UNIVERSITY of CALIFORNIA
Agriculture & Natural Resources

Research & Extension Centers - Administrative Office

Date: August 15, 2005

To: Cooperative Extension County Directors
Research and Extension Center Directors
Statewide Program Directors

cc: Cooperative Extension Regional Directors
REC Safety Coordinators
Fred Perry, Director, Research and Extension Centers
Jake McGuire, Controller and Business Services Director

From: Brian Oatman, EH&S Coordinator

Subject: **Advisory - Emergency Standard for Heat Illness Prevention**

On August 12, 2005, the California Occupational Safety and Health Standards Board adopted an emergency standard (California Code of Regulations, Title 8, Section 3395) intended to reduce the frequency and severity of heat-related illness. The emergency standard will now be forwarded to the Office of Administrative Law for review and will become effective within 10 days. This action was in response to eight cases of possible heat-related illness that occurred in July 2005, including five fatalities. Heat illness is a range of serious medical conditions resulting from the body's inability to cope with a particular heat load, increasing in severity from fatigue, to heat cramps, heat exhaustion, heat syncope, and heat stroke. The emergency standard includes three primary measures to control heat-related illness: provision of drinking water, access to shade, and training. The specific conditions of the standard are summarized below:

Applicability of Standard – Section 3395(a)

The standard applies to all outdoor places of employment whenever environmental risk factors for heat illness, such as air temperature, relative humidity, radiant heat sources, conductive heat sources, or protective clothing, are present.

Provision of Water – Section 3395(c)

Clean, fresh, and cool potable water shall be readily available to employees. The employer is required to provide enough water at the beginning of the work shift to provide one quart per employee per hour for drinking for the entire shift (at least 2 gallons per employee for an 8-hour shift). Employers may begin the shift with smaller quantities of water if they have effective procedures for replenishing the water supply during the shift as needed to allow employees to drink at least one quart per hour. As described under training below, employees should be encouraged to drink water frequently.

Provision of Shade – Section 3395(d)

The employer shall provide a shaded area that employees may use when they are suffering from heat illness or believe they need a recovery period to prevent heat illness. The shade 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.

Training – Section 3395(e)

All employees working outdoors in conditions where there are environmental risk factors for heat illness shall be trained on the following topics:

(A) The environmental and personal risk factors for heat illness;
    1. "Environmental risk factors for heat illness" are defined as working conditions that affect 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, workload severity and duration, protective clothing and personal protective equipment worn by employees.
    2. "Personal risk factors for heat illness" include age, degree of acclimatization, health, water consumption, use of medications, caffeine, or alcohol which can affect the body's water retention or other physical response to heat;
(B) The employer's procedures for identifying, evaluating, and controlling exposures to the environmental and personal risk factors for heat illness;
(C) The importance of frequent consumption of small quantities of water, up to 4 cups per hour under extreme conditions of work and heat;
(D) The importance of acclimatization;
    1. "Acclimatization" is the temporary adaptation of the body to work in the heat that occurs gradually when a person is exposed to it. Acclimatization peaks in most people within four to fourteen days of regular work for at least two hours per day in the heat.
(E) The different types of heat illness and the common signs and symptoms of heat illness;
    1. "Heat Illness" is a group of serious medical conditions resulting from the body's inability to cope with a particular heat load, and includes heat cramps, heat exhaustion, heat syncope and heat stroke.
(F) The importance of immediately reporting to the employer, directly or through the employee's supervisor, symptoms or signs of heat illness in themselves, or in co-workers;
(G) The employer's procedures for responding to symptoms of possible heat illness, including how emergency medical services will be provided should they become necessary;
(H) 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;
(I) How to provide emergency medical services with clear and precise directions to the work site.

Supervisors who oversee employees who work outdoors in the heat shall be trained on the following topics:

(A) The information required to be provided to all employees as described above.
(B) The procedures the supervisor is to follow to implement the applicable provisions in this standard.
(C) The procedures the supervisor is to follow when an employee exhibits symptoms consistent with possible heat illness, including emergency response procedures.

