

Heat Illness Prevention

April 10, 2024

Learning Objectives

- OSHA's National Emphasis Program for Outdoor and Indoor Heat Related Illness
- What causes and contributes to heat stress
- How to recognize and treat heat related illnesses
- The requirements for a heat stress prevention program





OSHA's National Emphasis Program

OSHA National Emphasis Program for Outdoor and Indoor Heat Related Illness

Why?

- Heat is the leading cause of death among weather-related phenomena
- Three-year average of fatalities has doubled since 1990s
- About 35 fatalities/ year, 2,700 cases with days away from work, and 3,500 illnesses
- 18 of last 19 summers- hottest on record



OSHA National Emphasis Program for Outdoor and Indoor Heat Related Illness

National Emphasis Program for Heat (April 8, 2022)

- CSHOs are to look for heat hazard(s) during inspections
- Will look for heat programs where heat index is above 80 degrees
- Programmed inspections on days when heat warnings are in effect



OSHA National Emphasis Program for Outdoor and Indoor Heat Related Illness

CSHOs will ask....

- Is there a written program?
- How did the employer monitor ambient temperature(s) and levels of work exertion at the worksite?
- Was there unlimited cool water that was easily accessible to the employees?
- Did the employer require additional breaks for hydration?
- Were there scheduled rest breaks?
- Was there access to a shaded area?



OSHA National Emphasis Program for Outdoor and Indoor Heat Related Illness

CSHOs will ask....

- Did the employer provide time for acclimatization of new and returning workers?
- Was a “buddy” system in place on hot days?
- Were administrative controls used (earlier start times and employee/job rotation) to limit heat exposures?
- Did the employer provide training on heat illness signs and symptoms, how to report signs and symptoms, first aid, how to contact emergency personnel, prevention, and the importance of hydration?

CSHOs will also interview employees for symptoms and identify job tasks that pose hazards.



What would a Heat Stress Standard Look Like?

When employees are required to work in hot environments for extended periods of time, every precaution must be taken to minimize the chances of heat-related illnesses, which may result in death if left untreated.

- Requirement for suitable amounts of cold water onsite
- Requirement for periodic shade breaks
- Mandated training on the signs and symptoms of heat stress related illness
- Written program



Current OSHA Standards for Heat Related Illness

- CA: requires shade breaks and available amounts of water onsite for outdoor work over 80 degrees
- OR: requires shade breaks and available amounts of water onsite for outdoor work over 80 degrees
- MN: applies protections to indoor and outdoor work
- WA: requires written heat program for outdoor work and requires available amounts of water onsite for outdoor work over 80 degrees
- NV: applies protections to high-risk industries in temperatures exceeding 90 degrees
- MD and VA: permanent regulation in the works





Causes and Contributions of Heat Stress

Introduction to Heat Stress

Body temperature:

- Normal body temperature is 98.6°F.
- Temperature regulation is called “thermoregulation” or “homeostasis.”
- The body gains or loses heat in the following ways:
 - Radiation
 - Convection
 - Conduction
 - Evaporation



When the body's natural defense mechanisms against heat fail, heat stress will occur.

Introduction to Heat Index Value

Heat index:

- It is a single value that reflects how hot the air feels.
- Humidity prevents sweat evaporation and makes the air feel hotter.
- Direct sunlight can increase heat index values.
- The heat index is a better measure than air temperature alone.
- Depending on the heat index value, the risk for heat-related illness can range from low to extreme.



NOAA's National Weather Service

Heat Index

Temperature (°F)

Heat Index

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
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



Heat Index

TABLE 1

Heat Index Risk Levels

Heat Index	Risk Level	Protective Measures
Less than 91°F	Lower (Caution)	Basic heat safety and planning
91°F to 103°F	Moderate	Implement precautions and heighten awareness
103°F to 115°F	High	Additional precautions to protect workers
Greater than 115°F	Very High to Extreme	Triggers even more aggressive protective measures



Monitoring Ambient Temperature

- National Oceanic and Atmospheric Administration
- National Weather Service Phone Numbers
- Weather Channel TV Network
- Websites
 - The Weather Channel
 - Weather Underground
- Check local weather forecasts
 - Radio, TV, websites
- Phone Applications
 - OSHA-NIOSH Heat Safety Tool App
 - Your favorite weather app



Environmental Factors

- The temperature of the air
- Humidity
- Radiant heat exchange with surrounding surfaces:
 - The sun
 - Bright lights
 - Boiler
 - Furnace
- Air movement:
 - A lack of breeze
 - A lack of ventilation



