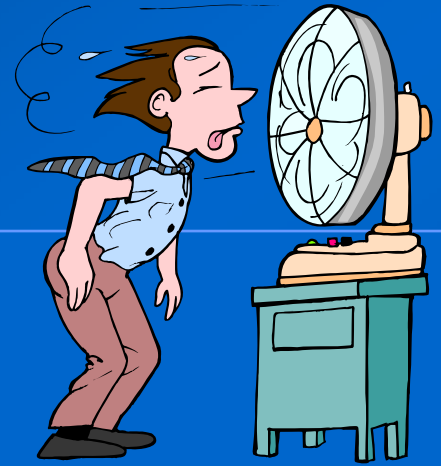


HEAT STRESS



Individuals At Risk

- All individuals who work in hot environments (inside and outside) are at risk of developing heat stress.
- More intense and strenuous workloads, put individuals at a greater risk.
- Wearing PPE such as respirators and protective suits can also increase this risk.

Contributing Factors

- Environmental Factors
 - Temperature
 - Humidity
 - Radiant Heat
 - Air Velocity

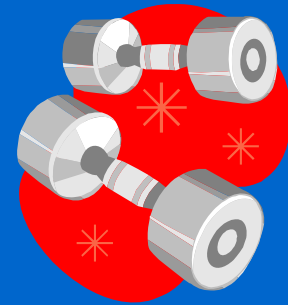


Temperature is not the only indicator!!

Contributing Factors

- Personal Factors

- Age
- Weight
- Fitness
- Acclimatization – increased tolerance to heat that comes from working in a hot environment for a period 1-2 weeks.



The Body's Response to Heat

- Increased Blood Circulation

- Blood is circulated to the skin which increases skin temperature and allows the body to give off excess heat through the skin.
- This is why your face turns red when you are hot.
- However, physical labor requires blood to fuel the muscles; therefore, less blood is available to flow to the skin surface and because of this, less heat is released from the body.

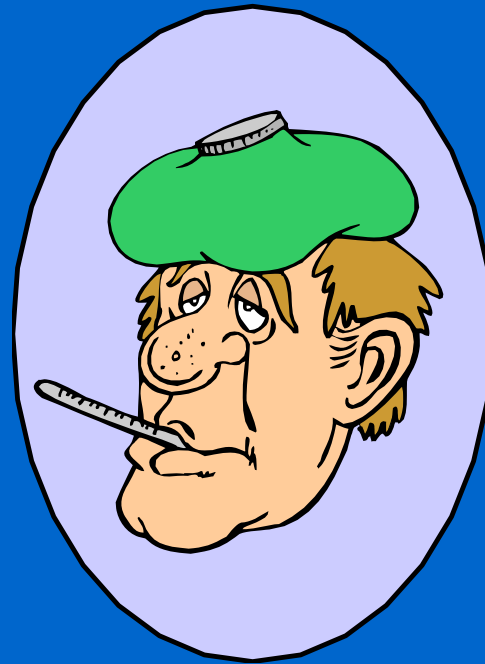
The Body's Response to Heat

- Sweating

- Sweating is an effective way to cool the body when humidity is relatively low.
- Sweating is most effective when the sweat evaporates from the skin rather than drips off or is wiped off.
- A young person can sweat as much as one quart per hour. (2-3 gallons per day)

Heat Disorders

- Heat Rash
- Heat Cramps
- Heat Exhaustion
- Heat Stroke



Heat Disorders

- Heat Rash

- Also known as “Prickly Heat.”
- Occurs when sweat cannot freely evaporate from the skin and sweat ducts become plugged. This inflammation can cause a red rash.
- Can be prevented by wearing clothes that allow sweat to evaporate as well as bathing regularly and drying the skin.

Heat Disorders

- Heat Cramps

- Cramps in the arms, legs, or abdomen
- Occur in individuals who sweat profusely then drink large quantities of water, but do not adequately replace the body's salt loss.
- To prevent, ensure that salts are replaced during and after heavy sweating.

Heat Disorders

- Heat Exhaustion

Mild form of shock caused when the circulatory system begins to fail as a result of the body's inadequate effort to give off excessive heat.

Although not an immediate threat to life, if not properly treated, could evolve into heat stroke.

Heat Disorders

- Heat Exhaustion - Symptoms
 - Skin is clammy and moist
 - Extreme weakness or fatigue
 - Nausea
 - Headache
 - Complexion pale or flushed
 - Body temperature normal or slightly elevated

Heat Disorders

- Heat Exhaustion - Treatment
 - Do not leave the person alone
 - Move to a cool place to rest
 - Drink water
 - Treat for shock, if necessary
 - If unconscious, fails to recover rapidly, has other injuries, or has a history of medical problems, seek medical attention.

Heat Disorders

- Heat Stroke

Severe and sometimes fatal condition resulting from the failure of the body to regulate its core temperature.

The body's normal cooling mechanisms stop functioning, sweating stops.