Implementation of the Standard

The emergency standard suggests that the required measures described above may be included in an employer's injury and illness prevention program (IIPP). For ANR units, it is recommended that the attached template be used to include these new requirements in each department's IIPP. This template can be filled out with specific information for

your unit – including employee classifications that may encounter outdoor work in hot conditions and directions for summoning emergency medical assistance to your worksite(s). The completed Heat Illness Prevention attachment should then be attached to your existing IIPP. Once the IIPP attachment has been completed, affected employees must be trained on these new standards. There are information sheets included in the IIPP attachment that describe the risks and symptoms of heat illness, preventative measures, and basic treatment measures. This information, coupled with a review of the Heat Illness Prevention IIPP attachment, should comprise your training program for affected employees.

Also, please note that if contract employees are used to perform fieldwork, their employer will be responsible for compliance with this standard. While ANR units would not be responsible for ensuring that non-UC employees are working in compliance with this standard, it would be prudent to include a requirement in any contract that states the contractor must have a safety program and will comply with applicable regulations for safety and worker protection. If a contractor is observed to be not in compliance with a safety requirement such as this emergency standard, it should be brought to the attention of the contractor representative, along with a directive to correct the unsafe condition.

If you have any questions about the enclosed information, please contact me by telephone at (530) 752-6024 or e-mail: baoatman@ucdavis.edu.

Attachments:
Heat Illness Prevention
Heat Index–from National Weather Service
Protecting Workers from Heat Stress–from Cal/OSHA Consultation Service
Safety Note #20, Heat Stress Awareness–from ANR Environmental Health & Safety

HEAT ILLNESS PREVENTION

UNIVERSITY OF CALIFORNIA
AGRICULTURE AND NATURAL RESOURCES
INJURY AND ILLNESS PREVENTION PROGRAM

Applicability
This attachment is intended 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 risk factors for heat illness are present. Environmental risk factors for heat illness are defined in the regulation as working conditions that affect 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, workload severity and duration, protective clothing and personal protective equipment worn by employees.

In the course of their work duties, employees in the classifications listed below may be exposed to environmental risk factors for heat illness.

Provision of Water
Clean, fresh, and cool potable water shall be readily available to employees. Whenever environmental risk factors for heat illness exist, 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). Supervisors are responsible to ensure that employees have an adequate supply of drinking water. Smaller quantities of water may be provided at the beginning of the shift if there are effective procedures for replenishing the water supply during the shift as needed to allow employees to drink at least one quart per hour. Employees are encouraged to drink water frequently.

Provision of Shade
A shaded are will be provided that employees may use when they are suffering from heat illness or believe they need a recovery period to prevent heat illness. The shade 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. Supervisors are responsible to ensure that employees have access to a shaded area.

Recognizing Heat Illness Risk Factors

As noted above, environmental risk factors for heat illness include air temperature, relative humidity, radiant heat from the sun and other sources, conductive heat sources such as the ground, air movement, workload severity and duration, protective clothing and personal protective equipment worn by employees.
Personal risk factors for heat illness include age, degree of acclimatization, general health, water consumption, and use of medications, caffeine, or alcohol which can affect the body's water retention or other physical response to heat.

Supervisors must evaluate work conditions before sending employees to perform outdoor work in hot conditions. Typically, temperatures above 90^{o}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 work activities that restrict the body's ability to cool itself, such as protective clothing, could result in a risk of heat illness at lower temperatures.

The National Weather Service Heat Index guideline (attached) may be used to assess the environmental risk of heat illness, based on temperature and relative humidity. The Heat Index table categorizes the risk or degree of heat illness with increasing heat index values. Provision of water and shade as described above should be implemented whenever the Heat Index exceeds 90^{o}F.

