



## **Heat Illness Prevention**

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### **1.0 Purpose / Scope**

The purpose of this procedure is to describe the various physiological effects of heat stress and the methods of recognition and prevention to safeguard personnel from the potential effects. This practice applies to all BPWE construction projects.

### **2.0 General Requirements**

Operations characterized by hot environments can lead to harmful heat stress on the body. Factors affecting the amount of heat stress include temperature, humidity, radiant heat (such as from a furnace or the sun), air velocity, direct physical contact with hot objects, and the level of physical activity. Outdoor operations carried out in hot weather are especially likely to cause heat stress among exposed workers, especially those that require semi-permeable or impermeable protective clothing to be worn.

How a person functions under conditions of heat stress will be unique to the individual and will depend on:

- Age
- Weight
- Metabolism
- Alcohol or drug use
- Pre-existing medical conditions
- Hypertension
- Use of medications
- Level of physical fitness

The type of clothing worn during use of PPE will also influence the heat load experienced by a worker.

If a worker's body temperature rises too high, they can become ill, with the severity depending on the temperature of the work area, how active they are, and how well their body copes with heat. Some of the various types of heat disorders in decreasing order of severity include heat stroke, heat exhaustion, heat cramps, heat collapse, heat rashes, and heat fatigue.

#### **2.1 Heat Stroke**

Heat stroke occurs when the body's system of temperature regulation fails and the body's temperature reaches critical levels. The body temperature can be so high that the victim loses consciousness. Continued exposure can strain the circulatory system, and can result in stroke or heart failure. Individuals with heart or circulatory problems are at even greater risk. The elevated metabolic temperatures caused by a combination of work load and environmental heat load, both of which contribute to heat stroke, are highly variable and difficult to predict.

Heat stroke can be life-threatening and must be treated as a medical emergency. Symptoms are:

- Raised body temperature



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- Rapid pulse
- Unconsciousness
- Dry, red skin that is hot to the touch
- Confusion and irrational behavior
- Convulsions

Medical attention should be obtained immediately. If the body temperature rises too high, death will follow. While waiting for professional treatment, the victim should be moved to a cool area and all efforts should be made to lower the body temperature. The victim's outer layer of clothing should be removed. Cool compresses should be applied or cool water should be showered over the victim's body with a hose. Care should be taken not to cool the individual too rapidly such as through the use of ice bath. Air movement around the victim's body should be increased to improve evaporative cooling. Fluids should be replaced immediately. The medical outcome of a heat stroke episode will depend on the fitness level of the victim and the timing and effectiveness of first aid treatment.

An employee suspected of suffering a heat stroke should never be left alone, sent home or to a physician unattended, or left without treatment, even if the employee requests otherwise. Should this individual become unconscious, an IV administered or other medical treatment given (prescription drugs), this event would need to be classified as an OSHA recordable.

### 2.2 Heat Collapse ("Fainting")

With heat collapse, the brain does not receive enough oxygen because of excessive pooling of the blood in the body extremities. Consequently, the exposed individual loses consciousness. This reaction is similar to that of heat exhaustion and does not affect the body heat balance. It is rapid and unpredictable. For prevention, the worker should gradually acclimatize.

### 2.3 Heat Exhaustion

Heat exhaustion is usually not life-threatening, but can strike any worker who is physically active in a hot work environment. Heat exhaustion occurs when the body loses more water than it is consuming. Symptoms include:

- Headache
- Nausea
- Vertigo
- Sweating
- Dizziness
- Fatigue
- Weakness
- Nausea
- Cold, pale and clammy skin



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Treatment for heat exhaustion is to transfer the victim to a cool area immediately. The victim should lie down, elevate their feet, and loosen their clothing. The victim should be provided fluid replacement. Cool compresses should be applied. If the symptoms persist, medical attention should be received.

Fortunately, this condition responds readily to prompt treatment. However, heat exhaustion should not be dismissed lightly, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended. Also, the victim may be injured when he or she faints.

### **2.4 Heat Cramps**

Heat cramps usually affect people who sweat a lot during strenuous activity. This sweating depletes the body's salt and moisture. The low salt level in the muscles causes painful cramps. Heat cramps may also be a symptom of heat exhaustion.