Behavioral Factors

- The clothing and personal protective equipment or PPE worn
- Exertion
- Physical contact with warm or hot objects
- Inadequate fluid intake



Personal Factors

- A poor level of physical fitness
- Obesity
- Chronic or acute illnesses
- Certain conditions such as diabetes, heart disease, or high blood pressure
- Medications
- Alcohol or drugs
- Lack of acclimatization
- Age



How the Body Regulates Heat

- Your body reacts to heat by circulating the blood and raising your skin's temperature. The excess heat is then released through the skin by sweating.
- Physical activity can limit the amount of blood that flows to the skin to release heat.
- Sweating can also maintain a stable body temperature if the humidity level is low enough to permit evaporation and if the fluids and salts you lose are adequately replaced.
- When your body cannot release heat, it stores it. This raises the core temperature and heart rate, putting the person's health at risk.





Recognizing and Treating Heat Related Illnesses

Results of Heat Stress

- Heat stress is a serious hazard in the workplace.
- Excessive heat can place an abnormal stress on the body.

Injuries due to sweaty palms, fogged up glasses, confusion, and dizziness

Illnesses:

- Heat exhaustion
- Heat cramps
- Heat stroke



Heat Stress- Early Signs of Trouble

- Heat stress reduces the employee's work capacity and efficiency.
- Signs of heat stress include:
 - Tiredness
 - Irritability
 - Inattention
 - Muscular cramps



Heat Rash- Another Early Sign of Trouble

- Also known as prickly heat, occurs when people are constantly exposed to hot and humid air, causing a rash that can substantially reduce the ability to sweat.
- Heat rash is not just a nuisance because of discomfort, but by reducing the ability to sweat, the ability to tolerate heat is reduced.



Heat Rash- Treatment

- First Aid for Heat Rash
 - Cleanse the affected area thoroughly and dry completely.
 - Calamine or other soothing lotion may help relieve the discomfort.



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Monitor for Heat Cramps- FINAL WARNING

Heat cramps are muscle pains or spasms that occur because of a salt imbalance.

They usually occur in heavily-used muscle groups and after heavy sweating and may begin towards the end of the workday



Heat Cramps- Treatment

If heat cramps occur, the employee must:

- Stop all activity and rest in a cool place.
- Drink clear juice or a sports beverage.
- Seek medical attention if cramps do not subside in an hour.
- Rest for several hours after cramps subside.



Know the Symptoms of Heat Exhaustion- TIME RUNNING OUT

- Heat exhaustion is a form of heat-related illness that can develop after several days of exposure to high temperatures.
- It is caused by dehydration.
- It may lead to heat stroke.
- Symptoms include the following:
 - Extreme weakness or fatigue
 - Nausea or vomiting
 - Headache
 - Irritability
 - Clammy, moist skin with profuse sweating
 - Rapid, weak heartbeat
 - Slightly elevated body temperature
 - Dizziness, lightheadedness, or fainting
 - Heat cramps

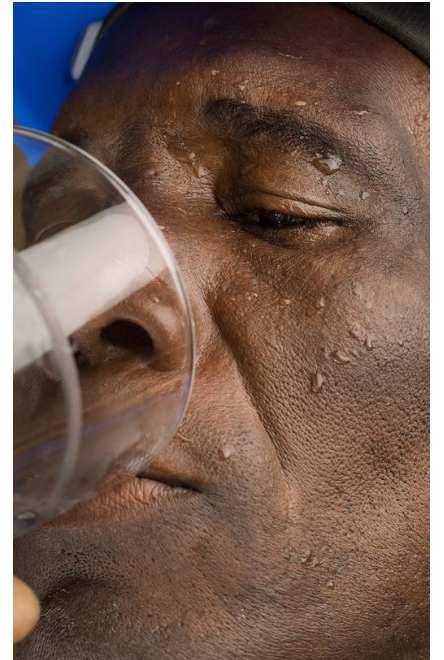


Treating Heat Exhaustion

If you detect signs of heat exhaustion, notify a supervisor or appropriate individual with first aid training.

The individual giving care must:

- Move the victim to the shade or to an air-conditioned environment.
- Cool the person by fanning, sponging with cool water, or applying ice packs.
- If conscious, give the victim cool, nonalcoholic beverages.



Heat Stroke- OUT OF TIME

- Heat stroke is immediately life-threatening.
- Heat stroke occurs when all of the body's cooling mechanisms have been exhausted.