Acclimatization to heat conditions

Acclimatization is the gradual exposure to work in hot conditions to allow a person's body to adjust to working in 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, starting with about 2 hours work per day. For less severe conditions, 2-3 days of increasing work activity and duration are recommended.

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, and includes 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:

> **Transient Heat Fatigue** 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).
>
> **Heat Rash** 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 soon 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.

Fainting A worker who is not accustomed to hot environments and who stands erect and immobile in the heat may faint. With enlarged blood vessels in the skin and in the lower part of the body due to the body's attempts to control internal temperature, blood may pool there rather than return to the heart to be pumped to the brain. Upon lying down, the worker should soon recover. By moving around, and thereby preventing blood from pooling, the patient can prevent further fainting.

Heat Cramps Heat cramps are 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 relived 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.**

Heat Exhaustion 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.**

Heat Stroke - Heat stroke is 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. The body's only effective means of removing excess heat is compromised with little warning to the victim that a crisis stage has been reached.

A heat stroke victim's skin is hot, usually dry, red or spotted. Body temperature is usually 105^{o}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 requires 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. Further 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 means of preventing permanent brain damage or death.

For more information, see the attached documents: *Protecting Workers from Heat Stress* and *Safety Note #20, Heat Stress Awareness* or see the Cal/OSHA website: http://www.dir.ca.gov/dosh/heatillnessinfo.html.

Any employee who recognizes symptoms or signs of heat illness in themselves or in co-workers should immediately report this condition to their supervisor.

Responding to Heat Illness

When you recognize signs of heat illness in yourself or in a co-worker:

- Move to a shaded area for a recovery period of at least five minutes
- If the condition appears to be severe or the employee does not recover, then emergency medical care is needed.
- Emergency medical care shall be provided by the following method:
  - Call 911
  - Be ready to provide emergency response personnel with directions to work location:

  - Transport the employee to the nearest hospital or urgent care center, located at:

  - Directions to medical care:

Training

All employees who may work outdoors in conditions where there are environmental risk factors for heat illness shall be provided training on the information contained in this procedure and attachments.

Heat Index

About 237 Americans succumb to the taxing demands of heat every year*. Our bodies dissipate heat by varying the rate and depth of blood circulation, by losing water through the skin and sweat glands, and as a last resort, by panting, when blood is heated above 98.6°F. Sweating cools the body through evaporation. However, high relative humidity retards evaporation, robbing the body of its ability to cool itself.

When heat gain exceeds the level the body can remove, body temperature begins to rise, and heat related illnesses and disorders may develop.

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.)**

(Due to the nature of the heat index calculation, the values in the tables below have an error +/- 1.3F.)

Temperature (F) versus Relative Humidity (%)

°F	90%	80%	70%	60%	50%	40%
80	85	84	82	81	80	79
85	101	96	92	90	86	84
90	121	113	105	99	94	90
95		133	122	113	105	98
100			142	129	118	109
105				148	133	121
110						135

HI	Possible Heat Disorder:
80°F - 90°F	Fatigue possible with prolonged exposure and physical activity.
90°F - 105°F	Sunstroke, heat cramps and heat exhaustion possible.
105°F - 130°F	Sunstroke, heat cramps, and heat exhaustion likely, and heat stroke possible.
130°F or greater	**Heat stroke highly likely with continued exposure.**

Below is a table comparing Temperature and Dewpoint, with the same disorders possible:

Temperature (Down) versus Dewpoint (across)

°F	55	60	65	70	75	80	85
80	80	80	81	83	84	87	
85		84	86	89	93	99	107
90			91	95	100	107	117
95				101	106	114	125
100					113	121	131
105						127	138
110						134	145

* 10-year average of heat related fatalities from 1994-2003. U.S. Natural Hazard Statistics. source: National Weather Service http://www.crh.noaa.gov/pub/heat.php Last modified: April 21 2005

