

HEAT STRESS CONTROL

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HEAT STRESS CONTROL

OBJECTIVES

- a. Provide information on heat stress to serve as operating and planning guidelines.
- b. Prevent and/or control heat stress-related disorders to employees in hot work environments.
- c. Define heat stress and its typical effects.

REFERENCES

Regulation

- CAL-OSHA, Title 8, Chapter 4, Section 3395, Heat Illness Prevention

Manuals

- OSHA Technical Manual, Section III, Chapter 4 - Heat Stress
- American Conference of Governmental Industrial Hygienist (ACGIH)
- Threshold Limit Values and Biological Exposure Indices for 2009
- EHS-CS-PG-011, Heat Illness Prevention

PREREQUISITES

VERIFY this document is current by checking Palomar College website, Environmental Health & Safety section (Training and Procedures) tab.

PRECAUTIONS

None

CHECKLISTS

Heat Stress Checklist, Attachment 3

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PROCEDURE

General

- 1) Heat Illness is a serious medical condition resulting from the body's inability to cope with an environmental heat load, and may include heat cramps, heat exhaustion, heat syncope, or heat stroke.
- 2) This program provides the methods and tools to ensure that the high temperatures and humidity that employees may encounter during work are properly evaluated, controlled, and responded to.
- 3) This program is applicable to all PCCD employees engaged in operations where the environmental risk factors for heat illness may exist or the temperature equals or exceeds 80 degrees Fahrenheit during the work period.

Responsibilities

- 1) Supervisors should perform the following:
 - Ensure employees are aware of the risks of heat disorders and measures to protect themselves and their co-workers.
 - Incorporate heat stress control into work activities by using a combination of work practices, personal protective measures, engineering controls, and special controls (see Attachments 2).
 - Ensure employees meet physical and mental demands of assigned tasks within the hot work environment, including respiratory protection qualifications.
 - Select acclimatized, experienced employees for hot environment work, when possible (Reference American Conference of Governmental Industrial Hygienist (ACGIH)).
 - Employees not acclimated may perform work as long as the employee is coached on potential hazards and effects associated with the hot environment, PPE, and dehydration.
 - Ensure employees are acclimatized to heat through short exposures followed by longer periods of work in the hot environment (see Attachment 2).
 - Monitor employees closely for signs and symptoms of heat disorders.

NOTE

Professional medical treatment is to be obtained immediately for any symptom of heat disorder.

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- Schedule hot work during cooler time periods whenever possible.
- Schedule regular rest breaks as often as practical, but before work time limits have been exhausted.
- Provide or ensure there is cool, palatable, drinking water, as much as a quart per employee per hour, in rest or break areas.
- Employees should be advised to drink 3 to 4 cups of water in small volumes (one cup) about every 20 minutes and coached on the importance of hydration to help control heat stress.

NOTE

Personal cooling devices increase weight that the worker must carry and may not be desirable for all applications.

- Ensure personnel use personal cooling devices for comfort and to extend work time in hot environments, particularly when double protective clothing (PC) or plastic PCs is worn.
- Provide shade for outdoor workers.

Caution

1. The use of cooling or air supplied suits may increase the risk of heat stress if the incoming breathing air temperature is high.
2. Using the below system may lead to dehydration. The cool, dry air feels comfortable and the employee may not realize the need to drink liquids frequently.

- Ensure personnel use cooling or air supplied suits that cool the whole body area, using a flow of breathing air, for special applications.

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- Ensure employees are allowed to leave the hot environment for a rest/recovery time any time symptoms of heat disorder become noticeable.
- Ensure employees alternate work and rest periods with longer rest periods in a cool area and maintain hydration to avoid heat disorders.
- Complete Heat Stress Checklist in Attachment 3 and review with employees during Pre-job Brief for high-temperature work activity.

2) Employees should perform the following:

- Monitor personal health for signs and symptoms of heat illness, and take cooling breaks as needed.
- Recognize the need to replace fluids.
- Be aware that pre-existing medical conditions could hinder their capabilities in a heat stress environment, such as:
 - a. High blood pressure
 - b. Respiratory or cardiopulmonary disorders
 - c. Other medical conditions that reduce physical fitness
- Share any adverse medical conditions with their supervisor prior to being assigned work in hot environments.
- Recognize the influence of their physical condition.
- Maintain physical fitness.
- Abstain from alcohol and caffeine containing drinks that reduce proper hydration.
- Be aware of adverse influences of drugs (including medicines).
- Be aware of own body symptoms under heat stress.
- Ensure adequate protection is taken when wearing body-cooling devices.
- Leave work area at the first sign of heat stress symptoms.
- Watch co-workers for signs of heat stress.

Note

Satisfaction of thirst will not prevent heat disorders from developing.