Symptoms include the following:

- Body temperature of 104°F or higher
- Red, hot, dry skin, with lack of perspiration
- Nausea
- Dizziness
- chills
- Confusion or irrational behavior
- Strong and rapid pulse
- Seizures or convulsions
- Loss of consciousness or coma



Heat Stroke- Treatment

This is a medical emergency! Call 911

Employees must notify a supervisor and follow the emergency action procedure.

- Move the victim to the shade or an air-conditioned environment.
- Cool by fanning, sponging, and applying ice packs.
- Give water only if conscious.
- Remove boots, socks, and other excess clothing.

Extreme caution must be used when soaking clothing or applying water to a victim. Shock may occur if done too quickly or with too cool of water





Requirements of a Heat Stress Prevention Program

The Written Program

Create, implement, and maintain an effective plan for minimizing and treating heat illness.

- Make the plan available to all employees on site as well as to company representatives and local authorities upon request.
- Provide copies of the plan in both English and any other languages understood by the majority of employees.



SAFETY ASSURANCE TIP

The Heat Stress Prevention Plan must address all requirements covered in this presentation, including potable water provisions, shade, preventative cool-down rest periods, high heat procedures, acclimation, and training policies and procedures.

Components of the Heat Stress Prevention Plan

The Plan should include provisions for:

- Responsibilities
- Hazard assessment(s)
- Employee training
- Access to shade
- Access to drinking water
- Employee monitoring
- Scheduling accommodations
- Acclimatization procedures
- Heat wave and extreme heat procedures
- Emergency response procedures



SAFETY ASSURANCE TIP

The Heat Stress Prevention Plan must address all requirements covered in this presentation, including potable water provisions, shade, preventative cool-down rest periods, high heat procedures, acclimation, and training policies and procedures.

Responsibilities

Management:

- Implementation of policy
- Making written policy available to all employees
- Providing sufficient water, shade, rest areas, and other heat illness controls
- Establishing work practices to minimize heat stress risks, such as acclimatization, required rest periods, employee monitoring, and strategic scheduling
- Providing access to first aid and emergency response procedures
- Assuring employees will not experience retaliation for reporting heat illness symptoms or unaddressed heat stress hazards
- Designating a procedure for contacting emergency services, including who is responsible for contacting them
- Providing training to any employee who could possibly be exposed to the risk of heat illness
- Conducting a heat stress hazard assessment
- Determining control methods to eliminate or reduce the risks



Responsibilities

Supervisors:

- Implementation of policy
- Completing all heat illness prevention training
- Knowing how to monitor employees for the signs and symptoms of heat illness and how to follow emergency response procedures
- Knowing how to monitor weather reports and respond to heat advisories
- Reporting any heat stress hazards that need to be addressed

Employees:

- Understanding their right to a heat stress-free workplace and what heat stress mitigation steps to expect from their organization
- Receiving appropriate training from their employer
- Knowing their role in heat-illness prevention and following guidelines to mitigate their risks
- Being able to recognize the symptoms of heat illness and immediately reporting them
- Reporting heat stress hazards that have not been addressed by the heat illness prevention plan



Hazard Assessment

Conduct a heat stress hazard assessment of the workplace. Determine how much heat and exertion employees are likely to be exposed to based on their work.

Factors that can increase heat stress include the following:

- Temperatures at the worksite
- Humidity
- A lack of air movement and exchange
- The amount of time employees spend working in the heat
- Time of day work takes place
- Sources of radiant heat (ex., sunlight, fire, or a hot furnace)
- Work that produces heat (ex., welding)
- Physical contact with warm or hot objects or liquids
- The clothing and PPE employees are required to wear
- Physically strenuous work



Hazard Assessment Sample

Name of risk assessor:	
Date of assessment:	
Job being assessed	
Location of assessment	
Name of employee being assessed	

Personal status of employee

Employees age		Is the employee male or female	Male / Female
Is the employee acclimatised:	Yes / No	If Yes provide details of acclimation:	
Is the employee experienced in the job?	Yes / No		
Is the employee experienced in working in the heat?	Yes / No		
Has the employee been trained to work in the heat?	Yes / No		

Please provide a brief description of the work being performed:	
How many employees are involved in this task?	

Where was the assessment conducted? (Please provide a description of the workplace. If necessary use the back of the page to provide a diagram of the workplace and the area)

How long (in minutes) does the work typically take?	a) Without a break:
	b) In a typical shift (excluding breaks):
	Daily / Infrequently
How often will this task take place:	
Is refresher training given to employees?	Yes / No
If YES how often?	

