Environmental Health and Safety **TITLE: Heat Stress Safety Procedure**	**Effective Date:** 09/25/2023	**Procedure Number:** EHS_SOP_225
	Revision: 0	**Page** 1 of x
	Approved by: Director, Environmental Health & Safety	

1. APPLICABILITY

This procedure applies to all departments, support personnel, functional units and Direct Support Organization (DSO) within the University of Central Florida (UCF), with employees that are expected to conduct strenuous work in hot environments or outdoors directly under the sun. Some UCF Departments or working groups with employees potentially exposed to heat stress are Athletics, Police, Housekeeping, Telecommunications, Parking Services, Maintenance, Landscape and Natural Resources, Utilities and Energy Services, Researchers, Environmental Health and Safety, and Emergency Response among others.

2. PROCEDURE STATEMENT

This Heat Stress Procedure provides information to managers, supervisors, superintendents, principal investigators, and employees about the hazards associated with strenuous work in hot environments and how to reduce the risk of illness, injury, or fatality from heat-related disorders.

As stated in the “UCF Design, & Renovation, and Construction Standards (2-8-21), Section C.7 Environmental Health and Safety Construction Information”, contractors are individually responsible for meeting and monitoring the requirements set forth by OSHA.

3. DEFINITIONS

Acclimatization: gradual physiological adaptation to the environmental conditions that improves an individual’s ability to tolerate heat stress.

Administrative Controls: work practices that will reduce the employee's exposure to conditions causing heat related stress (e.g., job rotation, assigning more staff to do certain jobs, establishing a work/rest schedule, scheduling strenuous jobs for early mornings when the heat index is lower).

Engineering Controls: physical modifications to the workplace facilities to reduce the employee's exposure to heat related stress (e.g., air conditioning, cooling fans, insulation of hot surfaces).

Heat Index: temperature the body feels when heat and humidity are combined. For a given temperature, the higher the humidity the higher the heat index. It is expressed in five categories: minimal, low, moderate, high, and extreme.

Heat-Related Disorder: physical illnesses caused by prolonged exposure to hot temperatures. The severity could vary from a minor heat cramp to a heat stroke or death.

Heat Stress: heat load to which a worker may be exposed from the combined contributions of environmental factors (e.g., air temperature, humidity, air movement, and radiant heat), and clothing.

Hot Environment: environmental conditions that could elevate the heat index to a risk level of moderate, high, or extreme. This includes but are not limited to: hot temperatures, high humidity, working directly under the sun, no air movement, no controls to reduce the impacts of equipment that radiated heat, protective clothing or gear worn, and strenuous work.

Strenuous Work: physical work that requires the use of force and a significant amount of energy at a moderate to fast pace (e.g., intense arm and trunk work, pushing or pulling heavy loads, shoveling, turning industrial valves manually).

Supervisors: refers to managers, supervisors, superintendents, principal investigators, or any other UCF personnel in charge of an operation or providing instructions or guidance to other staff on how to perform a specific task.

Work/Rest Schedule: work practice established by management to allow employee's body to recover from heat stress. For the best protection from heat-related illness, workers should spend the rest periods in a cooler place (e.g., in a lightly air-conditioned room, trailer or vehicle, or in full shade).

4. RESPONSIBILITIES

I. The Department of Environmental Health and Safety (EHS)

- Assist in the implementation of this procedure as requested by the supervisors
- Provide assistance or collaborate with all necessary training related to heat stress
- Assist supervisors in selecting adequate administrative controls (work practices) and Personal Protective Equipment (PPE) to properly protect the employees if engineering controls are not feasible
- Assist supervisors in providing information for the on-the-job heat stress training
- Be available to evaluate the heat exposure of specific jobs and make recommendations to reduce the heat stress risk
- Evaluate and update this procedure as necessary
- Keep records of all training required by this procedure