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- Drink 3 to 4 cups of water in small volumes (one cup) about every 20 minutes to maintain hydration to help control heat stress.
- Drink cool, palatable, water before starting hot work, during rest breaks, and after completion of work.
- Take rest breaks from work in hot environments when heat stress symptoms become noticeable (see Attachment 3).
- Consult their personal physician if they have any pre-existing medical conditions listed *and* are exposed to hot environments.
- Immediately report suspected personal heat illness symptoms to supervisor.

Characteristics of Heat Disorders

- 1) Recognize heat disorders are physical and psychological responses when body temperature rises above normal limits as a result of physical activity in an environment of elevated temperatures. (See Attachment 1 and table below.)
- 2) Heat disorders can be aggravated by the amount and type of clothing worn.

Disorder	Symptoms	Signs
Heat Exhaustion	Weakness Fatigue Blurred vision Dizziness Headache	High pulse rate Extreme sweating Pale face Insecure gait Normal to slightly elevated temperature
Heat Stroke	Chills Restlessness Irritability	Red face Hot dry skin (usual) Disorientation High temperature ($\geq 104^{\circ}\text{F}$) Erratic behavior Shivering Collapse Convulsions Unconsciousness

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Work Practices

- 1) All jobs in hot environments (greater than 79°F with WBGT [Wet Bulb Globe Temperature] index), or any job that requires PC (protective clothing) outer-garments be worn (plastics, etc...), should address heat stress control in the planning stages.
- 2) A buddy system of at least two employees should be used in hot environments. The buddy acts as an observer for signs of co-worker heat disorders, maintains communication with co-worker, and tracks the time co-worker is in hot environment.
- 3) When temperatures reach 95 degrees or above, the employer shall ensure that the employee takes a minimum ten-minute net preventative cool-down rest period every two hours. The preventative cool-down rest period required by this paragraph may be provided concurrently with any other meal or rest period required by Industrial Welfare Commission Order No. 14 (8 CCR 11140) if the timing of the preventative cool-down rest period coincides with a required meal or rest period thus resulting in no additional preventative cool-down rest period required in an eight-hour workday. If the workday will extend beyond eight hours, then an additional preventative cool-down rest period will be required at the conclusion of the eighth hour of work; and if the workday extends beyond ten hours, then another preventative cool-down rest period will be required at the conclusion of the tenth hour and so on. (§3395. Heat Illness Prevention in Outdoor Places of Employment)

Engineering Controls

- 1) The following engineering controls may be helpful in reducing the hazards of heat exposure to employees:
 - Increased ventilation using general room or area ventilation, or localized or spot cooling
 - Shielding as protection from radiant heat sources
 - Evaporative cooling and mechanical refrigeration
 - Cooling fans
 - Use of power tools to reduce manual labor
 - Climate-controlled break or rest rooms

First Aid

- 1) Contact the Fire Department at 9-911 if calling from campus phone for emergency aid.
- 2) Remove the affected employee to cool environment and loosen his/her clothing. Give sips of cool water to drink over time.

RECORDS

None

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HEAT DISORDERS AND HEALTH EFFECTS

CAUTION

Heat stroke is a medical emergency. Professional medical treatment is to be obtained immediately.

Heat Stroke - A condition occurring when the body's temperature regulation fails and body temperature rises to critical levels.

Employees suffering from heat stroke should be removed from the hot environment, 911 called, and aggressive cooling of the employee. Place ice bags under the armpits, near the heart, and in the groin area or thoroughly wet down with water and fan to lower the body temperature. Give fluid replacement if victim is conscious and able to swallow.

Regardless of the employee'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.

NOTE

Professional medical treatment is to be obtained immediately.

Heat Exhaustion - A condition occurring when the body becomes overheated due to the environment. Fortunately, heat exhaustion responds readily to prompt treatment but should not be dismissed lightly.

The signs and symptoms seen in heat exhaustion are similar to those of heat stroke, a medical emergency.

Employees suffering from heat exhaustion should be removed from the hot environment and given fluid replacement. Remove protective clothing and loosen clothing. Cool by sprinkling with water and/or fanning.

NOTE

Professional medical treatment is to be obtained immediately

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HEAT DISORDERS AND HEALTH EFFECTS (Continued)

Heat Collapse (Fainting/Dizziness) - A condition occurring after prolonged standing or after suddenly rising from a standing or sitting position in a hot environment. To prevent heat collapse, the employee should gradually become acclimatized to the hot environment and maintain proper hydration.

Employees suffering from heat collapse should be removed from the hot environment and given fluid replacement. Remove protective clothing, rest in a reclining position or seated with head between knees. Return to work only after medical release. If fainting recurs, consult a physician, as there may be causes other than heat stress.

<p style="text-align: center;"><u>NOTE</u></p>

<p style="text-align: center;">Professional medical treatment is to be obtained immediately.</p>
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Heat Cramps - A condition occurring when the body experiences an electrolyte imbalance caused by sweating. Heat cramps appear to be caused by lack of water replenishment. Remove from hot environment, remove protective clothing and loosen clothing. Provide water in small doses frequently up to 1 quart per hour.