What were the external climatic conditions? (If measurements are not available, provide a brief description).	Air temperature:	
	Radiant temperature:	
	Air velocity:	
	Relative humidity:	
	Description:	

Hazard Identification

Name of risk assessor:	
Date of assessment:	
Job being assessed	
Location of assessment	
Name of employee being assessed	

This observational check list helps identify potential heat stress hazards. If you observe any of the hazards described, tick the box to the right of that description.

If you identify a heat stress hazards not listed, describe the hazard in the "Other" box, and tick the appropriate answer.

Consideration	Description	Tick
Air Temperature	<ul style="list-style-type: none"> Does the air feel warm or hot? 	
Radiant Temperature	<ul style="list-style-type: none"> Is there a radiant heat source present eg the sun, furnaces; ovens; kiln walls, kilns; dryers; hot surfaces & machinery, exothermic chemical reactions, molten metals, etc.) 	
Humidity	<ul style="list-style-type: none"> Is there any equipment that produces steam? 	
	<ul style="list-style-type: none"> Is the workplace affected by external weather conditions? 	
	<ul style="list-style-type: none"> Are the employees wearing PPE that is vapour impermeable? 	
	<ul style="list-style-type: none"> Do your employees complain that the air is humid? 	
Air Movement	<ul style="list-style-type: none"> Is warm or hot air blowing onto your employees 	
Metabolic rate	<ul style="list-style-type: none"> Is the work-rate moderate to intensive? 	
PPE	<ul style="list-style-type: none"> Is PPE being worn to protect against harmful chemicals, asbestos, flames, extreme heat etc? 	
	<ul style="list-style-type: none"> Is respiratory protection being worn? 	
What your employees think	<ul style="list-style-type: none"> Do your employees think that heat stress is a problem? 	
	<ul style="list-style-type: none"> Do your employees complain of feeling warm or hot? 	
Other		

If you have ticked any of the descriptions to any of the above questions there may be a heat stress risk and you should now conduct a more detailed risk assessment using the heat stress observation checklist.



Engineering Controls

Ventilation types:

Air conditioning removes the heat from the air.

- If the air temperature is less than 95°F, fans can help employees stay cooler.
 - Fans increase convection and evaporation.
 - They provide movement, which must directly impact the employee.
- Use of power tools to reduce manual labor.



Controlling Radiant Heat

- Installing reflective screens or shields
- Insulating hot indoor surfaces



Employee Training

Training must include the following:

- Causes and contributing factors of heat stress
- Role of PPE in causing and controlling heat stress
- How to recognize heat stress
- How to treat heat stress
- Employee responsibilities regarding prevention and reporting
- Caution during summer
- Train workers to recognize the signs and symptoms of heat stress and start a “buddy system” since people are not likely to notice their own symptoms.



Employee Training

Employees must know their rights:

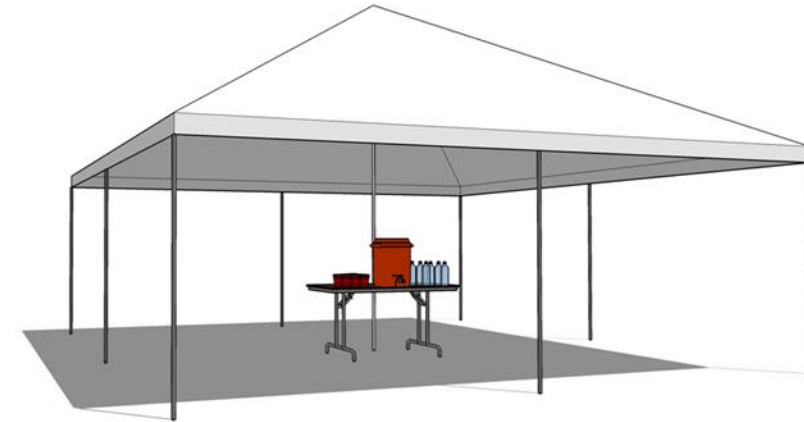
1. Freedom to exercise their rights to a heat stress-free workplace without retaliation
2. Access to first aid and emergency response procedures
3. The employer's responsibility to provide water, shade, cool-down rests, and access to first aid
4. The employer's use of acclimatization methods and principles



Shaded Areas

In temperatures exceeding 80°F:

- Provide shaded areas large enough to accommodate all employees during meal, rest, or recovery periods. This can be achieved through rotation of employee breaks.
- Locate shaded areas as close as feasible to the areas where employees are working.
- The provision of seating is recommended.