True medical emergency requiring immediate medical attention.

Heat Disorders

- Heat Stroke - Symptoms
 - Stop Sweating
 - Rapid Pulse
 - Mental Confusion
 - Loss of Consciousness
 - Convulsions
 - Body Temperature ≥ 105
 - Hot, dry skin
 - Can die unless treated promptly

Heat Disorders

- Heat Stroke - Treatment

- Call 911
- Remove victim to a cool area
- Soak clothing with cool water and fan vigorously to increase cooling
- Monitor vital signs



Prevention Methods



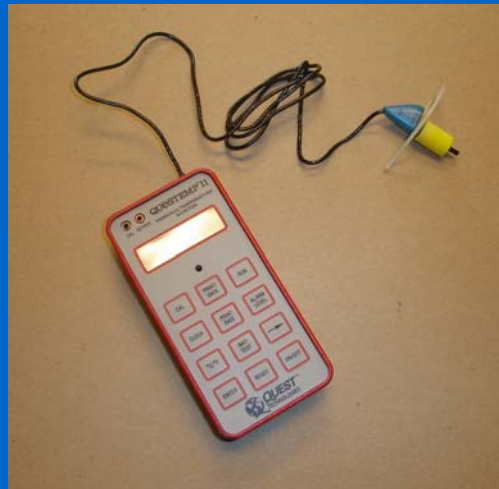
- Acclimatization
- Work in pairs
- Drink plenty of cool water or electrolyte replacement fluids even if not thirsty. (One small cup every 15-20 minutes)
- Be able to recognize early signs & symptoms of heat-induced illness and take appropriate action to prevent serious heat disorders.
- Schedule most strenuous work during the coolest times of the day.

Prevention Methods

- Spend as little time as possible in direct sunlight.
- Take frequent breaks in cool, shaded areas.
- Wear light, loose fitting, clothing.
- Avoid caffeine, which can make the body lose water.
- Rotate workers in and out of hot areas if possible.

Heat Stress Measurement

Area Heat Stress Monitor



Personal Heat Stress Monitor

Wet Bulb Globe Temperature Index

- WBGT is a number that is calculated as a combination of humidity, radiant, and ambient temperature readings.
- This number is then combined with work load to determine heat stress potential.
- The following table displays the recommended work/rest regimen for corresponding WBGT values.

General Heat Stress Index

Danger Category	Apparent Temperature	Heat Syndrome Degree Fahrenheit
IV. Extreme Danger	Greater than 130	Heat Stroke or sunstroke imminent.
III. Danger	105 to 130	Heat Stroke, heat cramps, or heat exhaustion likely. Heat stroke possible with prolonged exposure and physical activity.
II. Extreme Caution	90 to 105	Heat Stroke, heat cramps and heat exhaustion possible with prolonged exposure and physical activity.
I. Caution	80 to 90	Fatigue possible with prolonged exposure and physical activity.

Work/Rest Regimen

PERMISSIBLE HEAT EXPOSURE THRESHOLD LIMIT VALUES

Work/rest regimen	----- Work Load* -----		
	Light	Moderate	Heavy
Continuous work	30.0°C (86°F)	26.7°C (80°F)	25.0°C (77°F)
75% Work, 25% rest, each hour	30.6°C (87°F)	28.0°C (82°F)	25.9°C (78°F)
50% Work, 50% rest, each hour	31.4°C (89°F)	29.4°C (85°F)	27.9°C (82°F)
25% Work, 75% rest, each hour	32.2°C (90°F)	31.1°C (88°F)	30.0°C (86°F)

*Values are in °C and °F, WBGT.

These TLV's are based on the assumption that nearly all acclimatized, fully clothed workers with adequate water and salt intake should be able to function effectively under the given working conditions without exceeding a deep body temperature of 38°C (100.4° F). They are also based on the assumption that the WBGT of the resting place is the same or very close to that of the workplace. Where the WBGT of the work area is different from that of the rest area, a time-weighted average should be used (consult the *ACGIH 1992-1993 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices* (1992)).

These TLV's apply to physically fit and acclimatized individuals wearing light summer clothing. If heavier clothing that impedes sweat or has a higher insulation value is required, the permissible heat exposure TLV's in Table III: 4-2 must be reduced by the corrections shown in Table III: 4-3.

Source: ACGIH 1992.

Work/Rest Regimen

- Resting: Sitting quietly or sitting with moderate arm movement.
- Light Work: Sitting with moderate arm and leg movements, using a table saw, standing with light or moderate work at a machine with some walking.
- Moderate Work: Scrubbing in a standing position, walking about with moderate lifting or pushing.
- Heavy Work: Carpenter sawing by hand, shoveling dry sand, heavy assembly work.
- Very Heavy Work: Shoveling wet sand.

Heat Stress Monitoring

If you are unsure of the Heat Stress Potential that you are exposed to, contact the ADOT Safety and Health Section for Heat Stress Monitoring.

