CHAPTER 23

TABLE OF CONTENTS

23.00 INTRODUCTION

Chapter 23 of the Caltrans Safety Manual is the written Heat Illness Prevention Program (HIPP) and is part of the department's Injury and Illness Prevention Program (IIPP). It provides the procedures for complying with the requirements of Cal/OSHA's California Code of Regulations (CCR) Title 8, Subchapter 7, General Industry Safety Orders (GISO), §3395 Heat Illness Prevention in Outdoor Places of Employment and is available on the Caltrans intranet at:

http://admin.dot.ca.gov/lr/HEALTHSAFETY/Safety/safetymanual_toc.shtml

Also available on the internet at:
http://www.dot.ca.gov/hq/opo/safety/safetymanual_toc.htm

A written copy shall be made available upon request.

23.01 PURPOSE

The Caltrans Heat Illness Prevention Program provides guidance for the implementation of an effective plan to prevent heat illness.

23.02 POLICY STATEMENT

The Heat Illness Prevention Plan applies to all employees that may be exposed to environmental conditions that could cause heat illness. First line supervisors have direct responsibility to implement the plan and ensure that it is an effective part of the overall safety program. Chapter 23 includes Caltrans written procedures to be followed by supervisors and employees as part of the Heat Illness Prevention Plan.

23.03 DEFINITIONS

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.

Heat Illness (a.k.a. Heat Stress) is a serious medical condition resulting from the body's inability to cope with a particular heat load, and includes heat cramps, heat exhaustion and heat stroke.

Environmental risk factors for heat illness are the working conditions that create the possibility that heat illness could occur, including air temperature, relative humidity, and 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 are factors such as an individual's age, degree of acclimatization, health, water consumption, alcohol consumption, caffeine consumption, and use of prescription medications that affect the body's water retention or other physiological responses to heat.

Preventative cool-down rest period is a period of time in the shade to help the body relieve excess heat in order to prevent heat illness.

Shade is the 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 continuously 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.

Suitably cool water is water that is cooler than the ambient temperature but not so cool as to cause discomfort.

Temperature is 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. Other options for checking the temperature may be:

- The National Weather Service forecasts the temperature in various locations in California. Weather forecasts and information are broadcast on NOAA Weather radio and can be accessed at: http://www.weather.gov/view/states.php?state=ca&map=on

- OSHA's Quick Takes Heat Safety Tool: http://www.osha.gov/SLTC/heatillness/heat_index/heat_app.html

23.04 CALTRANS HEAT ILLNESS PREVENTION PLAN

The Caltrans Heat Illness Prevention Plan includes the following components:

1. **TRAINING**–All potentially impacted employees and their supervisors shall be trained on the risks and prevention of heat illness, including how to recognize symptoms and respond when they appear, and the importance of acclimatization.

2. **SUFFICIENT DRINKING WATER**–Supervisors shall make arrangements to provide fresh, pure, suitably cool drinking water to employees free of charge. The

water shall be located as close as practicable to the area where employees are working. 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 hour, per employee*** for the entire shift. Enough water to meet this requirement for the planned shift shall be available at all times for each employee who works outdoors in the heat, unless a plan to replenish water during the day is **carried out and documented**.

- Fresh and Pure: Water must be fit to drink (i.e., potable) and free from odors that would discourage workers from drinking the water. If supplied in water containers, the containers must be clean. If hose or connections are used, they must be governmentally approved for potable drinking water systems, as shown on the manufacturer's label.

3. **ACCESS TO SHADE**– When **temperatures below 80 degrees Fahrenheit, s**upervisors must provide timely access to shade upon an employee's request.

   When temperatures exceed 80 degrees Fahrenheit, employees shall be provided access to shade at all times. Supervisors need to determine in advance of the shift, how shade will be provided. Shade **shall** be in place and **ready for immediate use**. It must remain in place while employees are present. The amount of shade provided shall accommodate the number of employees on recovery periods, rest periods, or meal periods (if employees remain onsite), so that they can sit in a normal posture fully in the shade without having to be in physical contact with each other. The shade shall be located as close as practicable to the work area when it is safe to do so.

   Employees shall be allowed and encouraged to take a preventative cool-down rest in the shade when they feel the need to do so to protect themselves from overheating.

   An employee who takes a preventative cool-down rest shall:

   1. Be monitored and asked if he/she is experiencing symptoms of heat illness.
   2. Be encouraged to remain in the shade.
   3. Shall not be ordered back to work until any signs or symptoms of heat illness have abated, but in no event less than 5 minutes in addition to the time needed to access the shade.

