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1. Applicability

This Heat Illness Prevention Procedures Manual has been created to comply with California Code of Regulations Title 8. Section 3395. Heat Illness Prevention. The Heat Illness Prevention standard is applicable to any outdoor workplace, whenever environmental or personal risk factors for heat illness are present.

2. Responsibilities

Department Director/Chair/Deans are responsible for ensuring that this written procedures manual is implemented and available to UC Merced employees and that training is provided to employees.

Supervisors must evaluate work conditions during the warm periods of the year prior to sending employees to perform outdoor work. Cal/OSHA defines a trigger temperature and related "shade up" provisions when temperatures reach 80°F and "high heat" procedures are to be implemented when temperatures reach 95°F. Typically, temperatures above 80°F, especially with heavy physical work activities, would represent conditions where there is a risk of heat illness. Other factors, such as high humidity or worker protective clothing could result in a risk of heat illness at lower temperatures.

3. Heat Illness Risk Factors

3.1. Personal Risk Factors

Personal risk factors for heat illness include;

3.1.1. General Health & Age

Those at greatest risk for heat-related illness include personnel that are 65 years old or older, overweight, ill or taking certain medications. Additional risk factors Include: fever, dehydration, heart disease, mental illness, poor circulation, and sunburn.

3.1.2. Acclimatization

Temporary adaptation of the body to work in the elevated temperatures occurs gradually. The body needs time to adapt to working in the heat. When temperatures rise suddenly, an employee is at increased risk for heat illness while their body acclimatizes to the heat. Acclimatization is particularly important for employees who are returning to work after a prolonged absence, recent illness, or recently moving from a cool to hot climate. For heavy work under very hot conditions, a period of 4-10 days of progressively increasing work time is recommended. For less severe conditions, 2-3 days of increasing work activity and duration are recommended (for guidance, see Attachment A).

3.1.3. Alcohol & Caffeine

Alcoholic beverages, coffee, tea or other drinks containing caffeine will dehydrate the body and increase the risk of heat illnesses.

3.2. Environmental Risk Factors

Environmental risk factors for heat illness are defined in Cal/OSHA regulations as working conditions that create the possibility that heat illness could occur, including air temperature, relative humidity, radiant heat from the sun, and other sources, conductive heat sources such as the ground, air movement, work load severity and duration. Additional factors may include the use of protective clothing and other personal protective equipment.

The Heat Index (HI) is the temperature the body feels when heat and humidity are combined. The chart below shows the HI that corresponds to the actual air temperature and relative humidity. This chart is based upon shady, light wind conditions. Exposure to direct sunlight can increase the HI by up to 15°F. This table can be used in consideration of the risk factors and the subsequent need for water, rest and shade. Regardless of the actual ambient temperature, provision of water and shade as described above should be implemented whenever the Heat Index exceeds 80°F. See Attachment B for guidance on monitoring the weather.

NOAA's National Weather Service

Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

4. Identifying Heat Illness

Heat illness is a group of serious and escalating medical conditions that can result from the body's inability to cope with a particular heat load. These illnesses include heat fatigue, heat cramps, heat exhaustion, and heat stroke. The National Institute of Occupational Safety and Health (NIOSH) publication *Working in Hot Environments* describes the symptoms and response measures for several types of heat illness, as follows:

4.1. Transient Heat Fatigue

Refers to the temporary state of discomfort and mental or psychological strain arising from prolonged heat exposure. Workers unaccustomed to the heat are particularly susceptible and can suffer, to varying degrees, a decline in task performance, coordination, alertness, and vigilance. The severity of transient heat fatigue will be lessened by a period of gradual adjustment to the hot environment (heat acclimatization).

4.2. Heat Rash

Also known as prickly heat, is likely to occur in hot, humid environments where sweat is not easily removed from the surface of the skin by evaporation and the skin remains wet most of the time. The sweat ducts become plugged and a skin rash frequently appears. When the rash is extensive or when it is complicated by infection, prickly heat can be very uncomfortable and may reduce a worker's performance. The worker can prevent this condition by resting in a cool place part of each day and by regularly bathing and drying the skin.

4.3. Heat Cramps

Painful spasms of the muscles that occur among those who sweat profusely in heat, drink large quantities of water, but do not adequately replace the body's salt loss. The drinking of large quantities of water tends to dilute the body's fluids, while the body continues to lose salt. Shortly thereafter, the low salt level in the muscles causes painful cramps. The affected muscles may be part of the arms, legs, or abdomen, but tired muscles (those used in performing the work) are usually the ones most susceptible to cramps. Cramps may occur during or after work hours and may be relieved by taking salted liquids by mouth. CAUTION: Persons with heart problems or those on a low sodium diet who work in hot environments should consult a physician about what to do under these conditions.