Protecting Workers From Heat Stress

There are four environmental factors that can cause heat stress in a hot work area. These are **(1) temperature; (2) radiant heat from the sun or a furnace; (3) humidity; and (4) air velocity.** The level of heat stress a person encounters depends on his or her age, weight, level of fitness, medical condition, and acclimatization to the heat. Heat stress occurs when body muscles are being used for physical labor and less blood is available to flow to the skin and release the heat. For more detailed information, a 15-page booklet titled *Working in Hot Environments* is available from the **National Institute for Occupational Safety and Health (NIOSH), 4676 Columbia Parkway, Cincinnati, Ohio 45226; telephone (800) 356-4674**

What are some of the risks of heat stress?

- Rise in body temperature and heart rate
- Loss of concentration and difficulty in focusing on a task
- Increased irritability or sickness
- Little or no desire to drink
- Fainting and **possible death** if person is not removed from the source of the heat stress

How can you reduce the risk of heat stress?

- Provide water and encourage employees to drink (this helps to replace fluids lost through sweating).
- Train and educate workers to recognize heat stress symptoms.
- Train first aid workers to recognize and treat heat stress disorders.
- Ensure that the names of staff trained in first aid are known to all workers.
- Encourage employees to move to a cooler place, find shade, and rest during their breaks.
- Allow employees to slow the work pace or reduce the work load and to stop and rest if they become extremely uncomfortable.
- Encourage employees to wear appropriate clothing (cotton garments) and to use sunscreen, hats, and sunglasses.
- Be aware that older workers, obese employees, and people on medication are at greater risk for heat stress.

What are some of the symptoms of heat stress?

HEAT STROKE, the most serious health problem for workers in a hot environment, is caused by the body's failure to regulate its core temperature. Sweating stops and the body can no longer release excess heat. *Victims of heat stroke usually die unless treated promptly.* Signs include:

- Mental confusion, delirium, loss of consciousness, convulsions, or coma
- Body temperature of 106° F or higher
- Hot, dry skin that may be red, mottled, or bluish

How can heat stroke be treated? Prompt first aid can prevent permanent injury to the brain and other vital organs. While awaiting medical help, the victim should be moved to a cool area. The victim's clothing should be soaked with cool water and he or she should be fanned vigorously to increase cooling.

HEAT EXHAUSTION results from loss of fluid through sweating and from not drinking enough replacement fluids. The worker still sweats but experiences extreme weakness or fatigue, giddiness, nausea, or headache. The skin is clammy and moist, while body temperatures are normal or slightly elevated.

How can heat exhaustion be treated? The victim should rest in a cool place and drink water or an electrolyte solution, such as Gatorade or similar beverages used by athletes to restore potassium and salt. Severe cases, in which the victim vomits or loses consciousness, may require longer treatment under medical supervision.

HEAT CRAMPS, painful spasms of the muscles, are caused by the body's loss of salt.

How can heat cramps be treated? As in the case of heat exhaustion, a victim of heat cramps should drink an electrolyte solution such as Gatorade. Seek medical attention for the victim in the case of severe cramping.

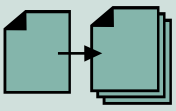
FAINTING can occur when a worker is unacclimatized to a hot environment.

How can fainting be treated? At first, allow the victim to lie down on his or her back. When consciousness has been regained, the victim should usually recover after a brief period of walking around slowly.

HEAT RASH, also known as prickly heat, can be extensive and can be complicated by infection. Heat rash can be so uncomfortable that sleep is disrupted. It can impede a worker's performance and can even result in a temporary total disability.

How can heat rash be treated? Place the victim in a cool place and allow the skin to dry.

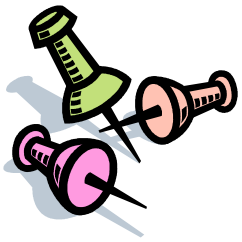
Information contained in this fact sheet was obtained from U.S. Department of Labor Fact Sheet No. OSHA 93-16. This fact sheet provides a general description only and does not carry the force of legal opinion.



