



# **MAINTAINING HEALTHY BODY TEMPS AT WORK**

**AN ERGODYNE WHITE PAPER**

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## INTRODUCTION

In 2001, Minnesota Viking football player Korey Stringer died from heat stroke during a pre-season practice on a hot August day. Dehydration—along with the insulating properties of his football pads and uniform—combined to raise his core body temperature to an extremely high degree. High enough to kill the 27-year-old professional athlete.

The news of Stringer's death shocked many and immediately increased heat stress awareness across the U.S., in particular awareness among football teams. But this tragic incident wasn't completely unusual: More than 20 high school and college football players have died from heat stroke since 1995.

However, football players aren't the only ones at risk. Workers across numerous industries are exposed to hazardous heat situations on a daily basis. And the fatality figures outside of football are even more staggering. In fact, at least 300 people die each year from heat stroke or other heat related illness.

While heat related deaths grab our attention, there are thousands of less severe, yet extremely dangerous, heat related illnesses each year across multiple industries.

It is easy to imagine a situation like the following occurring every day:

A utility lineman is sent out to repair a power line brought down by a tropical storm. Working in oppressively hot and humid conditions he wears protective gear that adds to his discomfort. He may have a small water bottle or—even more likely—no water at all to rehydrate. He will be working in the sun and heat for at least 4 hours without a break.

Our hypothetical worker faces an all too common high risk situation. And even though he might not die as a result of these conditions, the effects of heat stress don't have to be catastrophic to cause health and productivity problems.

## THE RISKS OF NOT BEING AWARE

Even when not fatal, the risks from heat stress on the jobsite are cause for concern. When heat stress occurs, multiple safety and productivity issues arise that are cause for alarm.

### **Worker Injury:**

While working under stress, cognitive abilities decrease. This results in slower reaction time and decision making. Operating equipment or tools can be dangerous at any time, but especially dangerous when you or your co-workers are impaired.

### **Property Loss or Damage**

Fine motor skills are often impaired when your body is under stress. A worker not at peak form can cause accidents and injury resulting in property loss and damage, and possibly causing harm to themselves and others.

### **Productivity Loss**

A stressed body cannot work at optimum speed or performance. Worker productivity declines as the effects of heat stress increase.

To best protect yourself against the effects of heat stress and other heat related illnesses it is important to better understand the illness and some of the early warning signs.

## WHAT IS HEAT RELATED ILLNESS?

Heat Related Illness (HRI) and Heat Stress are umbrella terms for a variety of physical conditions resulting from physical activity in hot or humid environments. These include heat rash, heat cramps, heat exhaustion, and heat stroke.

- Heat rash is caused by skin being constantly wet from sweat and plugged sweat glands. It appears as a tiny raised red blistering rash.
- Heat cramps are caused by excessive loss of water and electrolytes and are an early warning sign of heat stress. These painful cramps usually occur in the legs or abdomen.
- Heat exhaustion shows up as pale skin, excessive sweating, headache, nausea and vomiting, blurred vision, and dizziness. Sufferers may faint but usually remain conscious.
- Heat stroke involves dry hot skin and very high body temperature. The sufferer's skin is red and without sweat. Sufferers will also be either unconscious or incoherent.

## WHAT CAUSES HEAT RELATED ILLNESS?

Heat related illness causes can be both environmental and job related.

Environmental risk factors include:

- High air temperature
- Direct exposure to sunlight
- High humidity
- Radiant heat
- Lack of air movement
- Lack of water or other fluids to rehydrate

Job-related risk factors include:

- High work intensity
- Long work duration
- Heavy and/or non-breathable clothing

## EARLY WARNING SIGNS

While heat stroke can hit suddenly, it is almost always preceded by less-threatening conditions. Knowing the early warning signs can prevent more dramatic and severe outcomes. These signs include some or all of the following:

- headache
- dizziness or fainting (caused by a blood pressure drop from dehydration)
- confusion or disorientation
- mood swings (may seem violent or act intoxicated)
- rapid heart rate
- dark yellow urine (dehydration)

- redness of skin
- swollen lips
- chills

### **WHO IS AT RISK FOR HEAT STRESS?**

The short answer is everyone. There are, however, people at higher risk. Those include workers who:

- are obese, unfit or lack proper nutrition.
- are over 40
- are new to a work site or job (not yet acclimated to the climate or surroundings)
- have heart disease or high blood pressure
- are on certain medications
- have or do drink alcohol
- work in certain types of heavy, insulating clothing or gear (fire fighters, welders, electricians, garbage disposal, etc.)