#### Recognizing Heat Cramps

Heat cramps are muscle pains or spasms—usually in the abdomen, arms, or legs—that may occur in association with strenuous activity. If you have heart problems or are on a low-sodium diet, get medical attention for heat cramps.

#### What to Do

If medical attention is not necessary, take these steps:

- Stop all activity, and sit quietly in a cool place.
- Drink clear juice or a sports beverage.
- Do not return to strenuous activity for a few hours after the cramps subside, because further exertion may lead to heat exhaustion or heat stroke.
- Seek medical attention for heat cramps if they do not subside in 1 hour.

Heat cramps usually result from performing hard physical labor in a hot environment. It is believed that heat cramps are caused by an electrolyte imbalance resulting from excessive sweating. It is important to recognize that cramps can be caused by both, too much salt or too little salt. Cramps often occur in the muscles used during work and can be alleviated easily by resting and drinking water. Drinking carbohydrate-electrolyte replacement liquids should be consumed by worker's suffering from heat cramps so that physiological disturbances are minimized during recovery, when medically recommended. The condition should not be allowed to progress to a more serious level of heat stress.

Salt tablets should not be used for treatment because they tend to cause retention of both salt and water in the digestive system, which will deprive the rest of the body of water and electrolytes.



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### **During Hot Weather**

To protect your health when temperatures are extremely high, remember to keep cool and use common sense. The following tips are important:

#### ***Drink Plenty of Fluids***

During hot weather you will need to increase your fluid intake, regardless of your activity level. Don't wait until you're thirsty to drink. During heavy exercise in a hot environment, drink two to four glasses (16-32 ounces) of cool fluids each hour.

Don't drink liquids that contain large amounts of sugar—these actually cause you to lose more body fluid. Also, it is important to avoid very cold drinks, they may cause stomach cramps.

#### ***Replace Salt and Minerals***

Heavy sweating removes salt and minerals from the body. These are necessary for your body and must be replaced. If you must exercise, drink two to four glasses of cool, non-alcoholic fluids each hour. A sports beverage can replace the salt and minerals you lose in sweat. However, if you are on a low-salt diet, talk with your doctor before drinking a sports beverage or taking salt tablets.

### **2.5 Heat Rashes**

Heat rashes can be a common problem in the hot work environment. Prickly heat appears as red papules, usually in areas where clothing is restrictive and gives rise to a prickling sensation, particularly as sweating increases. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, all heat rashes disappear when the affected individual returns to a cool environment.

### **2.6 Heat Fatigue**

A predisposing factor of heat fatigue includes the lack of acclimatization. Symptoms include impaired performance of skilled sensorimotor, mental, or vigilance jobs. There are not any specific recommendations for treatment unless the condition is accompanied by other heat illness.

## **3.0 Key Responsibilities**

### **3.1 Managers/Supervisors**

Managers and supervisors are responsible for preventing heat related illnesses by providing the necessary training, supplies, and program auditing for employees. All managers and supervisors will:

- Educate and inform their employees to ensure that personnel understand the causes and recognition of heat stress illnesses.



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- Complete a formal Heat Stress / Heat Illness Training Program. This training must be documented and kept on file for record (refer to training section of this plan).
- Have reviewed and understand the requirements of this procedure.
- Ensure that employees always have adequate water at their work location.

### **3.2 Employees**

All employees on the project site must, through training and education:

- Understand the causes and hazards associated with heat stress illnesses.
- Understand the symptoms of heat stress illnesses
- Understand the protective measures and procedures used to prevent and/or respond to heat stress illnesses.
- Apply the protective measures and procedures to themselves and be alert to practices and work conditions of others.

### **3.3 HSSE Staff**

The HSSE staff is responsible for providing information, training and on-site support as needed. Heat illness will be incorporated into orientation ensuring that all employees receive the above information prior to starting onsite.

A thorough toolbox talk will be conducted with all employees onsite covering the above details to ensure that all employees that have completed the orientation.