Make copies or tear out all the pages with this symbol.

Safety Note

UNIVERSITY OF CALIFORNIA
AGRICULTURE AND NATURAL RESOURCES
ENVIRONMENTAL HEALTH AND SAFETY



Safety Note #20

HEAT STRESS AWARENESS

According to the National Weather Service, there were approximately 2,000 heat-related fatalities from 1991-2000. In addition, about 25,000 heat-related illnesses or injuries occurred during the same time. By taking several simple precautions, employees can control and/or reduce exposure to conditions that may cause heat stress. California Code of Regulations, Title 8, Section 3395 contains requirements for the control of heat illness risks. ***English and Spanish language safety videos that address agriculture-related heat stress are also available for loan from the ANR Environmental Health & Safety Library at (530) 752-3933.***

Heat Stress Disorders and Symptoms

1. Heat Stroke - sweating stops and the body fails to regulate its temperature. Victims may die if they don't receive immediate medical treatment. Characterized by: mental confusion, fainting, or seizures; hot dry skin usually reddish in color; and high body temperature.
2. Heat Exhaustion - profuse sweating results in dehydration. Characterized by: fatigue, dizziness, and nausea; pale and moist skin; and possibly slightly elevated temperature.
3. Heat Cramps - cramping thought to be due to loss of salt through sweating. Characterized by muscle spasms in arms, legs, and abdomen during or following work activities.
4. Heat Syncope - dehydration while standing still causes blood pooling in lower portions of the body. Characterized by fainting while standing still.
5. Heat Rash - occurs under hot and humid conditions where sweat does not evaporate readily. Characterized by irritated/itchy skin with prickly feeling and small red bumps on skin.

Treatments for Heat Stress Disorders

1. Heat Stroke - call 911 immediately, soak victim's clothing with cool water, move victim to shaded and cool area, fan victim to increase cooling of their body.
2. Heat Exhaustion - have victim rest in shaded and cool place and drink fluids. Do not serve caffeinated fluids such as soft drinks, iced tea, or coffee.
3. Heat Cramps - have victim rest and drink non-caffeinated fluids.
4. Heat Syncope - have victim rest in a shaded and cool place, and drink non-caffeinated fluids.
5. Heat Rash - wash and dry skin. Wear loose clothing and keep skin dry.

Precautions to Prevent Heat Stress Disorders

1. Acclimatize yourself to the prevailing weather conditions.
2. Always drink plenty of fluids such as water and sports drinks. Plan to have at least one quart of water available per person per hour of work (two gallons for an eight-hour shift). Avoid caffeinated drinks.
3. Wear summer hat with a brim and loose-fitting, light-colored, and lightweight clothing like cotton.
4. Schedule vigorous work activities during coolest portions of the work day and take frequent breaks on hot days.
5. If you are feeling symptoms of heat illness, take a rest period in a shaded area. Your supervisor is responsible to provide access to shade – this may be any area where you are protected from direct sunlight, such as under an umbrella, a portable structure, or inside a ventilated building or vehicle.

If a treated victim does not recover from heat illness in a reasonable amount of time, promptly seek medical attention. Plan ahead to know how to summon medical assistance and direct emergency responders to your work location or how to transport employees to a medical service provider.

UNIVERSITY of CALIFORNIA
Agriculture & Natural Resources

SAFETY MEETING / TRAINING RECORD

Location:_____ **Date:**_____

Training Topics: (specific description of equipment, product, item, situation or process)

Heat Illness

Instructional Materials Used: (manuals, handouts, videos, discussion, hands-on)

Handouts: Protecting Workers from Heat Stress, Safety Note #20, Heat Stress Awareness; Video: Ag: Heat Stress (optional)

Instructor:_____ **Signature:**_____

In Attendance:

Your signature below states that you have received and understand the information presented to you.

	(print name)	(signature)
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		
19.		
20.		