Shaded Areas- Examples

- Pop-ups
- Canopies
- Umbrellas
- Structures



Establish a Water Station

- Locate water stations as close as possible to areas where employees are working.
- Assure that the water is pure, fresh, cool or cold, and free for employees.
- Sufficient water must be provided.
 - Designate someone in charge of distributing and replenishing water
 - Ensure water containers are never empty
 - Water containers should be filled before employees need to report that the water needs replenished.

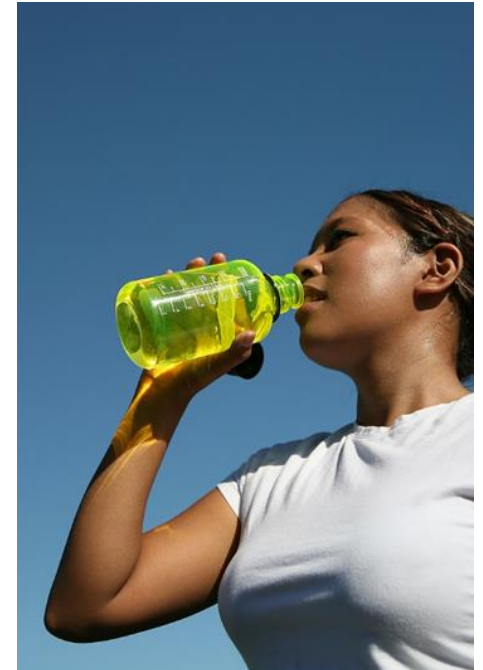


SAFETY ASSURANCE TIP

Establish a pre-shift inspection policy to assure that shade and water are being provided as close as possible to the areas where employees are working.

Fluid Choice

- In elevated temperatures, increase fluid intake.
- Benefits include the following:
 - Replacement of expelled water
 - Temperature regulation
 - Joint lubrication
 - Spine protection
 - Waste processing
- Water is preferable.
- Fluids with high electrolyte concentration are acceptable in small quantities.
- Avoid alcohol, caffeine, carbonation, and sugar



Fluid Intake

Employees must:

- Drink water before, during, and after working in heat, even if they do not feel thirsty.
- Drink small amounts frequently:
 - 6 ounces/15 minutes
 - 4 cups of water/hour if there is excessive sweating

Not:

- Drink extremely cold fluids.
- Drink extreme amounts
- Post work day hydration



Proper Diet

Diet affects the ability to regulate heat.

- Hot foods add directly to body heat.
- Heavy meals reduce the ability to get rid of heat.

Employees should:

- Eat light, cool meals.
- Not skip meals.



Clothing Choices

- Clothing should be:
 - Reflective.
 - Light-colored.
 - Lightweight.
 - Loose-fitting and breathable.
- Clothing should cover the exposed parts of the body.
- In direct sun, a hat with a wide brim or bill may be helpful.
- Consider providing:
 - Ice vests.
 - Water-cooled garments.
 - Phase change liquid cooling vests.
 - Cooling cloths made from special fabrics.



Monitoring

- Monitor for symptoms of heat illness.
- It can be done by supervisors and other employees.
- Watch those with risk factors more closely:
 - Heavy protective clothing
 - Working in direct sun
- Consider monitoring employees' heart rate and body temperature.
- Shorten work cycles and increase rest periods if employees':
 - Body temperatures are over 98.6°F.
 - Heart rates are over 110 beats per minute.



SAFETY ASSURANCE TIP

Closely monitor work site temperature changes to assure that your heat stress controls are adequate.

Scheduling

- Reduce work loads.
- Rotate strenuous tasks.
- If the heat index is at or above 115°F, suspend:
 - Strenuous work.
 - Work requiring non-breathable clothing.
- Reschedule strenuous jobs for the cooler part of the day.



Rest Breaks

- Allow and encourage rest periods (cool down period) of at least 5 minutes for employees feeling that they need protection from overheating.
- Encourage employees to stay in shaded areas during rest areas.
- Never order employees back to work if they exhibit symptoms of a heat illness.



Acclimatization

- Acclimatization is the physical process of adapting to a different thermal environment.
- It occurs during one to two weeks of exposure, peaking within four to 14 days of regular work for at least two hours per day, depending on:
 - Temperature.
 - Humidity.
 - Health and conditioning.
- Gradually increase length of time of work.
- Observe new employees during their first 14 days of employment in high heat areas.
- Re-acclimatization is necessary if:
 - Employees are away for a week or more.
 - The temperature increases significantly.



