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# **HEAT ILLNESS PROCEDURES MANUAL**

Safety Services – Health & Safety

University of California, Davis

Version 1.1

## Revision History

<b>Heat Illness Procedures Manual</b>		
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# HEAT ILLNESS PREVENTION

## I. Introduction

### A. Applicability

This Heat Illness Prevention Procedures Manual has been created for \_\_\_\_\_ (*dept.*) to comply with California Code of Regulations [Title 8, Section 3395, Heat Illness Prevention](#). The Heat Illness Prevention standard is applicable to any outdoor workplace, whenever environmental or personal risk factors for heat illness are present.

### B. Responsibilities

Department Directors, Chairs, or Deans are responsible for ensuring this written procedures manual is implemented and available to employees, and training is provided to employees. Supervisors must evaluate work conditions before sending employees to perform outdoor work in hot conditions. Cal/OSHA defines a trigger temperature and “shade up” provisions when temperatures exceed 80°F, and “high heat” procedures at 95°F. Typically, temperatures above 80°F, especially with heavy physical work activities, would represent conditions where there is a risk of heat illness. Other factors, such as high humidity or work activities, restrict the body’s ability to cool itself (i.e., protective clothing), and could result in heat illness at lower temperatures.

### C. Campus Policies and References

UC Davis Heat Illness Prevention policy is specified in Policy and Procedure Manual [290-52 Heat Illness Prevention](#) (<https://ucdavispolicy.ellucid.com/documents/view/299>). Additional heat illness reference information is found at the Safety Services’ [Heat Illness Prevention web page](#) (<https://safetyservices.ucdavis.edu/article/heat-illness-prevention>) and [SafetyNet #123 “Heat Illness Prevention.”](#) (<https://safetyservices.ucdavis.edu/safetynet/heat-illness-prevention>). A UC system-wide [online training module](#) is available for UC Davis at [lms.ucdavis.edu](https://lms.ucdavis.edu).

## II. Heat Illness Risk Factors

### A. Personal Risk Factors

Personal risk factors for heat illness include:

- **General Health & Age:** Those at greatest risk for heat-related illness include people greater than 65 years old, overweight, ill, or taking certain medications. Additional risk factors include fever, dehydration, heart disease, mental illness, poor circulation, and sunburn.
- **Acclimatization:** The temporary adaptation of the body to work in the heat occurs gradually with exposure to ambient heat. The body needs time to adapt to working in the heat. When temperatures rise suddenly, employees are at increased risk for heat illness while acclimating to the heat. Acclimatization is particularly important for employees who are returning to work after a prolonged absence, recent illness, or recently moving from a cool to hot climate. For heavy work under very hot conditions, a period of four to fourteen days of progressively increasing work time is recommended. For less severe conditions, two to three days of increasing work activity and duration are recommended (See [Appendix A](#)).
- **Alcohol & Caffeine:** Alcoholic beverages, coffee, tea, or other drinks containing caffeine will dehydrate the body and increase the risk of heat illnesses.

### B. Environmental Risk Factors

Environmental risk factors for heat illness are defined in the regulation as “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.” The Heat Index (HI) is the temperature the body feels when heat and humidity are combined. The chart below shows the HI that corresponds to the actual air temperature and relative humidity. This chart is based upon shady, light wind conditions. Exposure to direct sunlight can increase the HI by up to 15°F. This table can be used in consideration of the risk factors and the subsequent need for water, rest, and shade. Regardless of the actual ambient temperature, provision of water and shade as described above should be implemented whenever the HI exceeds 90°F (See [Appendix B](#)).