II. Supervisors

- Ensure the implementation of this procedure
- Contact EHS to coordinate all necessary training
- Monitor the environmental conditions and ensure that all necessary precautions are taken to protect their supervised staff
- Establish the necessary day-to-day work safety practices including the work/rest schedules considering the specific job's physical demands and the environmental conditions
- Ensure that all supervised personnel are properly trained and knowledgeable of the safety precautions when working in hot environments, as well as all the signs and symptoms caused by heat stress
- Ensure that engineering and administrative controls were considered before assigning personal protective equipment as the only method to reduce the exposure to heat related disorders
- Provide ready access to employees to drinking water or electrolyte replacement drinks when needed
- Allow for worker acclimatization to the hot environment when needed
- Ensure that the supervised personnel have all the necessary equipment to do the job in the safest possible way
- Provide safety reminders to the supervised staff on the morning briefings
- Identify the jobs with the potential for causing heat-related disorders and coordinate evaluations with EHS to identify the best available hazard control methods
- Enforce the compliance of supervised personnel regarding this procedure

- Inform EHS about changes in procedures or equipment that will affect this procedure

III. Employees

- Follow safe practices at all times
- Attend all required training and refreshers
- Inform the supervisor if they do not understand the information provided on training, or if there is any other safety concern before working in hot environments
- Use, inspect, and maintain all PPE as recommended by the manufacturer
- Inform the supervisor about any defects or damage to the PPE, or any of its components
- Monitor themselves, and their assigned pairs when applicable, for signs and symptoms of heat stress
- Assist the supervisors in identifying jobs or operations of high risk of illness or injury due to heat stress

5. PROCEDURE

Working in hot conditions or directly under the sun poses significant safety hazards to the workers. The factors that affect the amount of heat stress a worker experiences in a hot environment typically are:

- Temperature
- Relative humidity
- Air velocity
- Radiant heat (direct heat from the sun or a furnace)
- Work rate and physical effort required
- Duration of the job
- Type of clothing and PPE

All of these factors need to be evaluated in order to minimize their impact on the worker. Personal characteristics such as age, weight, physical fitness, and acclimatization to the heat also need to be factored-in to determine the worker's risk.

I. Heat-Related Disorder

The human body regulates high temperatures by two primary mechanisms; blood flow and sweating. Blood is circulated to the skin, increasing the skin temperature and

allowing the body to give off the excess heat through the skin. Sweating occurs when the body senses the heat loss due to increased blood circulation is not enough to cool the body. Evaporation of the sweat cools the skin and eliminates large quantities of heat from the body. If the body is unable to do this, the body's core temperature rises and the heart rate increases. If the body continues to store heat, the person may begin to have difficulty concentrating, may become irritable and lose the desire to drink. The next stage is often fainting which would signal a medical emergency. Table-1 includes the common heat disorders with the accompanying symptoms and appropriate first aid measures.

Table-1 Heat-Related Disorders

Disorder	Cause	Signs & Symptoms	Treatment
Heat Rash	-sweat that does not evaporate from the skin	-Clusters of red bumps on skin -Often appears on neck, upper chest, folds of skin	-Try to work in a cooler, less humid environment when possible -Keep the affected area dry
Heat Cramps	-Heavy sweating -Loss of salt	-Painful spasms of arms, legs and abdomen -Sudden onset -Hot, moist skin	-Drink water -Massage cramped area -Rest
Heat Exhaustion	-Dehydration -Non-acclimatized	-Heavy sweating -Intense thirst -Pale, moist, cool skin -Rapid pulse -Fatigue, weakness -Fainting, collapse	-Move to shade or an air-conditioned space -Rest, lying down, legs elevated -Loosen clothing -Drink water
Heat Stroke	-Excessive exposure to hot environments -Body's system of temperature regulation fails -Body temp. rises to critical levels	-High body temperature -Lack of sweating -Hot, red, dry skin -Rapid pulse -Chills -Difficulty breathing -Disoriented Weakness -Unconsciousness	-MEDICAL EMERGENCY -Call for emergency help -Immerse person in water -Massage body with ice

