Many workers are exposed to heat on the job. Exposure to extreme heat or work in hot environments may place these workers at risk of heat stress which can result in occupational injuries or illnesses. Heat stress can lead to heat cramps, heat exhaustion, or heat stroke. Every year many workers become sick or die from occupational heat exposure.

Why is Heat a Hazard to Workers?
When a person works in a hot environment, the body must get rid of excess heat to maintain a stable internal temperature. If the body cannot get rid of excess heat, it will store it. When this happens, the body’s core temperature rises and the heart rate increases.

What is Heat Stress?
Heat stress is when a body stores or absorbs more heat than it expends potentially due to factors such as:
- the work that an employee is doing
- environmental factors (i.e., air temperature, humidity, and radiant heat)
- direct sun exposure
- the clothing being worn by an employee
- poor physical condition
- limited/no air movement in work area
- some medications

The Body’s Reactions to Heat Stress
The human body has ways of coping with the high temperatures that it is exposed to. When your body starts to feel a rise in the temperature it automatically begins to take actions to protect you:
- the blood vessels near the skin start to dilate
- sweat is secreted from thousands of glands per square inch all across the body
- the blood flow to the skin increases
- heat is moved away from the body’s core by blood to the surface of the skin
- the skin starts to produce sweat
- as sweat evaporates it takes away the heat from the surface of the skin, thereby cooling the body
When the body absorbs more heat than it can take the body eventually starts to become overwhelmed causing the body’s temperature to rise. The body begins to experience heat strain, which is the body’s overall response to heat stress. As a result of heat strain several heat induced illnesses can occur such as:

- heat cramps
- heat exhaustion
- heat stroke

**Identification/Evaluation of Heat Stress Conditions**

Evaluate work areas for the following risk factors:

- high temperature
- humidity
- sources of radiant heat, such as steam pipes or steel plating
- use of protective clothing (coveralls, Tyvek suits) that can impair the body’s ability to regulate heat.
- work requiring moderate to heavy physical labor
- outdoor operations conducted in hot weather
- hot work operations
- work performed in confined spaces or enclosed areas during conditions that could result in heat buildup or other environments with minimal air movement

**Heat Stress Control Strategies**

The following are preventive measures to avoid heat stress when working in hot conditions:

- Gradually build up a tolerance when new to a job or after a long absence. (Generally takes about two weeks)
- Schedule high/moderate tasks for cooler parts of day
- Rotation of personnel
- Continuous monitoring (verbal/visual contact)
- Buddy System
- Install/Use general ventilation, cooling fans, or evaporative cooling whenever possible.
- Controlled climate
- Shield any heat producing equipment
- Shade the work area
- Plan the most strenuous work for the coolest part of the day.
- Wear loose, lightweight clothing
- Cooling clothing/PPE
- Wear a hat and use sunscreen if work is going to be done outdoors.
- Fluid/mineral replenishment
- Drink water steadily before work
- Eat well balanced meals. Avoid heavy or hot food
- Avoid alcoholic beverages after work or fluids containing caffeine. These beverages will cause the body to dehydrate and increase the risk of heat related disorders
- Drink electrolyte beverages to replace what’s lost in perspiration
- Work at a steady pace to minimize overexertion
- Take frequent breaks in a cool, well ventilated area
- Familiarize yourself with the symptoms and treatment of heat stress disorders.
- Including heat stress hazards in a Job Safety Analysis (JSA) or job plan
- Supervision should obtain support from project safety to evaluate hazards and recommend controls
Heat-related illness is preventable. There are steps that can be taken and procedures put into place that can reduce heat stress and exposure. Employers should include these steps and procedures in worksite training and job plans. Plan for an emergency and know what to do when heat related injuries or illness occurs.

When Working Keep Your Cool & Don’t Get Burned by Heat Stress!
Are You Hydrated?

Take the Urine Color Test

Purpose

- With normal kidney function, your level of hydration is indicated by the color of your urine. Some vitamins and supplements may cause a darkening of the urine unrelated to dehydration.
- Since heat-related illness often follows dehydration, this simple test will help protect your health.
- Dehydration also increases your risk for kidney stones.

How does it work?

- Match your urine color to the closest color in the chart and read the hydration level on the chart.
- Watch the urine stream, not the toilet water, as the water in the toilet will dilute your urine color.
- In response to dehydration, the kidneys conserve water and excrete more concentrated urine; the more concentrated the urine the darker the color.

Prevent Dehydration

- No amount of training or acclimatization can reduce the body’s requirement for water.
- Follow the water consumption guidelines in the water consumption table.

Water Consumption Table

<table>
<thead>
<tr>
<th>Heat Category</th>
<th>WBGT Index, *F</th>
<th>Easy Work</th>
<th>Moderate Work</th>
<th>Hard Work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Water Intake (Quart/Hour)</td>
<td>Water Intake (Quart/Hour)</td>
<td>Water Intake (Quart/Hour)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>78° - 81.9°</td>
<td>½</td>
<td>¾</td>
<td>¾</td>
</tr>
<tr>
<td>2</td>
<td>82° - 84.9°</td>
<td>⅓</td>
<td>¾</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>85° - 87.9°</td>
<td>¼</td>
<td>¾</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>88° - 89.9°</td>
<td>¼</td>
<td>¾</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>&gt; 90°</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

*This color chart is not for clinical use.

U.S. Army Public Health Command (Provisional)

http://phc.amedd.army.mil

CP-070-0510 (Also available as a tip card.)