Acclimatization

Two ways to introduce acclimatization:

1. If employee is not experienced on the job (i.e., new employee), he/she should start spending 20% of the time in the hot environment on the first day and increase the time by 20% each following day
2. Instead of reducing the exposure times to the hot job, the new employee can become acclimatized by reducing the physical demands of the job for a week or two



Heat Wave

Assign supervisors to closely observe and monitor employees during a heat wave.

A heat wave is defined as:

- Consistent temperatures over 80°F.
- Anytime the temperature is 10° higher than the average high daily temperature in the preceding five days.



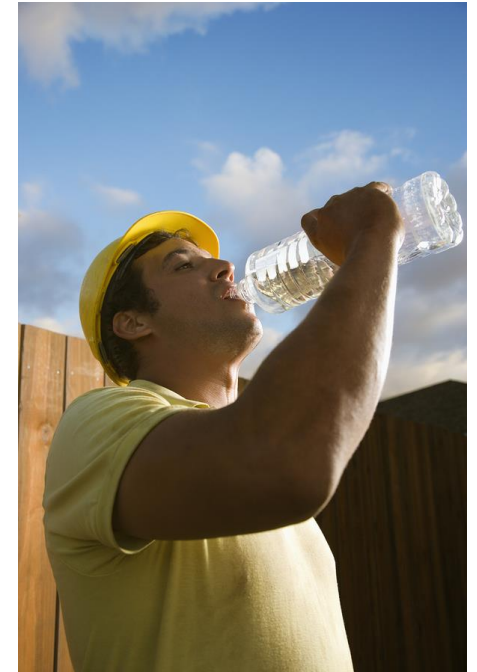
SAFETY ASSURANCE TIP

Review or create new plans to monitor employees in high heat conditions. Institute a ratio of one supervisor to 20 or fewer employees, a mandatory buddy system, or a consistent practice for supervisors to check on employees.

Extreme Heat

When work site temperatures equal or exceed **95°F**, the following procedures for extreme heat are necessary:

- Establish and maintain communications between employees and supervisors.
- Institute mandatory 10-minute break periods after every two hours worked.
- Supervise new employees for acclimatization.
- Monitor all employees for heat illness.
- Supervisors must remind employees to rest and drink water.
- Control convective heat by:
 - Wearing clothing to cover exposed skin.



Emergency Reporting and Response

- Assure that medical services are available and easily contacted.
- Employees must know who to contact to report signs of heat stress, i.e., a supervisor, other designated individual, or 911.
- They need a means to contact help, and they must know how to provide directions.
- Supervisors and employees must establish and maintain an effective means of communication through voice, visual gesture, or electronics. Electronic devices must have a reliable signal.
- Assure that the work area is staffed with a person able to administer first aid.
- Employees must know how to provide treatment until emergency personnel arrive.



SAFETY ASSURANCE TIP

Review your emergency preparedness plan and make sure supervisors and employees are designated to contact emergency services.

Tips to Comply with Best Practice Standards

Review your Heat Stress Prevention Plan and Employee Handbook. Assure that the following items are clearly articulated:

1. All requirements are covered including addressing potable water provisions, shade, preventative cool-down rest periods, high heat procedures, acclimation, and training policies and procedures.
2. An emergency preparedness plan identifying means of effective communication with employees by voice, observation, or electronic means, first aid response measures, and procedures for contacting emergency responders.



Summary

- Risk is increased for those who are not acclimated to the heat, are obese, have specific medical conditions, or take certain medications.
- Heat illnesses include heat exhaustion, heat cramps, and heat stroke.
- Treatment includes cooling the victim and replacing fluids if the victim is conscious.
- Employees must drink plenty of water throughout the day, take breaks in the shade, and wear appropriate clothing and PPE. Drinking water post-work is critical to the body's ability to recover from heat exposure.
- Have a process where employees can immediately report signs of heat illness.
- Studies show dehydration is present in heat illness victims.
- Studies show many fatalities occur on the first day of work in the heat.
- Heat impairs cognitive ability which can result in other work-related incidents/accidents.





Thanks!

Presented by:

Allison Fultineer, CSP, ARM

970-266-7162

afultineer@floodpeterson.com

Pat Hagge, CSP, ARM, ALCM

970-266-7115

phagge@floodpeterson.com