4.4. Heat Exhaustion

Includes several clinical disorders having symptoms which may resemble the early symptoms of heat stroke. Heat exhaustion is caused by the loss of large amounts of fluid by sweating, sometimes with excessive loss of salt. A worker suffering from heat exhaustion still sweats but experiences extreme weakness or fatigue, giddiness,

nausea, or headache. In more serious cases, the victim may vomit or lose consciousness. The skin is clammy and moist, the complexion is pale or flushed, and the body temperature is normal or only slightly elevated. In most cases, treatment involves having the victim rest in a cool place and drink plenty of liquids. Victims with mild cases of heat exhaustion usually recover spontaneously with this treatment. Those with severe cases may require extended care for several days. There are no known permanent effects. CAUTION: Persons with heart problems or those on a low sodium diet who work in hot environments should consult a physician about what to do under these conditions.

4.5. Heat Stroke

The most serious of health problems associated with working in hot environments. It occurs when the body's temperature regulatory system fails and sweating becomes inadequate. This the body's only effective means of removing excess heat. If this system is compromised a crisis stage can be reached with little warning. A heat stroke victim's skin is hot, usually dry, red or spotted. Body temperature is usually 105°F or higher, and the victim is mentally confused, delirious, perhaps in convulsions, or unconscious. Unless the victim receives quick and appropriate treatment, death can occur. Any person with signs or symptoms of heat stroke require immediate hospitalization. However, first aid should be immediately administered. This includes removing the victim to a cool area, thoroughly soaking the clothing with water, and vigorously fanning the body to increase cooling. Treatment at a medical facility should be directed to the continuation of the cooling process and the monitoring of complications which often accompany the heat stroke. Early recognition and treatment of heat stroke are the only effective means of preventing permanent brain damage or death.

5. Prevention

Shade must be provided if ambient temperature is above 80°F. Workers are required to rest in shaded areas at least every two hours if ambient temperature is above 95°F. Shade must be provided close to the work area and in a place that is convenient to the work site and not a location that is one the workers would object to. Employees must stay hydrated. UC Merced has the responsibility to provide clean, cooled water free of charge. When possible, workers should avoid vigorous physical activities in hot and humid weather. If such work is required, then:

- Drink plenty of fluids
- Avoid alcohol, coffee, and tea - may lead to dehydration
- Take frequent mini-breaks to hydrate yourself
- Supervisors must stay in continual contact with workers. This may be done electronically
- It is recommended that workers wear hats, light colored, loose fitting clothing.

5.1. Provision of Water

Employees are encouraged to drink water frequently and clean, fresh, and cool potable water shall be readily available to employees.

- Supervisors are responsible to ensure employees have an adequate supply of clean, pure, and cool drinking water free of charge (for guidance, see Attachment C).
- Supervisors shall encourage the frequent consumption of small quantities of water, up to 4 cups per hour, when the work environment is above 95°F.
- Drinking water will be provided in sufficient quantities to provide one quart per employee per hour for the entire shift (at least 2 gallons per employee for an 8-hour shift).
- If there are effective procedures for replenishing the water supply during the shift, a minimum of 2 quarts of water per employee may be provided at the beginning of the shift.

5.2. Shade and Rest

A shaded area will be provided which employees may use when they are suffering from heat illness or believe they need a recovery period to prevent heat illness (for guidance, see Attachment D). The shaded area shall be open to the air or ventilated and cooled and access shall be permitted at all times. Canopies, umbrellas or other temporary structures may be used to provide shade, provided they block direct sunlight. Vehicles may not be used for shade area unless such vehicles are air conditioned. Also, shaded areas cannot be in areas that are objectionable to workers. Supervisors are responsible for:

- Ensuring that employees have access to shaded or air conditioned areas (i.e. break room) to prevent or recover from heat illness symptoms or to take rest breaks.
- Emphasizing the importance of taking rest breaks and recognizing when a recovery period is needed
- Emphasizing the importance of taking rest breaks and recognizing when a recovery period is needed
- Supervisors are also responsible to honor employees' request for a recovery period and to monitor such employees during the recovery period

In the event an employee feels discomfort from the heat, accommodation of a recovery period to allow the employee to cool down and prevent the onset of heat illness shall be provided. Employees shall be allowed and encouraged to take a preventative cool-down rest in the shade for a period of no less than five minutes at a time when they feel the need to do so to protect themselves from overheating. Such access to shade shall be permitted at all times. An individual employee who takes a preventative cool-down rest

period shall be monitored and asked if he or she is experiencing symptoms of heat illness: (1) shall be encouraged to remain in the shade; and (2) shall not be ordered back to work until any signs or symptoms of heat illness have abated, but in no event, less than 5 minutes in addition to the time needed to access the shade. UC Merced is responsible to provide appropriate first aid or emergency response according to guidelines in Section 6 of this manual.

