

California Institute of Technology

Heat Illness Prevention Plan



Caltech Environmental Health and Safety Office
1200 E. California Blvd., M/C B125-6
Pasadena, CA 91125
Phone: 626.395.6727
Email: safety@caltech.edu
Website: safety.caltech.edu

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TABLE OF CONTENTS

TABLE OF CONTENTS	2
PURPOSE	4
SCOPE	4
RESPONSIBILITIES.....	4
DEFINITIONS.....	4
APPLICATION	7
TYPES OF HEAT ILLNESSES.....	7
PROVISION OF WATER	8
ACCESS TO SHADE / COOL-DOWN AREAS	8
HIGH HEAT PROCEDURES.....	9
ASSESSMENT & CONTROL MEASURES FOR INDOOR AREAS	9
EMERGENCY RESPONSE PROCEDURES	10
ACCLIMATIZATION	10
TRAINING	10

PURPOSE

The purpose of this Heat Illness Prevention Plan is to protect employees against heat illness in both outdoor and indoor locations. This includes raising awareness about the risks associated with heat exposure, establishing Institute protocols regarding the provision of water, providing access to cool-down areas and shade, implementing high heat procedures, developing emergency response protocols, allowing acclimatization, increasing knowledge of heat illness symptoms, ways to prevent illness, and what to do if symptoms occur. This plan is written in accordance with the [California Code of Regulations \(CCR\) Title 8, § 3395 and 3396](#).

SCOPE

The Heat Illness Prevention Plan applies to all Institute employees working in indoor and/or outdoor areas where environmental risk factors for heat illness are present and where they can be at risk for developing heat illnesses if they do not protect themselves appropriately. Cal/OSHA has identified temperature conditions, both for outdoor and indoor workplaces, where heat prevention protocols must be applied, and can be found [here](#).

RESPONSIBILITIES

Directors, Managers, Supervisors, and Faculty/Researchers are responsible for the following:

- Identifying all personnel who are required to work in indoor and outdoor areas where conditions conducive to potential heat illness are present.
- Assure that adequate water and shade or cool-down areas are available when risk factors for heat illness are present.
- Ensure that all affected employees have received proper training in heat illness prevention.
- Ensure that the requirements of this Plan are being met.

Environmental Health and Safety

- Conduct periodic review of this Plan.
- Develop and administer training to promote heat illness prevention.

DEFINITIONS

Acclimatization – 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 or fourteen days of regular work for at least two hours per day in the heat.

Clothing that Restricts Heat Removal – Full-body clothing covering the arms, legs, and torso that is any of the following: Waterproof; designed to protect the wearer from chemical, biological, physical, radiological, fire hazard; or designed to protect the wearer from contamination.

Cool-Down Area – An indoor or outdoor area that is blocked from direct sunlight and shielded from other high radiant heat sources and is either open to the air or provided with ventilation or cooling. A

cool-down area does not include areas where: environmental risk factors defeat the purpose of allowing the body to cool, employees are exposed to unsafe or unhealthy conditions, or employees are deterred or discouraged from accessing or using the cool-down area.

Environmental Risk Factors for Heat Illness – 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, workload severity and duration; or protective clothing and personal protective equipment worn by employees.

Globe Temperature – The temperature of the warmth from direct sunlight, measured by a globe thermometer, which consists of a thermometer sensor in the center of a six-inch diameter hollow copper sphere painted on the outside with a matte black finish, or equivalent. The globe thermometer may not be shielded from direct exposure to radiant heat while the globe temperature is being measured.

Heat Illness – A serious medical condition resulting from the body’s inability to cope with a particular heat load, and may include heat rash, heat cramps, heat exhaustion, and/or heat stroke.

Heat Index – A measure of heat stress developed by the National Weather Service for outdoor environments that considers the dry bulb temperature and the relative humidity. For purposes of this section, heat index refers to conditions in indoor work areas. Radiant heat is not included in the heat index.