		Temperature (°F)															
		80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
Relative Humidity (%)	40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
	45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
	50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
	55	81	84	86	89	93	97	101	106	112	117	124	130	137			
	60	82	84	88	91	95	100	105	110	116	123	129	137				
	65	82	85	89	93	98	103	108	114	121	128	136					
	70	83	86	90	95	100	105	112	119	126	134						
	75	84	88	92	97	103	109	116	124	132							
	80	84	89	94	100	106	113	121	129								
	85	85	90	96	102	110	117	126	135								
	90	86	91	98	105	113	122	131									
	95	86	93	100	108	117	127										
100	87	95	103	112	121	132											

**Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity**

Caution	Extreme Caution	Danger	Extreme Danger
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Table 1. Heat index and likelihood of heat disorders (source: National Weather Service)  
Update provided by Victor Duraj

## C. Identifying Heat Illness

Heat illness is a group of serious and escalating medical conditions that can result from the body's inability to cope with a particular heat load. These illnesses include heat fatigue, heat cramps, heat rash, fainting/syncope, heat exhaustion, and heat stroke. The National Institute of Occupational Safety and Health's (NIOSH) publication *Working in Hot Environments* describes the symptoms and response measures for several types of heat illness, as follows:

- **Transient Heat Fatigue:** Refers to the temporary state of discomfort and mental or psychological strain arising from prolonged heat exposure. Workers unaccustomed to the heat are particularly susceptible and can suffer, to varying degrees, a decline in task performance, coordination, alertness, and vigilance. The severity of transient heat fatigue will be lessened by a period of gradual adjustment to the hot environment (heat acclimatization).

- **Heat Cramps:** Painful spasms of the muscles that occur among those who sweat profusely in heat and drink large quantities of water, but do not adequately replace the body's salt loss. The drinking of large quantities of water tends to dilute the body's fluids, while the body continues to lose salt. Shortly thereafter, the low salt level in the muscles causes painful cramps. The affected muscles may be part of the arms, legs, or abdomen, but tired muscles (those used in performing the work) are usually the ones most susceptible to cramps. Cramps may occur during or after work hours, and may be relieved by taking salted liquids by mouth. **CAUTION:** Persons with heart problems or those on a low sodium diet who work in hot environments should consult a physician about what to do under these conditions.
- **Heat Rash:** Also known as prickly heat, is likely to occur in hot, humid environments where sweat is not easily removed from the surface of the skin by evaporation, and the skin remains wet most of the time. The sweat ducts become plugged and a skin rash soon appears. When the rash is extensive, or when it is complicated by infection, prickly heat can be very uncomfortable and may reduce a worker's performance. The worker can prevent this condition by resting in a cool place part of each day, and by regularly bathing and drying the skin.
- **Heat Syncope:** Heat syncope or fainting is a mild form of heat illness that often results from physical exertion when it is hot. It occurs when the body, in an effort to cool itself, causes the blood vessels to dilate to such an extent that blood flow to the brain is reduced. Inadequate fluid replacement, which leads to dehydration, usually contributes greatly to this illness. Symptoms include faintness, dizziness, headache, increased pulse rate, restlessness, nausea, vomiting, and brief loss of consciousness. In cases of heat syncope, lie or sit down the worker in shade or a cool area, elevate the feet, hydrate with fluids, and refrain from vigorous activity.

- **Heat Exhaustion:** Includes several clinical disorders having symptoms which may resemble the early symptoms of heat stroke. Heat exhaustion is caused by the loss of large amounts of fluid by sweating, sometimes with excessive loss of salt. A worker suffering from heat exhaustion still sweats but experiences extreme weakness or fatigue, giddiness, nausea, or headache. In more serious cases, the victim may vomit or lose consciousness. The skin is clammy and moist, the complexion is pale or flushed, and the body temperature is normal or only slightly elevated. In most cases, treatment involves having the victim rest in a cool place and drink plenty of liquids. Victims with mild cases of heat exhaustion usually recover spontaneously with this treatment. Those with severe cases may require extended care for several days. There are no known permanent effects. **CAUTION:** Persons with heart problems or those on a low sodium diet who work in hot environments should consult a physician about what to do under these conditions.
  