II. Engineering Controls

Engineering controls are always the preferred hazard control method, however, they are not always feasible. These are physical modifications to the workplace facilities or equipment to reduce the employee's exposure to heat related stress. The following are some engineering controls for heat stress that could be considered when possible:

- General ventilation, air conditioning, cooling spot units, local exhaust ventilation at the point of heat generation, etc.
- Using riding equipment or machinery (tractors, trucks, etc.) with air conditioning
- Using machinery or equipment to open trenches or to dig holes instead of using shovels and manual processes
- Using lighter equipment in general, especially if it needs to be carried
- Shielding radiant energy sources
- Opening windows (in areas with no air conditioning) or installing fans to create air flow
- Provide shaded areas with tarps or canopies

III. Training

All employees working in hot environments shall receive safety training on heat stress. Training will be coordinated by the supervisors. It could be conducted by EHS, supervisors, or a combination of both.

Training shall include, but is not limited to, the following topics:

- Causes of heat stress
- Hazard controls (engineering controls, work practices, and PPE)
- Signs and symptoms of heat-related disorders
- Actions to take to mitigate the effects of heat-related disorders.

IV. Acclimatization

New employees not used to work in hot environments – work schedule should be no more than 20% of the usual duration of work in the heat on day 1 and no more than 20% increase on each additional day.

Employees returning from an absence of two weeks or more - should have a 3-5 day period of acclimatization (this period should begin with 50% of the normal workload the first day and gradually build up to 100% on the last day).

V. Fluid Intake

Fluids, such as water or electrolyte replacement drinks (i.e. Gatorade, Powerade, etc.), shall be conveniently available to workers so they can drink about 8 oz. of liquids every

15-20 minutes. For remote outdoor work locations this means providing a cooler of liquids and ice that the workers can transport with them to the work area.

As a general rule of thumb when conducting strenuous jobs in hot environments, drinking water is normally sufficient when jobs are two hours or less. If the job takes more than two hours, electrolyte replacement drinks are recommended.

VI. Other Administrative Controls

These type of hazard controls are work practices intended to reduce the employee's exposure to conditions causing heat related stress. The following are some examples:

- Job rotation
- Assigning more staff to do certain jobs
- Establishing a work/rest schedule
- Scheduling strenuous jobs for early mornings when the heat index is lower

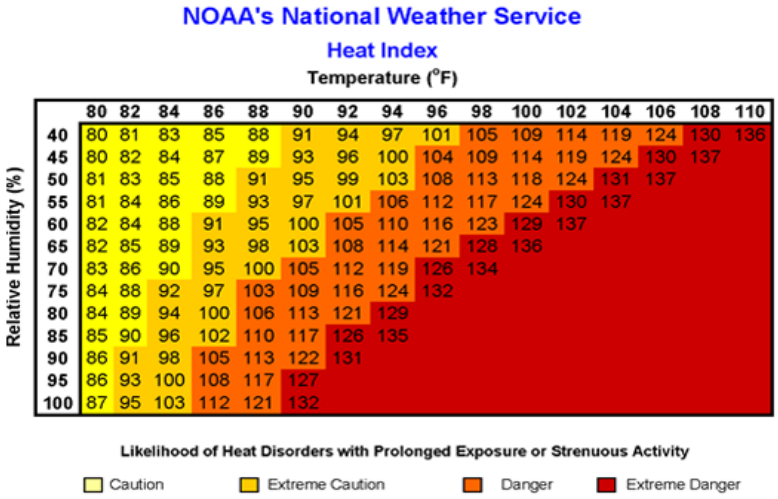
VII. Weather Conditions

Supervisors are responsible for monitoring weather conditions frequently during the day and adjust the work schedule accordingly. It might be appropriate to change the actual hours of work to minimize working during the heat of the summer months. Heavy work should be scheduled for the cooler hours of the day. Non-essential tasks should be postponed when there is a heat warning issued.