5.3. High-Heat Procedures

Additional high-heat procedures are required when the temperature equals or exceeds 95°F. These procedures shall include the following to the extent practicable:

- Ensuring that effective communication by voice, observation, or electronic means is maintained so that employees at the work site can contact a supervisor when necessary. An electronic device, such as a cell phone or text messaging device, may be used for this purpose only if reception in the area is reliable.
- Supervisors will visually observe workers where possible or, at the minimum, contact them via electronic means every two hours or at regular intervals. Such observations will include observing employees for alertness and signs or symptoms of heat illness regularly.
- Reminding employees throughout the work shift to drink plenty of water.
- Supervisors will hold pre-shift meetings (i.e. before work commences for the day) to discuss the need for water and shade during high heat periods.
- Cal/OSHA requires close supervision of all new employees by a supervisor or designee for the first 14 days of the employee's employment by the employer, unless the employee indicates at the time of hire that he or she has been doing similar outdoor work for at least 10 of the past 30 days for 4 or more hours per day.

6. Responding to Heat Illness Emergencies

6.1. Employee Procedures

Any employee who recognizes the symptoms or signs of heat illness in themselves or in co- workers should immediately report this condition to their supervisor. When you recognize signs of heat illness in yourself or in a co-worker:

- Move them to a shaded area for a recovery period of at least five minutes
- Provide pure, cool water (as much as needed)
- Do not leave person
- Monitor individual until recovery is evident
- If the condition appears to be severe or the employee does not recover, then emergency medical care is needed.
- Immediately report to your supervisor any symptoms or signs of your heat illness you may be experiencing or observing in a co-worker
- Call 911 if supervisor is not readily available

6.2. Supervisor Procedures

Supervisors shall;

- Carry cell phones, radios or other means of communication ensuring emergency services can be called and verifying the radios or other means of communication are functional prior to each shift.
- Stay in contact and monitor workers at all times
- Monitor worker suffering from heat illness and not leave such person alone or leave the site until after the arrival of emergency medical personnel.
- Know the exact work locations and have clearly written and precise directions to the work site for emergency responders.

6.3. Emergency Contact Procedures

- Call 911
- Be ready to provide emergency response personnel with directions to work location.
- When working at remote locations you must be able to provide concise directions to emergency response personnel for guidance, see Attachment E)
- Further emergency response guidance for supervisors is provided in Attachment F

6.4. Response to Heat Stroke Symptoms

- Victims of heat stroke must receive immediate treatment to avoid permanent organ damage.
- Always notify emergency services (911) immediately. If their arrival is delayed, they can give you further instructions for treatment of the victim.
- If possible, get the victim to a shady area to rest
- Remove heavy or change to lightweight clothing,
- Cool the victim; effective cooling measures include:
  - Administering cool, non-alcoholic beverages,
  - Applying cool or tepid water to the skin (for example you may spray the victim with cool water from a garden hose),
  - Providing a cool shower or sponge bath,
  - Move to an air-conditioned environment or fan the victim to promote evaporation,
  - Place ice packs under armpits and groins.
- Monitor body temperature with a thermometer and continue cooling efforts until the body temperature drops to 101°F-102°F.

7. Employee and Supervisor Training

All employees, including supervisors, who may work outdoors in conditions where there are environmental risk factors for heat illness shall be provided Heat Illness Prevention training on the information contained in this document including;

- Environmental and personal risk factors for heat illness as well as the added burden of heat load on the body caused by exertion, clothing, and personal protective equipment
- Procedures for complying with the Cal/OSHA requirements
  - Training workers that it is very important to frequently consume water. The recommendation is up to 4 cups per hour when the work environment is hot and employees are likely to be sweating more than usual in the performance of their duties
  - The importance of acclimatization,
  - The different types of heat illness and the common signs and symptoms of heat illness,
  - Buddy system for workers is now required in "High Heat" periods
  - Importance to employees of immediately reporting symptoms or signs of heat illness in themselves, or in co-workers,
  - Employer's procedures for responding to symptoms of possible heat illness, including how emergency rl1edical services will be provided,
  - Procedures for contacting emergency medical services, and if necessary, for transporting employees to a point where they can be reached by an emergency medical service provider including clear and precise directions to the work site

In addition, prior to supervising employees performing work that should reasonably be anticipated to result in exposure to the risk of heat illness, effective training on the following topics shall be provided to the supervisor:

- The supervisor shall be trained on their responsibilities in this heat illness prevention program
- The procedures the supervisor is to follow when an employee exhibits symptoms consistent with possible heat illness, including emergency response procedures
- How to monitor weather reports and how to respond to hot weather advisories
- Further information can be found in the attached guidelines.