   If employee exhibits signs or reports symptoms of heat illness while taking a preventative cool-down rest period, appropriate first aid or emergency response must be provided.

   Supervisors need to determine how shade will be provided. For example:

- A vehicle with the air-conditioning operating that has been allowed to cool prior to entering is acceptable shade. Seatbelts are required to be worn while employees are in the vehicle.

- Buildings or structures that are either open to the air or equipped with ventilation or open to air movement.

- Canopies and other temporary structures or devices may be used to provide shade, **when it is safe to do so.** Caltrans **does not** erect temporary shade structures in the right-of-way, unless **supervisors** have evaluated the area and determined that the location and structures are safe for the conditions (i.e. Structures are sufficiently distant from the roadway, secured from blowing over/away, and do not block motorist views of the roadway or traffic signs). ***(Note: This applies at all temperatures including the above 80 degree procedures and the over 95 degree high heat procedures.)***

- Trees with sufficiently dense canopy that provide substantially complete blockage of direct sunlight. The branches from the tree must not be so low to the ground that employees must crouch or cannot sit up straight without contacting vegetation.

When supervisors have determined that it is infeasible or unsafe to have shade present on a continuous basis alternative procedures that allow employees to cool may be utilized. For example:

- Shift changes that would allow most of the intense labor to be performed during the cooler times of the day. (Supervisors must comply with MOU shift change requirements.)

- Frequent changes in flagger personnel. Location and visibility are important factors in flagging operations. Flaggers need to stay out of areas that are in shadows. [Flagging Instruction Handbook]

4. **HIGH HEAT PROCEDURES –** In addition to the previous procedures**, when temperatures are equal to or exceed 95 degrees Fahrenheit**, Supervisors are required to implement and document the following high-heat procedures:

   A. Ensure effective communication by voice, observation, or electronic means is maintained so that employees at the work site can contact a supervisor when necessary. An electronic device may be used for this purpose only if reception in the area is reliable.

   B. Observe employees for alertness and signs or symptoms of heat illness.

      i. Direct observation shall be by a supervisor or designee.

ii. The buddy system where employees stay in contact with each other, observe each other throughout the day, and immediately report any signs or symptoms of heat illness to the supervisor or designee.

iii. Regular communication with employees who work alone by radio or cellular phone, or other effective means of observation.

C. Designate one or more employees on each worksite as authorized to call emergency medical services, and allow other employee to call for emergency services when no designated employee is available.

D. Hold pre-shift meetings before the commencement of work to review the high heat procedures; and:

i. Encourage employees to drink plenty of water to stay hydrated.

ii. Remind employees of their right to take a preventative cool-down rest when necessary.

iii. Identifying the employee(s) who should call for emergency medical services when needed.

iv. How employees will be observed, e.g., direct observation, the buddy system or by regular communication.

5. **EMERGENCY RESPONSE PROCEDURES**– Supervisors shall ensure that effective communication by voice, observation, or electronic means is maintained at all times so that employees at the work site can contact a supervisor or emergency medical services when necessary**. An electronic device, such as a cell phone or text messaging device, may be used for this purpose only if reception in the area is reliable.** If this is not possible, the supervisor will ensure other means of summoning emergency medical services (e.g. supervisor designates an employee who can be reached by radio).

If a supervisor observes, or any employee reports any signs or symptoms of heat illness, the supervisor shall take appropriate immediate action.

- If the symptoms are **mild** as described in section 23.07, provide first aid treatment and a period of rest. Never leave employee alone or send them home without being offered onsite first aid and/or being provided with emergency medical services. Evaluate the employee's response to the first aid and their fitness/ability to continue their job functions. Re-assess worksite conditions and any environmental risk factors that may be present. Make worksite adjustments as necessary. Closely monitor the affected employee for a period of time sufficient to allow for acclimatization.

- If the affected employee mentions heart problems or low sodium diet, or has heat cramps that do not subside within one hour, provide for immediate medical care.

- If an employee develops **moderate or severe** symptoms of heat illness as described in section 23.07, **call 9-1-1** and give first aid treatment until professional medical help takes over.

- Supervisors, or their designee(s) in their absence, will be the responsible person in charge to call **9-1-1**. When a responsible person in charge is not available, **any** employee may call **9-1-1**.