- **Heat Stroke:** The most serious of health problems associated with working in hot environments. It occurs when the body's temperature regulatory system fails and sweating becomes inadequate. The body's only effective means of removing excess heat is compromised with little warning to the victim that a crisis stage has been reached. A heat stroke victim's skin is hot, usually dry, red or spotted. Body temperature is usually 105°F or higher, and the victim is mentally confused, delirious, perhaps in convulsions, or unconscious. Unless the victim receives quick and appropriate treatment, death can occur. Any person with signs or symptoms of heat stroke requires immediate hospitalization. However, first aid should be immediately administered. This includes removing the victim to a cool area, thoroughly soaking the clothing with water, and vigorously fanning the body to increase cooling. Further treatment at a medical facility will be directed to the continuation of the cooling process and the monitoring of complications which often accompany the heat stroke. Early recognition and treatment of heat stroke are the only means of preventing permanent brain damage or death.



## III. Prevention Procedures

### A. General Prevention

- Rest in shaded areas
- Stay hydrated
- Avoid vigorous physical activities in hot and humid weather
- At work, if you must perform physical activities in hot weather:
  - Drink plenty of fluids
  - Avoid alcohol, coffee, and tea
  - Take frequent mini-breaks to hydrate yourself
  - As practical, wear hats, light colored, and light/loose clothes

### B. Provision of Water

Employees are encouraged to drink water frequently. Water shall be fresh, pure, suitably cool, and provided to employees free of charge. The water shall be located as close as practicable to the areas where employees are working and be readily available.

- Supervisors are responsible for ensuring employees have an adequate supply of drinking water (See [Appendix C](#)).
- Supervisors shall encourage the frequent consumption of small quantities of water, up to 4 cups per hour, when the work environment is hot and employees are likely to be sweating more than usual in the performance of their duties.
- Drinking water will be provided in sufficient quantities to provide 1 quart per employee per hour for the entire shift (at least 2 gallons per employee for an 8-hour shift).
- If there are effective procedures for replenishing the water supply during the shift, a minimum of 2 quarts of water per employee may be provided at the beginning of the shift.

## **C. Shade and Rest**

A shaded area will be provided when the temperature exceeds 80°F. The amount of shade present shall be at least enough to accommodate all employees on recovery or rest periods, so that they can sit in a normal posture fully in the shade without having to be in physical contact with each other. This needs to accommodate all of the employees who are on such break at any point in time. This does not mean that employers are required to provide enough shade to accommodate all of the employees on the shift at the same time. Employers may, for example rotate the breaks among employees. The shade shall be located as close as practicable to the areas where employees are working. Subject to the same specifications, the amount of shade present during meal periods shall be at least enough to accommodate the number of employees on the meal period who remain onsite (See [Appendix D](#)). The shaded area shall be open to the air, or ventilated and cooled, and access shall be permitted at all times. Canopies, umbrellas, or other temporary structures may be used to provide shade, provided they block direct sunlight. Supervisors are responsible for:

- Ensuring that employees have access to shaded or air conditioned areas (e.g. break room, or a vehicle whose AC has been running and maintaining a cool interior) to prevent or recover from heat illness symptoms, or to take rest breaks.
- Emphasizing the importance of taking recovery or rest periods.
- Accommodating a preventative cool-down rest if the employee feels discomfort in the heat to prevent the onset of heat illness. An individual employee who takes a preventative cool-down rest shall:
  - Be monitored and asked if he or she is experiencing symptoms of heat illness.
  - Be encouraged to remain in the shade.
  - Not be ordered back to work until any signs or symptoms of heat illness have abated, but in no event less than five minutes in addition to the time needed to access the shade.

## **D. High Heat Procedures**

Additional high-heat procedures are required when the temperature equals, or exceeds, 95°F. These procedures shall include the following, to the extent practicable:

- Ensure that 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, such as a cell phone or text messaging device, may be used for this purpose only if reception in the area is reliable.

- Observe employees for alertness and signs or symptoms of heat illness.
- Remind employees throughout the work shift to drink plenty of water.
- Cal/OSHA requires close supervision of all new employee by a supervisor or designee for the first 14 days of the employee's employment, unless the employee indicates at the time of hire that he or she has been doing similar outdoor work for at least ten of the past 30 days for four or more hours per day.
- For agricultural work sites, mandatory ten minute preventative cool-down rest periods shall be provided every two hours.

