructed by a supervisor or co-workers to:

- Sit or lie down in a cool place when they begin to feel symptoms.
- Slowly drink water, clear juice, or a sports beverage.

Heat Cramps

Workers with heat cramps should:

- Stop all activity, and sit in a cool place.
- Drink clear juice or a sports beverage.
- Not return to strenuous work for a few hours after the cramps subside, because further exertion may lead to heat exhaustion or heat stroke.
- Seek medical attention if the worker has heart problems, the worker is on a low-sodium diet, or the cramps do not subside within one hour.

Heat Rash

Workers experiencing heat rash will be treated according to the following procedures:

- Directed to work in a cooler, less humid environment when possible.
- Keep the affected area dry.
- Use dusting powder to help increase comfort.

TRAINING

All employees who are exposed or potentially exposed to heat stress will receive training regarding heat stress-related injuries and illnesses and prevention measures at the time of assignment to work activities that involve hot conditions.

The following topics will be covered during safety training for heat stress:

- Knowledge of the hazards of heat stress, including environmental factors that might contribute to the risk of heat-related illness (temperature, humidity, radiant heat, air movement, conductive heat sources, workload activity and duration, and personal protective equipment).
- Recognition of predisposing factors, danger signs, and symptoms (e.g., age, degree acclimatization, medical conditions, consuming alcohol, caffeine use, nicotine use, and use of medications that affect the body's response to heat).
- The importance of frequent drinking of small quantities of water.
- Awareness of first-aid procedures for heat stroke and other heat stress-related illnesses.
- The procedure for reporting signs and symptoms of heat-related illness in themselves and co-workers.
- Employee responsibilities in avoiding heat stress.
- Use of protective clothing and equipment, including the importance of removing heat-retaining PPE, such as non-breathable chemical resistant clothing, during breaks.

- First aid and other emergency response procedures

Refresher Training

Personnel covered by this Plan will receive refresher heat stress training at least once per year, and whenever there is a change in work assignment or hot conditions, or when a new heat source is introduced to a work area.

RECORDKEEPING

Heat stress-related illnesses that are relieved by first aid and do not require additional medical treatment will not be recorded in injury and illness records.

Heat stress-related illnesses that require medical treatment will be recorded as an illness and/or injury on illness recordkeeping forms. For example, the administration of fluids by intravenous injections is recordable as medical treatment, and more serious cases of heat disorders involving such injections will be entered into the injury and illness records. In addition, any diagnosis by a physician or other licensed healthcare professional of heat syncope (fainting due to heat) will be recorded.