

# Heat Safety

or

## *HOW TO HAVE A HOT TIME WITHOUT LOSING YOUR COOL!*

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The Competition Consortium

<http://www.tccnar.org>

CPT, US Army Field Artillery, Retired

M109 Howitzer and Pershing Missile System

(This article is based on research on the web, US Army training and doctrine, and over 20 years experience in leading soldiers in extreme heat with NO heat injuries.)

### **Have a Hot Time**

It's perfect rocket weather! The sky is cloudless and the only wind is a soft, fitful breeze from the south. Rockets of all sizes are whooshing and thundering upward in a thoroughly satisfying display. This tale is full of sound and fury, signifying that you're flying rockets in Texas! As you help a fellow rocketeer prep his flight you notice that, despite the heat, he has stopped sweating. His previously cheerful, purposeful actions have become confused. His calm proficiency seems to have evaporated in the heat. He's making simple mistakes and yelling at the rocket as if it were the cause of his clumsiness. Your friend is experiencing heat stroke. If he doesn't get help soon, he could suffer severe injury or even die. You are his best hope to avoid this fate!

Central Texas is known for high temperature and high humidity from May until October. Typical May daily high temperatures are in the low to mid eighties with the humidity averaging in the high seventies. This combination of heat and humidity means your body can't cool itself as efficiently as it needs to. The Texas coast will have even higher humidity. West Texas will have lower humidity, but this "dry heat" sucks the water out of faster than in more humid areas. You must take precautions to ensure that you don't suffer a heat related injury.

Here are a few tips to help you maximize your rocketry enjoyment in the heat.

Drink WATER!! This is the most important and easiest thing you can do to avoid heat injury. If you wait until you are thirsty to drink, then your body is already about 1 quart low on water. Keep a container with you and drink even when you are not thirsty. Take a container of water with you while chasing rockets. Soda and alcohol are bad for you and coffee (caffeine) is worse. Water is best. You can drink too much water, but it is difficult. You probably should aim to drink from ½ to ¾ quarts per hour, but don't exceed 1 ½ quarts per hour or 12 quarts per day.

Understanding dehydration: <http://ojames3.tripod.com/tccrangesafety/rangesafety-heat-dehydration.pdf>

Here is the US Army’s recommendation for water consumption. Use it to more accurately gauge your body’s need based on actual conditions. On this table, rocket prep and launch would be easy work. Recovery would be moderate to hard work.

Easy Work		Moderate Work		Hard Work			
<ul style="list-style-type: none"> <li>• Weapon Maintenance</li> <li>• Walking Hard Surface at 2.5 mph, &lt; 30 lb Load</li> <li>• Marksmanship Training</li> <li>• Drill and Ceremony</li> </ul>		<ul style="list-style-type: none"> <li>• Walking Loose Sand at 2.5 mph, No Load</li> <li>• Walking Hard Surface at 3.5 mph, &lt; 40 lb Load</li> <li>• Calisthenics</li> <li>• Patrolling</li> <li>• Individual Movement Techniques, i.e. Low Crawl, High Crawl, etc.</li> </ul>		<ul style="list-style-type: none"> <li>• Walking Hard Surface at 3.5 mph, ≥ 40 lb Load</li> <li>• Walking Loose Sand at 2.5 mph with Load</li> <li>• Field Assaults</li> </ul>			
<ul style="list-style-type: none"> <li>• The work-rest times and fluid replacement volumes will sustain performance and hydration for at least 4 hours of work in the specified heat category. Fluid needs can vary based on individual differences (<math>\pm \frac{1}{4}</math> qt/h) and exposure to full sun or full shade (<math>\pm \frac{1}{4}</math> qt/h).</li> <li>• <b>NL</b> = no limit to work time per hour.</li> <li>• <b>Rest</b> means minimal physical activity (sitting or standing), accomplished in shade if possible.</li> </ul>				<ul style="list-style-type: none"> <li>• <b>CAUTION: Hourly fluid intake should not exceed 1½ quarts.</b></li> <li>• <b>Daily fluid intake should not exceed 12 quarts.</b></li> <li>• If wearing body armor add 5°F to WBGT in humid climates.</li> <li>• If wearing NBC clothing (MOPP 4) add 10°F to WBGT.</li> </ul>			
Heat Category	WBGT Index, F°	Easy Work		Moderate Work		Hard Work	
		Work/Rest	Water Intake (Qt/H)	Work/Rest	Water Intake (Qt/H)	Work/Rest	Water Intake (Qt/H)
1	78° - 81.9°	NL	½	NL	¾	40/20 min	¾
2 (GREEN)	82° - 84.9°	NL	½	50/10 min	¾	30/30 min	1
3 (YELLOW)	85° - 87.9°	NL	¾	40/20 min	¾	30/30 min	1
4 (RED)	88° - 89.9°	NL	¾	30/30 min	¾	20/40 min	1
5 (BLACK)	> 90°	50/10 min	1	20/40 min	1	10/50 min	1

See <http://hprc-online.org/environment/files/HeatStressCard.pdf> for electronic versions of this document.

Wear loose fitting, light colored clothing. Wear a cap with a flap to cover your neck and ears or a hat with a wide brim. Stay in the shade. Avoid strenuous activity. These are simple precautions to protect your body from excessive exposure to heat.