8. Issued By and Next Review Date

Issued by:	William C. Collier, Campus Safety Officer
Approved by:	David Ott, EH&S Director
Issue Date:	5/21/2015
Next Review Date:	Three years from Issue Date

9. Attachments

Attachment A: Acclimatization Guidance

Attachment B: Guidance - Monitoring the Weather

Attachment C: Guidance on Provision of Water

Attachment D: Access to Shade Requirements

Attachment E: Remote Location Emergency Response Information

Attachment F: Emergency Response Guidance

Attachment A: Acclimatization Guidance

When ambient temperatures rise to levels higher than employees are accustomed to, supervisors must act effectively by taking the following measures:

- Monitor the weather and be aware of sudden heat wave(s) or increases in temperature to which employees haven't been exposed to for several weeks or longer.
- Cut short or re-schedule the work day during a heat wave or heat spike (e.g., a sudden increase in daytime temperature of 9°F or more). During the hot summer months, the work shift may start earlier in the day or later in the evening.
- Lessen the intensity of work for new employees during a two-week break-in period (i.e., scheduling slower paced, less physically demanding work during the hot parts of the day and the heaviest work activities during the cooler parts of the day). New employees may be assigned to a "buddy" or experienced coworker to watch each other closely for discomfort or symptoms of heat illness.
- Closely observe all employees during a heat wave and monitor for possible symptoms of heat illness. For employees working in remove locations, maintain frequent communication by phone or radio.
- Train employees and supervisors on the importance of acclimatization.

Attachment B: Guidance – Monitoring the Weather

Recommended Equipment:

Supervisors may find a Heat Index chart, radio, cell phone, and thermometer helpful in monitoring weather. Supervisors can access the internet (http://www.nws.noaa.gov), Google (http://www.google.com) for "weather and location zip code," or check the Weather Channel TV Network to view the extended weather forecast in order to plan in advance the work schedule, know whether a heat wave is expected and if additional schedule modifications will be necessary. Supervisors without internet actions can call the California "Dial a forecast" numbers:

- Eureka: (707)443-7062
- Hanford: (559)584-8047
- Los Angeles: (805)988-6610 Ext. 1
- Sacramento: (916)979-3051
- San Diego: (858)297-2107 Ext. 1
- San Francisco: (831)656-1725 Ext. 1

Prior to each workday, supervisors should:

- Review the forecasted temperature and humidity for the worksite and compare it against the National Weather Service Heat Index guideline to evaluate the risk level for heat illness.
    - Employees working in direct sunlight are at greater risk and there is a need to adjust the heat index down 15°F
- Monitor the weather (using http://www.nws.noaa.gov or with the aid of a simple thermometer) at the worksite. This critical weather information will be taken into consideration, to determine when it will be necessary to make modifications to the work schedule (such as stopping work early, rescheduling the job, working at night or during cooler hours of the day, and/or increasing the number of water and rest breaks)
- Use a thermometer at the work location and check the temperature every 60 minutes to monitor for sudden increases in temperature, to ensure that once the temperature exceeds 80°F, the shade structures are opened and accessible to the workers and to make certain that once the temperature equals or exceeds 95°F, additional High Heat Procedures are implemented.

Attachment C: Guidance on Provision of Water

Recommended Equipment:

- Cool water and drink containers, ice, cleaning equipment, whistle or horn

Supervisors must ensure:

- Drinking water containers (5 to 10 gallons each) are brought to the site, so that at least 2 quarts per employee are available at the start of the shift.
- Drink containers ensuring enough disposable cups are made available for each worker and are kept clean until used.
- The water level of all containers are adequate for the number of workers at the site by checking every 30 – 60 minutes and more frequently when the temperature exceeds 95°F. When the water level within a container drops below 50%, water containers will be refilled with cool water. Additional water containers (i.e. 5 gallon bottles) will be available to replace water as needed.
- When the temperature exceeds 95°F, carry ice in separate containers so that when necessary, it will be added to the drinking water to keep it cool.
- Check the work site and place the water as close as possible to the employees (i.e. no more than 50 – 100 feet from the workers). If field terrain prevents the water from being placed as close as possible to the workers, bottled water or individual containers (in addition to disposable cups and water containers), will be provided so that workers can have drinking water readily accessible.
- Water containers will be relocated to follow along as the work moves, so drinking water will be readily accessible.
- Encourage employees to frequently consume small quantities of water, up to 4 cups per hour, when the work environment is hot and employees are likely to be sweating more than usual in the performance of their duties.
- Provide clean water containers and keep in sanitary condition.
- Advise employees of the daily location of the water coolers and remind them to drink water frequently. When the temperature exceeds or is expected to exceed 90°F, hold a brief “tailgate” meeting each morning to review with the employees the importance of drinking water, the number and schedule of water and rest breaks, and the signs and symptoms of heat illness.
- Use audible devices (such as whistles or air horns) to remind employees to drink water.
- Increase the number of water breaks when the temperature equals or exceeds 95°F or during a heat wave, remind workers throughout the work shift to drink water.
- Stress the importance of the frequent consumption of water during employee training.

