
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 (General Information) tab.

PRECAUTIONS

None

CHECKLISTS

Heat Stress Checklist, Attachment 3

HEAT STRESS CONTROL

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 and 4).
 - 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.

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| <u>NOTE</u> |
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| 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.
- Use estimated job temperatures, estimated work rate (See Attachment 2) and protective clothing requirements to determine work time limit from Attachment 4. These values represent the maximum work time limit.

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- If employees exceed the maximum work time limit in Attachment 4, evaluate and determine why maximum work time limits were exceeded.
- 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.
- Ensure employees take recovery breaks equal to at least the number of minutes calculated from:
Actual Exposure Time x 60 minutes ÷ Maximum Stay Time (Attachment 4).
- 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 and become familiar with the table in Attachment 4.
- 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.

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.

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

HEAT STRESS CONTROL

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 Floor cleaning |
| | Walking with moderate lifting or Pushing | Insulation removal or installation |
| | Walking with occasional ladder or stair climbing | 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 |

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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.

| Table 2 Screening Criteria for Heat Stress Exposure (WBGT values in °F) for 8 hour work day, five days a week with conventional breaks | | | | | | | | |
|---|--------------|----------|-------|------------|------------------|----------|-------|------------|
| Work Demands | Acclimatized | | | | Not Acclimatized | | | |
| | Light | Moderate | Heavy | Very Heavy | Light | Moderate | Heavy | Very Heavy |
| 100% Work | 85.1 | 81.5 | 78.8 | | 81.5 | 77 | 72.5 | |
| 75% Work; 25% Rest | 86.5 | 83.3 | 81.5 | | 84.2 | 79.7 | 76.1 | |
| 50% Work; 50% Rest | 88.7 | 85.1 | 83.3 | 81.5 | 86 | 82.4 | 79.7 | 77 |
| 25% Work; 75% Rest | 90.5 | 87.8 | 86 | 85.1 | 87.5 | 84.2 | 82.4 | 79.7 |

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| HEAT STRESS CHECKLIST | | | |
|---|---|--|---|
| <ul style="list-style-type: none"> ○ 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

Author: Derrick Johnson Phone: x3677 Location: R-6

| Date of Revision | Description of Change/Comments | Reviewer(s) | Step, Section, Attachment or Page |
|------------------|--------------------------------|-------------|-----------------------------------|
| October 21, 2013 | Date procedure was completed | See Below | |

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