Heat Wave – Any day in which the predicted high outdoor temperature for the day will be at least 80 degrees Fahrenheit AND at least ten degrees Fahrenheit greater than the average high daily outdoor temperature for the preceding five days.

High Radiant Heat Area – A work area where the warmth that radiates from direct sun is at least five degrees Fahrenheit greater than the general air temperature.

Indoor – A space that is under a ceiling or overhead covering that restricts airflow and is enclosed along its entire perimeter by walls, doors, windows, dividers, or other physical barriers that restrict airflow, whether open or closed. All work areas that are not indoors are considered outdoor.

Personal Heat-Protective Equipment – Equipment worn to protect the user against heat illness. Examples include water-cooled garments, air-cooled garments, cooling vests, wetted over-garments, heat-reflective clothing, and supplied-air personal cooling systems.

Personal Risk Factors for Heat Illness – Factors such as an individual’s age, degree of acclimatization, health, water consumption, caffeine consumption, alcohol consumption, and use of prescription medications that affect the body’s water retention or other physiological responses to heat.

Preventative Cool-Down Rest – A rest taken in a cool-down area to prevent overheating.

Radiant Heat – Heat transmitted by electromagnetic waves and not transmitted by conduction or convection. Sources of radiant heat include the sun, hot objects, hot liquids, hot surfaces, and fire.

Relative Humidity – The amount of moisture in the air relative to the amount that would be present if the air were completely wet, such as during a rainstorm. The higher the humidity, the more moisture in the air.

Shade – Blockage of direct sunlight. One indicator that blockage is sufficient is when objects do not cast a shadow in blocked sunlight. Shade is not adequate when heat around shade defeats the purpose of shade, which is to allow the body to cool. For example, a car sitting in the sun does not provide acceptable shade to a person inside it, unless the car is running with air conditioning. Shade may be provided by any natural or artificial means that does not expose employees to unsafe or unhealthy conditions and that does not deter or discourage access or use.

Shielding – A physical barrier between radiant heat sources and employees that reduce the transmission of radiant heat.

Temperature – The dry bulb temperature in degrees Fahrenheit is obtainable by using a thermometer freely exposed to the air without considering humidity or radiant heat, to measure the temperature in the immediate area where employees are located.

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APPLICATION

OUTDOOR PLACES OF EMPLOYMENT

This section applies to employees whose job entails working outdoors, such as, but not limited to: Facilities Operations and Researchers conducting fieldwork. This Plan shall go into effect when the outdoor temperature equals or exceeds 80°F. When the outdoor temperature equals or exceeds 95°F, high heat procedures shall be activated.

INDOOR PLACES OF EMPLOYMENT

This Plan applies to all indoor work areas where the temperature or heat index equals or exceeds 87°F when employees are present; or 82°F if employees must wear personal protective equipment that restricts heat removal.

TYPES OF HEAT ILLNESSES

It is important to recognize and know how to treat the most common heat illnesses. See chart below:

Recognizing and Treating the Most Common Heat Illnesses		
Illness	Signs & Symptoms	Treatment
Heat Rash	<ul style="list-style-type: none">• Itching/irritation of the skin from clogged sweat glands• Looks like a red cluster of pimples or small blisters• Most likely to occur in areas where it is hard for sweat to evaporate	<ul style="list-style-type: none">• Keep affected area dry
Heat Cramps	<ul style="list-style-type: none">• Heavy sweating which depletes salt levels• Painful cramps in arms, legs, abdomen	<ul style="list-style-type: none">• Replenish electrolytes (water + electrolytes pack, sports drink)• Massage cramped areas• Rest in shade
Heat Exhaustion	<ul style="list-style-type: none">• Heavy sweating, clammy skin, pale• Extreme weakness, dizziness, nausea• Muscle cramps, fast and shallow breathing• Slightly elevated body temperature	<ul style="list-style-type: none">• Move to a cool, shaded area• Rest with legs elevated• Replenish electrolytes (water + electrolytes pack, sports drink)
Heat Stroke	<ul style="list-style-type: none">• No sweating, dry skin, vomiting• Headache, seizures, unconsciousness, confusion• Very high body temperature, rapid heartbeat	<ul style="list-style-type: none">• Call Security at 626-395-5000 and provide exact location• Move victim to shade• Provide victim with drinking water, if conscious• Apply cool, wet towels to the victim's neck and under arms