### **HOW TO BEAT THE HEAT**

Take preventative action to decrease excess heat, beginning with these interventions:

#### **Engineering Controls**

- Install air conditioning whenever possible to keep temperatures in check
- Provide shaded shelters in close proximity to work areas
- Use fans to provide airflow and ventilation

#### **Administrative Controls**

- Train and educate workers and supervisors on risk factors and early warning signs of HRI
- Provide cool drinking water in close proximity to work areas. At least one quart per hour. The average person sweats 2-3 gallons per day when working in heat
- Promote hydration before feeling thirsty
- Monitor temperature and humidity levels near work areas
- Implement a heat management program, including action levels and emergency procedures

#### **Work Practice Controls**

- Use work cycles to limit time spent in hot work areas and allow breaks in shaded rest areas
- Schedule frequent breaks for new workers to help acclimate to hot or humid environments
- Use a Buddy System to monitor worker conditions

### **Personal Protective Equipment**

- Wear broad brimmed hats and lightweight clothing to reduce direct sun exposure
- Wear absorptive or evaporative cooling clothing or accessories to aid in keeping core body temperatures in check
- Wear lightweight fast drying clothes that remove sweat. Sweat adds an insulating layer and causes the body to work even harder to stay cool
- Use cooling vests, especially under heavy protective gear or full enclosure suits, to keep overall body temperatures at a more moderate level

These precautionary measures can help maintain a lower core body temperature and prevent the loss of skilled workers due to heat related illness and recovery time. Comfortable working conditions also result in a more effective and more productive workforce.

### **REGULATORY UPDATE**

While severe work-related heat injuries are subject to workers compensation and OSHA recording rules, several states have gone beyond basic regulation and enacted special Heat Exposure Enforcement or Heat Emphasis programs. These initiatives are designed to proactively reduce HRI.

Washington and California are among the most active states. Both have implemented special programs for at-risk workers along with reference and training materials for employers. These heat stress programs generally require:

- Ready access to cool drinking water for hydration at no cost to the workers.
- Ready access to shade or ventilated cooling areas
- Written procedures and training for workers and supervisors
- Emergency procedures if medical treatment is required

These special programs typically initiate around 85 degrees Fahrenheit. However, the Washington program begins as low as 52 degrees Fahrenheit for workers wearing vapor-proof PPE, such as chemical resistant suits or coveralls.

### **CONCLUSION**

Heat Stress is an increasing problem on the jobsite. Workers are putting in longer hours in all climates. Those climates are becoming more severe. The average worker has become less fit and more at risk.

Taking the risks of heat related illness seriously, being aware of the early warning signs, and taking steps to minimize workplace risks will make your jobsite a more productive and safer environment for all.

## RESOURCES FOR MORE INFORMATION:

- NIOSH Safety and Health Topic: Heat Stress <http://www.cdc.gov/niosh/topics/heatstress/>
- NIOSH Publication No. 86-112: Working in Hot Environments  
<http://www.cdc.gov/niosh/hotenvt.html>
- OSHA Safety and Health Topics: Heat Stress  
<http://www.osha.gov/SLTC/heatstress/index.html>
- OSHA Technical Manual: HEAT STRESS  
[http://www.osha.gov/dts/osta/otm/otm\\_iii/otm\\_iii\\_4.html](http://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_4.html)
- U.S. MARINE CORPS HEAT INJURY PREVENTION PROGRAM  
<http://www.marines.mil/news/publications/Documents/MCO%206200.1E%20W%20CH%201.pdf>
- Heat raises a black flag at Camp Lejeune  
<http://www.leatherneck.com/forums/showthread.php?t=48608>
- Wikipedia: Hyperthermia <http://en.wikipedia.org/wiki/Hyperthermia>
- State of Washington - Outdoor Heat Exposure Rule  
<http://www.lni.wa.gov/Safety/topics/atoz/heatstress/default.asp>
- State of California – Heat Illness Prevention  
<http://www.dir.ca.gov/DOSH/HeatIllnessInfo.html>
- State of Minnesota - Heat Stress Guide  
[http://www.dli.mn.gov/OSHA/PDF/heat\\_stress\\_guide.pdf](http://www.dli.mn.gov/OSHA/PDF/heat_stress_guide.pdf)