## IV. Responding to Emergencies

### A. Employee Procedures

Any employee who recognizes the symptoms or signs of heat illness in themselves, or in coworkers, should immediately report this condition to their supervisor. When you recognize signs of heat illness in yourself or in a co-worker:

- Move them to a shaded area for a recovery period of at least five minutes.
- If the condition appears to be severe or the employee does not recover, then emergency medical care is needed.
- Immediately report to your supervisor any symptoms or signs of heat illness you may be experiencing or observing in a co-worker.
- Call 911 if your supervisor is not readily available.

### B. Supervisor Procedures

Supervisors must:

- Carry cell phones, radios, or other means of communication, ensuring emergency services can be called, and verifying the radios or other means of communication are functional prior to each shift.
- Know the exact work locations, and have clearly written and precise directions to the work site for emergency responders.

- Conduct pre-shift meetings before the commencement of work to review the high-heat procedures, encourage employees to drink plenty of water, and remind employees of their right to take a cool-down rest when necessary.
- Keep a written copy of the UC Davis Heat Illness Prevention manual at the worksite, available to employees and representatives of Cal/OSHA. The plan should be in both English, and the language understood by the majority of the employees.

## **C. Emergency Contact Procedures**

- Call 911.
- Be ready to provide emergency response personnel with directions to work location.
- When working at remote locations, you must be able to provide concise directions to emergency response personnel for guidance (See [Appendix E](#)).
- Further emergency response guidance for supervisors is provided in [Appendix F](#).

## **D. Response to Heat Stroke Symptoms**

- Victims of heat stroke must receive immediate treatment to avoid permanent organ damage.
- Always notify emergency services (911) immediately. If their arrival is delayed, they can give you further instructions for treatment of the victim.
- If possible, get the victim to a shady area to rest.
- Remove heavy clothing, or change to lightweight attire.
- Cool the victim; effective cooling measures include:
  - Administering cool, non-alcoholic beverages.
  - Applying cool or tepid water to the skin (i.e. spray the victim with cool water from a garden hose).
  - Providing a cool shower or sponge bath.
  - Move to an air-conditioned environment or fan the victim to promote evaporation.
  - Place ice packs under armpits and groins.
  - Monitor body temperature with a thermometer, and continue cooling efforts until the body temperature drops to 101-102°F.

## V. Employee and Supervisor Training

All employees, including supervisors, who may work outdoors in conditions where there are environmental risk factors for heat illness shall be provided with Heat Illness Prevention training on the information contained in this document, including:

- 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.
- Procedures for complying with the Cal/OSHA requirements.
- The importance of frequent consumption of water, up to 4 cups per hour, when the work environment is hot and employees are likely to be sweating more than usual in the performance of their duties.
- The importance of acclimatization.
- The different types of heat illness, and the common signs and symptoms of heat illness.
- Importance of employees immediately reporting symptoms or signs of heat illness in themselves, or in co-workers.
- Employer's procedures for responding to symptoms of possible heat illness, including how emergency medical services will be provided.
- 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, including clear and precise directions to the work site.

In addition, prior to supervising employees performing work that should reasonably be anticipated to result in exposure to the risk of heat illness, effective training on the following topics shall be provided to the supervisor:

- The supervisor shall be trained on their responsibilities in this Heat Illness Prevention Program manual.
- The procedures the supervisor is to follow when an employee exhibits symptoms consistent with possible heat illness, including emergency response procedures.
- How to monitor weather reports, and how to respond to hot weather advisories.

## Appendix A

### A. Acclimatization Guidance

When ambient temperatures rise to levels higher than employees are accustomed, supervisors must act effectively by taking the following measures:

- Monitor the weather and be aware of sudden heat wave(s), or increases in temperatures to which employees haven't been exposed to for several weeks or longer.
- "Heat Wave" is defined as any day in which the predicted high temperature for the day will be at least 80°F, and at least 10°F higher than the average high daily temperature in the preceding five days.
- Cut short or re-schedule the work day during a heat wave or heat spike (e.g., a sudden increase in daytime temperature of 9°F or more). During the hot summer months, the work shift may start earlier in the day or later in the evening.
- Lessen the intensity of work for new employees during a two week break-in period (i.e. scheduling slower paced, less physically demanding work during the hot parts of the day and the heaviest work activities during the cooler parts of the day). New employees may be assigned to a "buddy" or experienced coworker to watch each other closely for discomfort or symptoms of heat illness.
- Closely observe all employees during a heat wave and monitor for possible symptoms of heat illness. For employees working in remote locations, maintain frequent communication by phone or radio.
- Train employees and supervisors on the importance of acclimatization.
- For heavy work under very hot conditions, a period of four to fourteen days of progressively increasing work time is recommended. For less severe conditions, two to three days of increasing work activity and duration are recommended.

# Appendix B

## A. Monitoring the Weather

### 1. Recommended Equipment

Supervisors may find a HI chart, radio, cell phone, and thermometer helpful in monitoring the weather. Supervisors can access the [National Weather Service](#) for weather based on location zip code, or check the Weather Channel TV Network to view the extended weather forecast in order to plan in advance of the work schedule, know whether a heat wave is expected, and if additional schedule modifications will be necessary. Supervisors without internet access can call the California “Dial a forecast” numbers:

- Eureka 707-443-7062
- Hanford 559-584-8047
- Los Angeles 805-988-6610(#1)
- Sacramento 916-979-3051
- San Diego 858-297-2107(#1)
- San Francisco 831-656-1725(#1)

### 2. Supervisors

Prior to each workday, supervisors should:

- Review the forecasted temperature and humidity for the worksite, and compare it against the National Weather Service HI guideline to evaluate the risk level for heat illness.
  - Employees working in direct sunlight are at greater risk, and there is a need to adjust the HI down 15°F.
- Monitor the weather (using [www.nws.noaa.gov](http://www.nws.noaa.gov) or with the aid of a simple thermometer) at the worksite. This critical weather information will be taken into consideration to determine when it will be necessary to make modifications to the work schedule (such as stopping work early, rescheduling the job, working at night or during the cooler hours of the day, increasing the number of water, and rest breaks).
- Use a thermometer at the work location and check the temperature every 60 minutes to monitor for sudden increases in temperature to ensure that once the temperature exceeds 80°F, the shade structures are opened and accessible to workers, and to make certain that once the temperature equals or exceeds 95°F additional high-heat procedures are implemented.

# Appendix C

## A. Provision of Water

### 1. Recommended Equipment

Water and drink containers, ice, cleaning equipment, whistle or horn.

### 2. Supervisors

Supervisors must ensure:

- Drinking water containers (5 to 10 gallons each) are brought to the site, so that at least 2 quarts per employee are available at the start of the shift.
- Drink containers have enough disposable cups, are made available for each worker, and are kept clean until used.
- The water level of all containers is checked every 30-60 minutes, and more frequently when the temperature exceeds 90°F. When the water level within a container drops below 50%, water containers will be refilled with cool water. Additional water containers (i.e. 5 gallon bottles) will be available to replace water as needed.
- When the temperature exceeds 90°F carry ice in separate containers, so that when necessary, it will be added to the drinking water to keep it cool.
- The water is as close as possible to the employees (i.e. no more than 50-100 feet from the workers) at the work site. If field terrain prevents the water from being placed as close as possible to the workers, bottled water or individual containers (in addition to disposable cups and water containers), will be provided so that workers can have drinking water readily accessible.
- Water containers will be relocated to follow along as the work moves, so drinking water will be readily accessible.
- Employees frequently consume small quantities of water, up to 4 cups per hour, when the work environment is hot and employees are likely to be sweating more than usual in the performance of their duties.
- Water containers are clean and kept in sanitary condition.
- Employees are informed of the daily location of the water coolers and remind them to drink water frequently. When the temperature exceeds or is expected to exceed 95°F, hold a brief



'tailgate' meeting each morning to review with employees the importance of drinking water, the number and schedule of water and rest breaks, and the signs and symptoms of heat illness.

- Audible devices (such as whistles or air horns) are available to use to remind employees to drink water.
- The number of water breaks is increased when the temperature equals or exceeds 95°F, or during a heat wave remind workers throughout the work shift to drink the proper amount of water.
- The importance of frequent drinking of water during employee training.