VIII. Heat Stress Index

This is the temperature the body feels when heat and humidity are combined. It can be used to help determine the risk of heat-related illness for outdoor workers, what actions are needed to protect workers, and when those actions are triggered. Depending on the heat index value, the risk for heat-related illness can range from lower to very high to extreme. As the heat index value goes up, more preventive measures are needed to protect workers. Heat index values are divided into four bands associated with four risk levels. The heat stress index can be determined using the temperature and humidity of the current location provided by the National Oceanic and Atmospheric Administration (NOOA) and the following matrix.

Table-2 Heat Index Matrix



The next table, established by the Occupational Health and Safety Administration (OSHA), provides guidelines on the risk level and protective measures based on the heat index.

Table-3 Heat Risk Levels and Protective Measures

Heat Index	Risk Level	Protective measures
Less than 91^0F	Lower (Caution)	Basic heat safety and planning
91^0F to 103^0F	Moderate (Extreme Caution)	Implement Precautions and heighten awareness
103^0F to 115^0F	High (Danger)	Additional precautions to protect workers
Greater than 115^0F	Very High (Extreme Danger)	Triggers more aggressive protective measures

The heat index and risk level can also be determined by using a free application developed by OSHA for mobile phones or tablets. The application is called “Heat” and can be downloaded using the following link:

https://www.osha.gov/SLTC/heatillness/heat_index/heat_app.html

Full sunshine can increase heat index values by up to 15° Fahrenheit. Strenuous work and the use of heavy or specialized protective clothing also have an additive effect. As a result, the risk at a specific heat index could be higher than that listed above if the work is in direct sunlight without a light breeze. Extra measures, including implementing precautions at the next risk level, are necessary under these circumstances.

IX. Work/Rest Schedules

When possible, heavy and minimal work activities should be alternated. Tasks should be rotated among workers. Employees should be allowed sufficient breaks in a cool

area to avoid heat strain and promote recovery. Shade or an air-conditioned break room should be provided.

Rest periods do not necessarily mean that the workers are on break. These can be productive times to perform mild or light work, such as completing paperwork, sorting small parts, attending a meeting, or receiving training.

X. Workplace Surveillance

Supervisors with employees working outdoors should pay attention to the temperature, humidity, and heat stress indices, especially if they are doing strenuous work. NOOA's National Weather Service is a good source of information for weather and forecast. If the heat stress index exceeds 120^{o}F, or 118^{o}F for workers with protective clothing, work in a heat stress environment must stop. If it is imperative that work gets done, contact EHS for additional assistance. Also, discontinue any work activity for a person when:

- There are complaints of sudden and severe fatigue, nausea, lightheadedness, dizziness, or fainting
- There are periods of inexplicable irritability, malaise, or flu-like symptoms
- Sweating stops and the skin becomes hot and dry

Additionally, supervisors shall be aware of other non-occupational risk factors that can affect their employees:

- Age
- The use of certain drugs and alcohol consumption
- Obesity
- Physical fitness

XI. Personal Protective Equipment (PPE)

During work in hot environments, workers should use the lightest weight or "breathable" protective garments that provide adequate protection. This may include the wearing of shorts if this does not create a hazard for the worker's legs. For work in extremely hot environments, cool vests should be considered. These vests typically provide 1-2 hours of cooling, recharge in 20 minutes, and maintain a constant temperature of 55^{0}F.

6. PROCEDURE EVALUATION AND REVIEW

This procedure should be evaluated and updated by EHS as needed or if there is any change on the process, equipment, or work environment that affects the employee's exposure to heat stress as informed by the supervisors. Information from supervisors and employees is vital for the review and evaluation of this procedure.

7. DOCUMENT HISTORY

Date	Revision number	Author	Modifications
09/25/2023	0	Renee Michel	Annual review