  - ✓ To **call 9-1-1**, use a Caltrans provided vehicle radio to call Caltrans Dispatch or use a cell phone. In areas without radio or cell phone coverage, **plan ahead how to call for emergency medical help if necessary**. Options include using a Roadside Assistance Telephone, a local business phone or driving to a nearby location with known radio/cell coverage.

- Supervisors are to ensure that employees are able to provide clear, concise directions to their work site to emergency responders.

  - ✓ When providing a location description for emergency medical responders, do not rely only on Post Mile marker information, but also provide landmarks, distances, directions and as much location specific information as possible.

  - ✓ If the location is inaccessible, plan ahead on how employees will be transported to a point where they can be reached by emergency medical service personnel. Options include ensuring a vehicle is available to transport the affected person to a predetermined location that is accessible to emergency medical service personnel.

6. **ACCLIMATIZATION**–Supervisors are responsible to ensure employees are trained on acclimatization and, when planning work, consider the need to acclimatize to anticipated heat conditions.

   All employees shall be closely observed by a supervisor or designee during a heat wave. For the purpose of this section only, **"heat wave"** means any day in which the predicted high temperature for the day will be at least 80 degrees Fahrenheit and at least ten degrees Fahrenheit higher than the average high daily temperature in the preceding five days.

   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 employee's employment.

Recommendations for dealing with heat wave and employees new to the anticipated heat conditions include:

a. Monitor the weather
b. Adjust work schedules, locations, and/or the order of tasks
c. Increase observation and communication with employees

7. **ANNUAL "REFRESHER" TRAINING**– Formal training shall be provided to all employees before working where environmental risk factors for heat illness are present and refresher training shall be provided annually (See section 23.05).

23.05 TRAINING REQUIREMENTS

All employees working on job tasks where environmental risk factors for heat illness are present shall receive heat safety training before beginning work. Supervisors or their designees, once trained, are required to provide this training to all affected employees and document the training. Training topics shall include the following:

- The procedures for complying with the requirements of this standard including, but not limited to: Caltrans responsibility to provide water, shade, cool-down rests, and access to first aid as well as employees' right to exercise their rights under this standard without retaliation.

- Environmental and personal risk factors for heat illness.

- Importance of frequent consumption of small quantities of ***water, up to 1 quart per hour***, when the work environment is hot and employees are likely to be sweating more than usual in the performance of their duties.

- Importance of acclimatization, staying hydrated, and using shade when necessary.

- The different types of heat illness and the common signs and symptoms of heat illness.

- The importance to employees of immediately reporting to their supervisor symptoms or signs of heat illness in themselves or in coworkers.

- Procedures for responding to symptoms of possible heat illness, including first aid and how emergency medical services will be provided, should they become necessary.

- 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.

- Procedures for ensuring that, in the event of an emergency, clear, and precise directions to the work site can and will be provided as needed to emergency responders.

Additional Supervisor Training:

Prior to supervising employees working in the heat, supervisors and their designees shall be trained on the following topics:

- How to monitor weather reports and how to respond to hot weather advisories (*news, media options, and use of a thermometer*)

- The procedures the supervisor is to follow to implement the applicable provisions of the Heat Illness Prevention Plan.

- The procedures the supervisor is to follow when an employee exhibits symptoms consistent with possible heat illness, including emergency response procedures.

All completed Heat Illness Prevention training is to be recorded in the department's Learning Management System (LMS). The Heat Illness Prevention training course number is 100741.

23.06 TYPES OF HEAT ILLNESS / SYMPTOMS AND FIRST AID

1. **Mild** (Prickly Heat & Heat Cramps)

   This is the least serious form of heat Illness. Mild heat Illness is always reversible and usually not dangerous unless the symptoms persist. Although you can continue work soon after receiving first aid, always inform your supervisor if you experience mild symptoms of heat illness at work.

   Signs and Symptoms:

   - Excessive sweating
   - Painful spasms in muscles during or several hours after activity **(Heat Cramps)**
   - Tiny red bumps on the skin and a prickling sensation **(called Prickly Heat)**

   What Your Body is Doing:

   Sweating is a natural cooling process, but it causes your body to lose water and minerals. Excessive sweating can dehydrate the body and create an imbalance causing muscles to cramp. When your sweat glands become blocked and inflamed, a rash results.

