

# California Institute of Technology

## Heat Illness Prevention Program



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## Scope

Institute employees working in outdoor places of employment or in other areas at times when environmental risk factors for heat illness are present, are at risk for developing heat illnesses if they do not protect themselves appropriately. The objective of this program is employee awareness regarding heat illness symptoms, ways to prevent illness, and what to do if symptoms occur as defined under the [California Code of Regulations \(CCR\) Title 8, § 3395](#).

## Responsibilities

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

1. Identifying all employees who are required to work outdoors where potential heat illness could occur.
2. Assure that adequate water and shade are available when environmental risk factors for heat illness are present.
3. Ensure that all affected employees have received proper training on heat illness prevention.
4. Ensure that the requirements of this program are being met.

The Environment, Health, and Safety Office is responsible for providing annual training to all potentially affected employees and their supervisors on the risks and prevention of heat illness, including how to recognize symptoms, and respond when they appear.

## 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.

**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, protective clothing and personal protective equipment worn by employees.

**Heat Illness** – A serious medical condition resulting from the body's inability to cope with a particular heat load, and includes heat rash, heat cramps, heat exhaustion, and heat stroke.

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

**Shade** – Means blockage of direct sunlight. One indicator that blockage is sufficient is when objects do not cast a shadow in the area of blocked sunlight. Shade is not adequate when heat in the area of 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.

**Temperature** – Means the dry bulb temperature in degrees Fahrenheit obtainable by using a thermometer to measure the outdoor temperature in an area where there is no shade. While the temperature measurement must be taken in an area with full sunlight, the bulb or sensor of the thermometer should be shielded while taking the measurement, e.g., with the hand or some other object, from direct contact by sunlight.

## Types of Heat Illness

**Heat Rash** – Heat rash occurs when sweat ducts become clogged and the sweat can't get to the surface of the skin. Instead, it becomes trapped beneath the skin's surface causing a mild inflammation or rash.

Symptoms:

- Looks like a red cluster of pimples or small blisters
- Most likely to occur on the neck and upper chest, in the groin, under the breasts, and elbow creases.

**Heat Cramps** – Heat cramps usually affect workers who sweat a lot during strenuous activity. This sweating depletes the salt and moisture levels. Low salt levels in muscles causes painful cramps. Heat cramps can also be a symptom of heat exhaustion.

Symptoms:

- Muscle pain or spasms usually in the abdomen, arms, or legs.

**Heat Exhaustion** – Heat exhaustion is the body's response to an excessive loss of water and salt, usually through excessive sweating. Workers most prone to heat exhaustion are those that are elderly, have high blood pressure, and those working in a hot environment.

Symptoms:

- Heavy sweating
- Extreme weakness or fatigue
- Dizziness
- Nausea
- Clammy moist skin
- Pale or flushed complexion
- Muscle cramps
- Slightly elevated body temperature
- Fast and shallow breathing

**Heat Stroke** – Heat Stroke is the most serious form of heat illness and is considered a medical emergency. Heat stroke often occurs as a progression from milder heat-related illnesses such as heat cramps, heat syncope, and heat exhaustion. Heat stroke can kill or cause damage to the brain or other internal organs.

Symptoms:

- Throbbing headache
- Lack of sweating despite the heat.
- Red, hot, and dry skin.
- Nausea and vomiting.
- Rapid heartbeat, which may be either strong or weak.
- Behavioral changes such as confusion, disorientation, or staggering.
- Very high body temperature
- Seizures
- Unconsciousness

## Provision of Water

Employees must have access to potable water. Water must be provided in sufficient quantity at the beginning of the work shift to provide one quart per employee per hour for drinking for the entire shift. Employees may begin the shift with smaller quantities of water if effective procedures for replenishment of water during the shift have been implemented to provide employees one quart or more per hour. The water shall be located as close as practical to the area where the employees are working.

## Access to Shade

When the outdoor temperatures in the work area exceeds 80 degrees Fahrenheit shade will be provided in one or more areas, while employees are present, that is open to the air or provided with ventilation or cooling.

Employees will be allowed and encouraged to take a preventative cool-down rest in the shade 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 the employee still exhibits signs or symptoms of heat illness, the supervisor will contact Security and request a Pasadena Fire Department paramedic.

## High Heat Procedures

Caltech will implement high-heat procedures when the temperature reaches or exceeds 95 degrees Fahrenheit. These procedures include the following:

1. Communication will be maintained by voice, observation, or electronic means so that employees can contact a supervisor when needed.
2. Employees will be observed for alertness and signs or symptoms of heat illness. Employee observation/monitoring will be done by one or more of the following:
  - a. Supervisor or designee observation of 20 or fewer employees, or
  - b. Mandatory buddy system, or
  - c. Regular communications with sole employee with either a radio or cell phone, or
  - d. Other effective means of observation.
3. Designating one or more employees to contact Security and request a Pasadena Fire Department paramedic.
  - a. Other employees may contact Security and request a Pasadena Fire Department paramedic when no designated employee is available.
4. Remind employees to drink plenty of water during their workday.
5. Pre-shift meeting to review high heat procedures, encourage employees to drink plenty of water, and remind employees of their right to take a cool-down rest when necessary.

## 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 that employees can contact a supervisor or Security.
2. Responding to signs and symptoms of heat illness and notification procedures to Security.
  - a. If a supervisor observes, or any employee reports, any signs or symptoms of severe heat illness in any employee, the supervisor will take immediate action.
  - b. If the signs or symptoms are indicators of severe heat illness, such as decreased level of consciousness, staggering, vomiting, disorientation, irrational behavior, or convulsions, Security must be notified immediately.
  - c. An employee 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 employee will be transported to the Holliston parking structure for transportation to an occupational health clinic.
4. In the event of 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 designated employee during a heat wave for heat illness signs or symptoms. A heat wave is defined as any day that is at least 80 degrees Fahrenheit and at least ten degrees hotter than the average high daily temperature in the preceding five days.
2. Any employee who has been employed and is from an area that is not a high heat area shall be closely observed by a supervisor or designee for the first 14 days of the employee's employment.

## Training

Employee 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 responsibilities and procedures to provide water, shade, cool-down rests, and medical treatment without fear of retaliation.
3. The importance of consumption of water, up to four cups per hour, when the work environment is hot and the employee is more likely to sweat more than usual.
4. The concept, importance, and methods of acclimatization.
5. The different types of heat illness, the common signs and symptoms of heat illness. Proper procedures for 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 immediately reporting signs and symptoms of heat illness in themselves or their co-workers.
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 Employee training will consist of the following:

1. The training required for employees.
2. The procedures the supervisor is to follow to implement the 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.