PROVISION OF WATER

All employees shall have access to potable drinking water that meets the following requirements:

- Must be fresh, pure.
- Suitably cool.
- Provided free of charge.
- Shall be located as close as practicable to immediate work areas and in indoor cool-down areas.
- Where drinking water is not plumbed or otherwise continuously supplied, it shall be provided in sufficient quantity at the beginning of the work shift to provide one quart per person per hour for drinking for the entire shift.

If Caltech employees carry reusable bottles, they shall use water fountains and bottle refill stations at the closest building to their work location. A map of 1st floor water fountains and bottle refill stations can be found [here](#).

ACCESS TO SHADE / COOL-DOWN AREAS

When the outdoor temperature is greater than or equal to 80 degrees Fahrenheit, shade shall be provided and maintained in one or more areas while workers are present that are either open to the air or provided with ventilation or cooling. When the outdoor temperature is less than 80 degrees Fahrenheit, shade shall be made available and provided upon request by an employee.

The shade or cool-down area shall be large enough to accommodate the number of workers on recovery or rest periods, so that they can sit in a normal posture without having to be in physical contact with each other. The shade or cool-down area shall be located as close as practicable to their work areas.

Caltech employees shall use air-conditioned buildings equipped with lobby areas/seating as cool-down areas. These indoor cool-down areas shall be always maintained at less than 82 degrees Fahrenheit while employees are present. Other building areas, such as decks, breezeways, courtyards, patios, shall be used as a shaded rest area, so long as structures or trees provide adequate shade from the sun. In the event that these areas are not near the work location, portable shade shall be used, such as EZ-UP canopies.

Subject to the same specifications, the size of the shade or cool-down area during meal periods shall be large enough to accommodate the number of people on the meal period who are onsite.

For employees working indoors where the indoor temperature or heat index equals or exceeds 87°F (or 82°F if employees must wear clothing that restricts heat removal), at least one cool-down area that is kept below 82°F must be made available.

All employees will be allowed and encouraged to take a preventative cool-down rest in a shade or cool-down area when they feel the need to protect themselves from overheating.

An individual who takes a preventative cool-down rest will:

1. Be monitored and asked if they are experiencing heat illness symptoms.
2. Be encouraged to remain in the shade.
3. Will not be allowed to work until signs or symptoms of heat illness have abated.
4. If heat exhaustion/stroke is present, the supervisor will contact Security at 626-395-5000.

HIGH HEAT PROCEDURES

High heat procedures shall only apply to employees who work in outdoor conditions that are conducive to potential heat illness. Caltech will implement high-heat procedures when:

- The outdoor temperature reaches or exceeds 95 degrees Fahrenheit; or when
- Employees must enter the utility tunnels for construction, repair, or maintenance.

High heat procedures include the following:

1. Communication will be maintained by voice, observation, or electronic means so that employees can contact a Supervisor, if needed.
2. Employees will be observed for alertness and signs or symptoms of heat illness. Observation/monitoring will be done by one or more of the following:
 - a. Supervisor or designee observation of 20 or fewer persons
 - b. Mandatory buddy system
 - c. Regular communications with sole worker with either a radio or cell phone
 - d. Other effective means of observation.
3. Contact Security at 626-395-5000 in the event of an emergency.
4. Remind workers to drink plenty of water during their workday.
5. Pre-shift meetings to review high heat procedures, encourage drinking plenty of water, and remind workers of their right to take a cool-down rest when necessary.