Heat Rash - A condition occurring where clothing is restricted and is the most common problem in hot work environments. Prickly heat is manifested as red papules. In most cases, heat rashes disappear when the affected individual returns to a cool environment.

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WORK RATE GUIDELINES

Table 1		
CATEGORY	TYPE OF ACTIVITY	EXAMPLES
LIGHT	Sitting with moderate arm and trunk Movement	Inspections and surveys with minimal climbing
	Sitting with moderate arm and leg Movement	Supervising or monitoring areas or equipment
	Standing, light work at machine or Bench	Stationary welding
	Standing, light work with some walking and minimal climbing	Bench work
MODERATE	Standing with moderate work and some	Painting
	Walking with moderate lifting or Pushing	Floor cleaning
	Walking with occasional ladder or stair climbing	Insulation removal or installation Surveys and inspections with moderate climbing
HEAVY	Walking with frequent stair or tree Climbing	Grounds Services climbing trees to trim branches
	Heavy lifting, pushing, or pulling	Transporting equipment by hand Shoveling
VERY HEAVY	Shoveling wet sand or asphalt work	Shoveling wet sand or asphalt work

HEAT STRESS CONTROL

WORK RATE GUIDELINES (Continued)

Heat Stress affects personnel differently based on individual characteristics. Acclimatization is a gradual physical adaptation that improves an individual's ability to tolerate heat stress. Full heat acclimatization may require up to three weeks of continued physical activity under heat stress conditions similar to those anticipated for work. Its loss begins when the activity under those heat stress conditions is discontinued, and a noticeable loss occurs after 4 days. With a recent history of heat stress exposures (e.g., 5 of the last 7 days), a worker can be considered acclimatized for the purpose of using Attachment 2.

Acclimatization schedule:

New workers need time to acclimatize unless they have previously worked in hot environments. To prevent heat-related illnesses, they should work shorter workdays in the heat during their first 1-2 weeks. OSHA and NIOSH recommend the "Rule of 20 percent" for building heat tolerance:

- For new workers, the schedule should be no more than a 20% exposure on day 1 and an increase of no more than 20% on each additional day.
- For workers who have had previous experience with the job, the acclimatization regimen should be no more than a 50% exposure on day 1, 60% on day 2, 80% on day 3, and 100% on day 4.

<https://www.cdc.gov/niosh/topics/heatstress/acclima.html>

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HEAT STRESS CHECKLIST

- Advise employees of heat stress conditions (high temperatures, high humidity, poor air movement, radiant heat sources, double PCs, et al.)
- Provide or communicate sources for shade/breaks _____
- Provide or communicate locations of potable water _____
- Advise employees to drink 3 to 4 cups of water per hour
- Communicate locations of heat load controls (fans, mechanical and power devices to reduce work load, cool vests, etc.)
- Identify and communicate Work Time Limits from Attachment 4: _____
- Review signs of heat illnesses with employees:

Disorder	Symptoms	Signs	Treatment
Heat Rash	Itching	Red Papules	Return to cool environment
Heat Cramps	Muscle cramps	Pain	Call 9-911 Remove from hot environment Remove PPE Loosen clothing Provide fluids
Heat Collapse	Dizziness	Fainting	MEDICAL EMERGENCY – CALL 9-911 Remove from hot environment Remove PPE Loosen clothing Rest in a reclining position or seated with head between knees Provide fluids if victim is conscious and able to swallow
Heat Exhaustion	Nausea Dizziness/ fainting Paleness Blurred vision Headache Thirst Weakness or unusual fatigue	High pulse rate Extreme sweating Pale face Insecure gait Normal to slightly elevated temperature	MEDICAL EMERGENCY - CALL 9-911 Remove from hot environment Remove PPE Loosen clothing and elevate legs Provide fluids if victim is conscious and able to swallow Cool by sprinkling with water and/or fanning

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HEAT STRESS CHECKLIST (Continued)			
Disorder	Symptoms	Signs	Treatment
Heat Stroke	Chills Restlessness Irritability	Red face Hot, dry skin (usual) High temperature (>104°F) Disorientation Erratic behavior Shivering Collapse Convulsions Unconsciousness	MEDICAL EMERGENCY - CALL 9-911 Remove from hot environment Pack ice under arm pits, near the heart and in the groin area Provide fluids if victim is conscious and able to swallow
<ul style="list-style-type: none">○ Advise employees to report any symptoms of heat illness recognized in themselves or their coworkers to supervision immediately.○ Remind employees of emergency services 9-911.○ Discuss previous heat stress measurement readings taken in Containment.			

SUMMARY OF CHANGES

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Date of Revision	Description of Change/Comments	Reviewer(s)	Step, Section, Attachment or Page
October 21, 2013	Date procedure was completed	Sean Health, Jeff Bennett	
July 12, 2023	Document Location References to attachments Added to work practices Updated heat acclimatization process. Attachment 4 removed.	Jason Bennett	Page 2 Page 3, 4, 5 Page 7 Page 11

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