# Appendix D

## A. Access to Shade

### 1. Recommended Equipment

Portable canopies, large beach-style umbrellas, or other shade structures, and chairs, benches, sheets, and towels.

### 2. Supervisors

Supervisors must ensure:

- Shade structures are brought to the site to accommodate at least the number of employees on recovery or rest periods during the shift, and either chairs, benches, sheets, towels, or any other items to allow employees to sit in a normal posture fully in the shade without having to be in physical contact with each other or the bare ground. However, chairs, benches, etc. are not required for acceptable sources of shade, such as trees.
- Shade structures are opened and placed as close as practical to the workers, when the temperature exceeds 80°F. When the temperature is at or below 80°F, the shade structures will be brought to the site, but will be opened and set in place upon worker(s) request. **Note:** The interior of a vehicle may not be used to provide shade unless the vehicle is air-conditioned, and the air conditioner is on and has cooled the interior of the vehicle before being used as shade.
- The daily location of the shade structures is known to the workers, as well as allow and encourage employees to take a minimum five minute preventative cool-down rest in the shade when they feel the need to do so to protect themselves from overheating.
- Shade structures are relocated to follow along with the employee work groups, and double-check they are as close as practical to the employees, so that access to shade is provided at all times. In situations where trees or other vegetation are used to provide shade (such as in orchards), the supervisor will evaluate the thickness and shape of the shaded area (given the changing angles of the sun during the entire shift), before assuming that sufficient shadow is being cast to protect employees.
- For non-agricultural employers, in situations where it is not safe or feasible to provide shade, steps are taken to provide shade upon request, or other alternative cooling measures with equivalent protection.

### **3. Exceptions**

- Where the employer can demonstrate that it is not feasible, or unsafe, to have a shade structure or otherwise to have shade present on a continuous basis, the employer may utilize alternative procedures for providing access to shade if the alternative procedures provide equivalent protection.
- Except for employers in the agricultural industry, cooling measures other than shade (e.g., use of misting machines) may be provided in lieu of shade if the employer can demonstrate that these measures are at least as effective as shade in allowing employees to cool.

## Appendix E

### A. Remote Location Emergency Response Information

Work Location (include map for remote locations): \_\_\_\_\_

Directions to the Work Location:

\_\_\_\_\_

Nearest Medical Care facility:

Name: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_

Directions to Medical Care facility:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Indicate means of communication:

\_\_\_\_\_

Phone Number (if applicable):

\_\_\_\_\_

Means of transport to nearest Medical Care location:

\_\_\_\_\_

# Appendix F

## A. Emergency Response

### 1. Recommended Equipment

First aid kit, radios, cell phones, smartphones, or other forms of communication, flashlights, and reflective vests.

### 2. Written Response Procedures

Supervisors must have a written response procedure developed for each location. This must include a map along with clear and precise directions (such as streets or road names, distinguishing features and distances to major roads) at a remote, off-campus site, to avoid a delay of emergency medical services ([Appendix E](#)).

Prior to starting work, supervisors must:

- During a heat wave or hot temperatures, remind and encourage workers to immediately report to their supervisor any signs or symptoms they are experiencing.
- Ensure a qualified, appropriately trained, and equipped person will be available at the site, to render first aid if necessary.
- Determine if a language barrier is present at the site and take steps to ensure emergency medical services can be immediately called in the event of an emergency.
- Carry cell phones or other means of communication, to ensure that emergency medical services can be called, and check that these are functional at the worksite prior to each shift.

### 3. Emergency Response

- Take immediate steps to keep the stricken employee cool and comfortable once emergency service responders have been called (to reduce the progression to more serious illness).
- At remote locations such as rural farms, lots, or undeveloped areas, designate an employee or employees to physically go to the nearest road or highway where emergency responders can see them.
- If daylight is diminished, the designated employee(s) shall be given a reflective vest or flashlights in order to direct emergency personnel to the location of the worksite, which may not be visible from the road or highway.