## **4.0 Procedure/Process**

### **4.1 Administrative and Work Practices Controls**

#### **4.1.1 Training**

Training is the key to good work practices and the prevention of heat stress illnesses. The projects heat stress training program for management / supervision will cover the following components:

- Knowledge of the hazards of heat illness
- Recognition of predisposing factors, danger signs, and symptoms
- Awareness of first-aid procedures for and potential health effects of heat stroke
- Supervisory and employee responsibilities in avoiding heat stress
- The importance of employee acclimatization



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- The importance of ensuring that employees follow the “buddy system” and notify supervision immediately if a co-worker displays any signs of heat illness
- This Heat Illness Prevention Procedure
- Use of protective clothing and equipment (i.e. cooling devices etc.)
- The Site Specific Emergency Response Procedure

### 4.1.2 Breaks / Shift Work

Work shifts may need to be altered for heat exhaustion prevention. This may include earlier start times and possibly night work.

Once the ambient temperature has reached 93 degrees Fahrenheit the HSSE Administrative Assistant will announce on the radio to inform all crews of the current temperature. All employees whose work activities require them to be exposed to these temperatures will be required to follow the below work hour / break timeline:

50 minutes of work / 10 minutes of break in a cool location (cab of a truck, etc.)

### 4.1.3 Task Management Controls

Task Management Controls that should prove effective are:

- Optimizing work locations for prevailing wind when applicable
- Reduce the physical demands of work such as excessive lifting or digging through mechanical aids (i.e. forklift, crane etc.)
- Recovery areas should be provided. Company vehicles may be used for recovery areas so long as there is adequate space for employees in the vehicle. Adequate drinking water must be available at these locations.
- Use intermittent rest periods with water breaks (refer to above section)
- Use relief workers as necessary (i.e. carrying backpack vibrators, tower climbing, etc.)
- Assign extra workers where necessary.
- Use Buddy System to monitor team members. “Stop the Job” when the buddy needs a break.

### 4.1.4 Acclimatization

The human body can adapt to heat exposure up to a point. This physiological adaptation is called acclimatization. After acclimatization, the same activity will produce lower level cardiovascular demands. The worker will sweat more efficiently (causing better evaporative cooling), may lose less salt, and thus will more easily maintain normal body temperatures.

A properly designed acclimatization program decreases the risk of heat-related illnesses and unsafe acts. Such a program basically involves exposing employees to work in a hot environment for progressively longer periods. NIOSH says that, for workers who have had



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previous experience in jobs where heat levels are high enough to produce heat stress, the regimen should be 50 percent exposure on day 1, 60 percent on day 2, 80 percent on day 3, and 100 percent on day 4. For new workers who will be similarly exposed, the regimen should be 20 percent on day 1, with a 20 percent increase in exposure each additional day.

### **4.1.5 Fluid, Electrolyte, and Nutrition Replacement**

#### **Water**

Cool (50-60° F) water or any cool liquid (alcoholic beverages excluded) shall be made available to workers in such a way that they are stimulated to frequently drink water. Ample supplies of liquids should be placed close to the work area.

#### **Electrolytes**

All contractors onsite will have an adequate supply of Squencher (electrolyte supplement) available for employees. Consuming 1 bottle of Squencher for 3 bottles of water will be promoted in orientation as well as at Stretch and Bend on a frequent basis.

#### **Nutrition**

Employers shall promote employees to eat regularly. Poor nutrition is a frequent cause of heat related illness.

**\*Note:** Caffeinated and/or high sugar content products can act as diuretics and may result in additional dehydration.

### **4.1.6 Cooling Devices**

Cooling devices such as cool bandanas, cooling head pieces, and cool vests/shirts are excellent methods to control heat related illnesses.

All employees will be provided with two cool bandanas for use. One cool bandana should be placed in a cooler with ice while the other is in use, rotating them as necessary.

## **5.4 First Aid**

For heat cramps or heat exhaustion the worker should be removed from the work area to a cool or shady area and given plenty of water or fluids. The employee should be transferred to the onsite first aid trailer for medical evaluation.

For heat stroke victims, the individual will need medical attention immediately. While waiting for assistance the victim should be moved to a cool or shady area increasing air movement, if possible. Outer clothing layers should be removed and cool compresses can be used. If the victim is



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conscious, give water or other fluids. If possible, the employee should be transferred to the onsite first aid trailer for medical evaluation.

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