First Aid:

- Rest in a cool or shady area
- Drink water
- Use warm moist compresses over cramping muscles, followed by a gentle massage
- Keep skin dry and clean
- If symptoms persist, seek medical attention

2. **Moderate** (Heat Exhaustion)

Heat exhaustion is a more serious form of heat illness, although the symptoms are usually reversible if treated quickly. However, if left untreated it can lead to Heat Stroke. It is important that you inform your supervisor immediately if you experience symptoms of moderate heat illness so that immediate action be taken. **9-1-1** services will be called and first aid treatment will be provided until professional medical help takes over.

Signs and Symptoms:

- Heavy sweating, cold/clammy skin
- Extreme weakness or fatigue
- Dizziness or fainting, cramps
- A weak and rapid pulse
- Fast, shallow breathing

What Your Body is Doing:

The loss of too much water and minerals reduces the blood supply to your brain, muscles, and skin. Your heart works harder to maintain the blood supply.

First Aid and Medical Information:

- ***Call 9-1-1 for emergency medical treatment***
- Provide rest and cool the victim with whatever methods you have available For example, spray them with cool water, place cool wet cloth on their body or give them a cool shower
- Provide cool (non-alcoholic) drinks
- Loosen clothing

3. **Severe** (Heat Stroke)

This is a serious, **life-threatening medical emergency, CALL 9-1-1 IMMEDIATELY!** It can happen in a few hours or less while working in a hot environment. The symptoms are reversible, but if not treated promptly, heat stroke can lead to permanent brain damage or death.

Signs and Symptoms:

- Warm, dry skin
- Confusion or unconsciousness
- A strong & rapid pulse
- Throbbing headache
- Nausea, vomiting or both

What Your Body is Doing:

When your body becomes so overheated that your sweat glands and other organs cannot function normally, then blood flow and sweat cannot cool your body sufficiently. This can affect vital organs, including your heart and brain, and may cause permanent damage.

First Aid and Medical Information:

- **Call 9-1-1!** Heat stroke is an extremely dangerous condition and requires emergency medical treatment
- Immediately begin cooling the victim using whatever methods you have. For example, spray them with cool water, place cool wet cloth on their body, give them a cool shower, immerse the victim in cool water, or wrap them in a cool wet sheet and fan them
- Giving drinking water is generally not recommended since a victim of heat stroke can go into seizure, shock, and/or vomit and choke
- If prompt emergency medical service is not possible or is delayed, ask the emergency response entity for additional first aid assistance via telephone or radio

23.07 PREVENTING HEAT STRESS CHECKLIST

Supervisors and employees should be aware of the health risks associated with working and/or performing work activities in environments that may contribute to heat illness. Knowing what factors can increase your risk will enable you to take steps to reduce problems while working in the heat. The following are suggested ideas and/or steps that supervisors and employees can take to help prevent heat stress:

1. **Discuss the increased risks.** When working in high heat exposure areas such as exposure to radiant heat from mechanical sources or on hot days the risk for heat illness increases.

2. **Drink plenty of water—*1 quart per hour***. Thirst is not a good indicator of how much water your body needs. Drink more water or other fluids than you need to satisfy your thirst. It is best to regularly replenish the water you lose from sweating by drinking small amounts frequently throughout the work shift.

3. **Take preventative recovery periods.** Depending on conditions (e.g. - air temperature, sun exposure, physical exertion), more recovery periods may be needed. If **not** in the right-of-way, use available or provided shade for recovery. If in the right-of-way, move to shade, a cool location, or an air-conditioned vehicle. Seatbelts are required to be worn while employees are in the vehicle.

4. **Wear PPE to guard against heat exposure.** When possible, wear comfortable, loose, lightweight clothing that allows body heat to be released. Cover your head.

5. **Acclimatize to hot work.** This usually requires several days working in the heat for short periods, gradually increasing work time and intensity. Consider alternative work schedules (work earlier or later) to avoid the times when heat is most severe. Note: Consideration should be given to shift changes that would allow most of the intense labor to be performed at the cooler time of the day. Employees in good physical condition tend to better acclimatize because their cardiovascular systems respond more efficiently.

6. **Eat light meals.** It is better to eat light during the workday when exposed to heat as hot, heavy meals add heat to your body and diverts blood to your digestive system.

7. **Avoid drinks with alcohol, caffeine, and large amounts of sugar.** Remember that personal risk factors such as acclimatization, age and health affect the body's water retention and physiological responses to heat. If you take any medications, follow your doctor's instructions in regard to using the medicines in heat/sun intensive environments.

8. **Be proactive!** Practice preventive measures and know the signs, symptoms, and first aid for stages of heat illness.