Get ready for the heat! Spend some time outdoors getting hot prior to hitting the range. Use this link to see the humidity in your area:

<http://www.wunderground.com/US/Region/Southcentral/Humidity.html>

Use the buddy system. Watch each other for signs and symptoms of heat stroke or heat exhaustion.

### **Don't Lose Your Cool**

When it comes to heat, your body is like a car. If either one overheats, the result could be minor or major problems. Knowing what to do can help you keep your body, or your car for that matter, running. When a person has heat stroke, it's like a car running with almost all the water boiled out of the radiator. It's very serious, and can lead suddenly, and without warning, to a complete breakdown.

As you move, your body heats up. Your body keeps cool by sending blood close to your skin, and by sweating. When the temperature is above 90deg. F, when the humidity is high, or when the sun is beating down on your head, it's difficult to stay cool. When in extreme heat, people can suffer heat cramps and heat exhaustion. These are unpleasant and can be somewhat serious. But, if they suffer heat stroke, they run the risk of brain damage and even death.

### **Symptoms of Heat Stroke**

When the body overheats, it can go into crisis. Usually, we sweat when we're hot. When someone has heat stroke, there is no sweat. Their skin is very dry and hot. Other symptoms include strong, fast pulse, very high temperature (106deg.F to 112deg.F), and confused, strange, or angry behavior. The victim may feel chilled, nauseated, or dizzy, and soon become unconscious.

### **First Aid for Heat Stroke: Act Immediately**

Contact health care professionals right away. If the victim has stopped breathing, use artificial respiration to get breathing going again. Move the victim to a cooler area, and if possible, soak them in a cool bath. Use a fan or cold packs if available. Keep the victim lying down with feet raised.

### **Avoid Heat Stroke**

If you know you'll be exposed to greater heat or humidity than normal, take several days to get used to it by spending time in similar conditions. When in the heat, take frequent breaks and drink plenty of cool water. Even when you're not thirsty, your body is losing fluid which needs to be replaced. Alcohol makes it harder for your body to keep cool, so avoid alcohol when you do hard work in hot weather. Don't skip meals. Eat normal meals to ensure you have enough salt/electrolytes. Don't take diet pills during heavy exertion in the heat.

### **Symptoms of Heat Exhaustion**

While Heat Exhaustion is more difficult to diagnose than heatstroke, chances of full recovery are far better unless the patient is not treated promptly. Because of excessive fluid loss, Heat Exhaustion usually gives adequate warning. Its symptoms include: increased fatigue, weakness, anxiety, and drenching sweats, leading to circulatory collapse with a slow, thready pulse; low or imperceptible blood pressure; cold, pale, clammy skin; and disorientation followed by a shock-like unconsciousness.

Syncope (faint) is a mild form of heat exhaustion and is precipitated by standing for a long time in a hot environment, e.g. the soldier on the parade ground, and is due to pooling of blood in the heat-dilated vessels of the lower extremities.

### **First Aid for Heat Exhaustion**

Place the patient flat or with the head slightly down. This helps restore fluids to the brain. When the patient starts responding, give the patient small amounts of sugar water.

### **Avoid Heat Exhaustion**

Drink water! Wear loose fitting, light weight, light color clothing. Stay in the shade as much as possible. Avoid unusual, strenuous activity. Drink more water! Eat normal meals to ensure you have enough salt/electrolytes. Don't take diet pills during heavy exertion in the heat.

### **Symptoms of Heat Cramps**

Heat cramps are less serious than heat stroke or exhaustion, but you should not ignore the condition. Heat cramps are characterized by painful and involuntary muscle spasms which usually occur in the abdomen, arms and legs, accompanied by heavy sweating. Heat Cramps often occur when you exercise heavily in a hot/humid climate.

### **First Aid for Heat Cramps**

Have the patient stop what they are doing and sit quietly in a cool, shaded place. Give the patient cool water along with fluids such as clear juice or sports drinks with electrolytes. If the patient vomits, don't give them any more to drink. Gently massaging the cramping muscles can provide relief. You can have the patient gently stretch the cramping muscles and/or use ice to reduce the cramps. If the cramps continue for an hour or more, have the patient see a doctor.

### **Avoid Heat Cramps**

Drink water! Wear loose fitting, light weight, light color clothing. Stay in the shade as much as possible. Avoid unusual, strenuous activity. Drink more water! Eat normal meals to ensure you have enough salt/electrolytes. Don't take diet pills during heavy exertion in the heat.

Stay cool and have a great time flying rockets!

### **References and More information**

American Academy of Orthopedic Surgeons  
<http://orthoinfo.aaos.org/topic.cfm?topic=A00319>

Army and Air Force Heat Stress Control and Heat Casualty Management

<http://www.operationalmedicine.org/TextbookFiles/HeatStressControl.htm>

Texas A & M Health Hints “Heat: Adjust, hydrate, stay safe”

<http://fcs.tamu.edu/health/healthhints/2008/aug/heat.pdf>

References for the article titled “Heat: Adjust, hydrate, stay safe”

<http://fcs.tamu.edu/health/healthhints/2008/aug/ref.php>

*“Health Tips for Travelers Consider Climate & Accommodations: Tropical oasis or alpine adventure”*

<http://fcs.tamu.edu/health/healthhints/2008/jul/index.php>

National Institute for Occupational Safety and Health

<http://www.cdc.gov/niosh/topics/heatstress/>

Bay Area Environmental Safety Group

<http://www.baesg.org/heatlist.htm>