ASSESSMENT & CONTROL MEASURES FOR INDOOR AREAS

Indoor workplaces that have a potential for high temperature must be monitored for temperature and heat index. Whenever the temperature or heat index reaches 87°F (or 82°F for employees who must wear clothing that restricts heat removal), control measures to keep workers safe must be implemented. Control measures include the following:

- Engineering Controls: This control measure shall be used to reduce and maintain the temperature/heat index to below the applicable threshold. If this is not feasible, engineering controls shall reduce the temperature to the lowest feasible level.
- Administrative Controls: Where feasible engineering controls are not sufficient to reduce and maintain the temperature to below the applicable threshold, administrative controls shall be used to minimize the risk of heat illness.
- Personal Heat Protective Equipment: Where feasible engineering controls are not sufficient to reduce and maintain the temperature to below the applicable threshold, personal heat protective equipment shall be used to minimize the risk of heat illness.

EMERGENCY RESPONSE PROCEDURES

Caltech will implement the following emergency response procedures:

1. Ensure that effective communications by voice, observation, or cell phone is maintained so a Supervisor or Security (626-395-5000) can be contacted. If necessary, the emergency blue phone located on campus can be used to reach Campus Security.
2. Responding to signs and symptoms of heat illness and notification procedures to Security.
 - a. If a Supervisor observes, or any worker reports, any signs or symptoms of severe heat illness, the Supervisor will take immediate action.
 - b. If the signs or symptoms are consistent with those of Heat Stroke, Security must be notified immediately.
 - c. An individual showing signs or symptoms of heat illness will be monitored and not left alone or sent home without being offered medical assistance.
3. In the event of a non-life threatening emergency, the person will be transported to the Holliston parking structure for transportation to an occupational health clinic.
4. In the event of a life threatening emergency, Security will direct the Pasadena Fire Department to the individual's location.

ACCLIMATIZATION

1. All employees will be closely observed by a Supervisor or designee during a heat wave for heat illness signs or symptoms.
2. An employee who has been newly assigned to a high heat area shall be closely observed by a Supervisor or designee for the first 14 days of employment. Gradually increase shift length over the first one to two weeks.

TRAINING

Effective training in the following topics shall be provided to employees prior to commencing work that should reasonably be anticipated to result in exposure to the risk of heat illness.

Training will consist of the following:

1. The 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 (PPE).
2. The Institute's procedures to provide water, shade, cool-down rests, and access to first aid, as well as the employees' right to exercise their rights under this standard without retaliation.
3. The importance of frequent consumption of small quantities of water, up to four cups per hour, when the work environment is hot, and workers are likely to sweat more than usual in the performance of their duties.
4. The concept, importance, and methods of acclimatization.
5. The different types of heat illness, and the common signs and symptoms of heat illness, and appropriate first aid to the different types of heat illness, and that heat illness can progress

quickly from mild symptoms and signs to serious and life threatening illness.

6. The importance of employees of immediately reporting signs and symptoms of heat illness in themselves or their co-workers to their appropriate Supervisor.
7. The procedures for responding to signs or symptoms of heat illness and how to notify Security.
8. The procedures for requesting transportation by Security to an Occupational Health Clinic for a non-threatening heat illness.
9. The procedures for requesting the Pasadena Fire Department for a life-threatening heat illness. These procedures will include designating a person to be available to ensure that emergency procedures are invoked.

Supervisor training will consist of the following:

1. The required training topics to be provided to all employees working in indoor or outdoor areas that are subject to high temperatures.
2. The procedures the Supervisor is to follow to implement and comply with the Institutes Heat Illness Prevention Program.
3. The procedures the Supervisor is to follow when an employee exhibits signs or symptoms of heat illness, including emergency response procedures.
4. How to monitor weather reports and respond to hot weather advisories.