Attachment D: Access to Shade Requirements

Recommended Equipment:

- Portable canopies, large beach-style umbrellas, or other shade structures, also: chairs, benches, sheets, towels and water misting devices where possible shall be provided

Supervisors must ensure:

- Shade structures are brought to the site, to accommodate at least 25% of the employees on the shift and either chairs, benches, sheets, towels or any other items to allow employees to sit in a normal posture fully in the shade without having to be in physical contact with each other or the bare ground. However, chairs, benches, etc. are not required for acceptable sources of shade such as trees.
- Shade structures are opened and placed as close as practical to the workers, when the temperature equals or exceeds 80°F. When the temperature is below 80°F, the shade structures will be brought to the site, but will be opened and set in place upon worker(s) request. Note: The interior of a vehicle may not be used to provide shade unless the vehicle is air-conditioned and the air conditioner is on.
- Point out the daily location of the shade structures to the workers as well as allow and encourage employees to take a 5 minute cool-down rest in the shade, when they feel the need to do so to protect themselves from overheating.
- Ensure shade structures are relocated to follow along with the employee work groups and double-check they are as close as practical to the employees, so that access to shade is provided at all times. In situations where trees or other vegetation are used to provide shade (such as in orchards), the supervisor will evaluate the thickness and shape of the shaded area (given the changing angles of the sun during the entire shift), before assuming that sufficient shadow is being cast to protect employees.
- For non-agricultural employers, in situations where it is not safe or feasible to provide shade, steps are taken to provide shade upon request or other alternative cooling measures with equivalent protection (such as a break area in a nearby building with air conditioning).

Exceptions:

- Where the employer can demonstrate that it is infeasible or unsafe to have a shade structure, or otherwise to have shade present on a continuous basis, the employer may utilize alternative procedures for providing access to shade if the alternative procedures provide equivalent protection.
- Except for employers in the agricultural industry, cooling measures other than shade (e.g., use of misting machines) may be provided in lieu of shade if the employer can demonstrate that these measures are at least as effective as shade in allowing employees to cool.

Attachment E: Remote Location Emergency Response Information

Work Location: _____

(Include map for remote locations)

Directions to the Work Location:	

Nearest Medical Care Facility

Name: _____

Address: _____

Phone: _____

Directions to Medical Care Facility	
Means of transport to nearest Medical Care Facility	

Communication

Means of communication: _____

Phone Number (if applicable): _____

Attachment F: Emergency Response Guidance

Recommended Equipment:

- First aid kits, radios, cell phones, BlackBerrys, or other forms of communication; flashlights, reflective vests.

Written Response Procedures:

Supervisors must have a written response procedure developed for each location. This must include having a map along with clear and precise directions (such as streets or road names, distinguishing features and distances to major roads) at a remote, off-campus site, to avoid a delay of emergency medical services.

Prior to starting work, supervisors must:

- During a heat wave or hot temperatures, remind and encourage workers to immediately report to their supervisor any signs or symptoms they are experiencing.
- Ensure a qualified, appropriately trained and equipped person will be available at the site, to render first aid if necessary.
- Determine if a language barrier is present at the site and take steps to ensure emergency medical services can be immediately called in the event of an emergency.
- Carry cell phones or other means of communication to ensure that emergency medical services or 9-1-1 can be called and check that these are functional at the worksite prior to each shift.

Emergency Response:

- Take immediate steps to keep the stricken employee cool and comfortable once emergency service responders have been called (to reduce the progression of more serious illness)
- At remote locations such as rural farms, lots or underdeveloped areas, designate and employee or employees to physically go to the nearest road or highway where emergency responders can see them.
- If daylight is diminished, the designated employee(s) shall be given reflective vest(s) or flashlights in order to direct emergency personnel to the location of the worksite, which may not be visible from the road or highway.