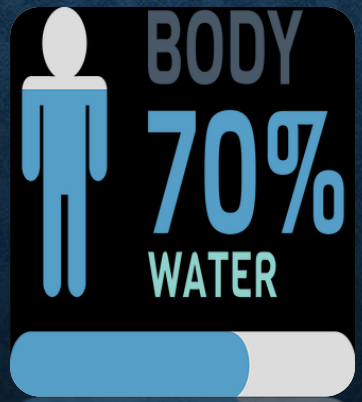
HEAT STRESS

INDIVIDUALS AT RISK

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



CONTRIBUTING FACTORS

- Environmental Factors
  - Temperature
  - Humidity
  - Radiant Heat
  - Air Velocity
- Personal Factors
  - Age
  - Weight
  - Fitness

NOTE: Temperature is not the only indicator

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.

  - 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.

HEAT DISORDERS

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

HEAT DISORDERS

- Heat Rash
  - The most common problem in hot work environments.
  - Prickly heat is manifested as red papules and usually appears in areas where the clothing is restrictive.
  - As sweating increases, these papules give rise to a prickling sensation.
  - 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, heat rashes will disappear when the affected individual returns to a cool environment.

HEAT DISORDERS

- Heat Cramps
  - These cramps have been attributed to an electrolyte imbalance caused by sweating.
  - It is important to understand that cramps can be caused by both too much and too little salt.
  - Cramps appear to be caused by the lack of water replenishment. Sweat is a hypotonic solution (±0.3% NaCl), excess salt can build up in the body if the water lost through sweating is not replaced.
  - Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

  - Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur. Recent studies have shown that drinking commercially available carbohydrate-electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

HEAT DISORDERS

- Heat Exhaustion
  - The signs and symptoms of heat exhaustion are *headache, nausea, vertigo, weakness, thirst, clammy skin and giddiness.*
  - This condition responds readily to prompt treatment.
  - Heat exhaustion should not be dismissed lightly, however, for several reasons.
    - The victim may be operating machinery or controlling an operation that should not be left unattended
    - The victim may be injured when he or she faints
    - The signs and symptoms seen in heat exhaustion are similar to those of heat stroke, a medical emergency.
  - Workers suffering from heat exhaustion should be removed from the hot environment and given fluid replacement and should be encouraged to get adequate rest.

If unconscious, fails to recover rapidly, has other injuries, or has a history of medical problems, seek medical attention.

HEAT DISORDERS

- Heat Stroke
  - Occurs when the body's system of temperature regulation fails and body temperature rises to critical levels.
  - ***Heat stroke is a medical emergency***.
  - The primary signs and symptoms of heat stroke are ***confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature***,
    - If body temperature is too high, it causes death. If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately.
  - Place the worker in a shady area and the outer clothing should be removed.
  - Wet the worker's skin and air movement around the worker should be increased to improve evaporative cooling.
  - Fluids should be replaced as soon as possible.
  - The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment.

Regardless of the worker's protests, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

PREVENTION METHODS

- Acclimatization - 1 to 2 weeks to get use to the heat
- 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

Heat Safety Tool

By U.S. Department of Labor (DOL), Occupational Safety and Health Administration (OSHA)

Android Market | iPhone

When you're working in the heat, safety comes first. With the OSHA Heat Safety Tool, you have vital safety information available whenever and wherever you need it - right on your mobile phone.

The App allows workers and supervisors to calculate the **heat index** for their worksite, and, based on the heat index, displays a **risk level** to outdoor workers. Then, with a simple "click," you can get reminders about the **protective measures** that should be taken at that risk level to protect workers from heat-related illness-reminders about drinking enough fluids, scheduling rest breaks, planning for and knowing what to do in an emergency, adjusting work operations, gradually building up the workload for new workers, training on heat illness signs and symptoms, and monitoring each other for signs and symptoms of heat-related illness.

Working in full sunlight can increase heat index values by 15 degrees Fahrenheit. Keep this in mind and plan additional precautions for working in these conditions.

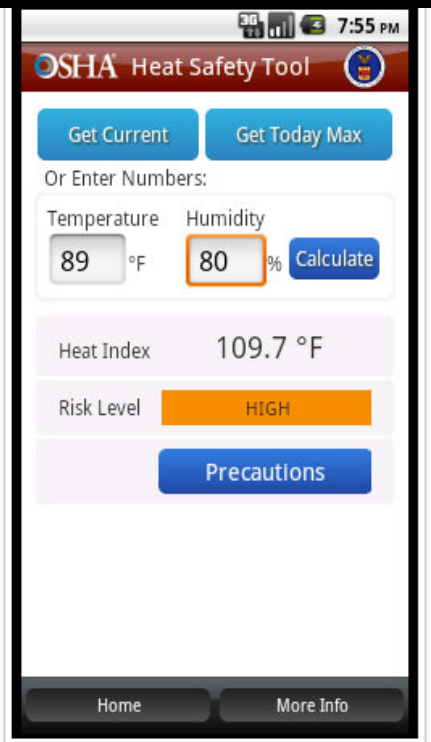
The OSHA Heat Tool is available in Spanish for Android and iPhone devices. To access the Spanish version on the iPhone, set the phone language setting to Spanish before downloading the app.

Stay informed and safe in the heat, check your risk level.

For more information about safety while working in the heat, see OSHA's heat illness webpage, including new online guidance about using the heat index to protect workers.

The source code for this app is available for download:

- Android: English (ZIP*) | Spanish (ZIP*)
- iPhone: All-in-One (ZIP*)



Campaign to Prevent Heat Illness in Outdoor Workers

https://www.osha.gov/SLTC/heatillness/heat_index/heat_app.html

WET BULB GLOBE TEMPERATURE INDEX (HEAT 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 (Heat Index).

WORK/REST REGIMEN

PERMISSIBLE HEAT EXPOSURE THRESHOLD LIMIT VALUES

Work/Rest Cycles & Water Intake

Use heat condition information below to determine required water intake and work/rest cycles.

Heat Category	WBGT INDEX (° F)	Easy Work/Rest (Minutes)	Water Intake/Hr (Qts)	Moderate Work/Rest (Minutes)	Water Intake/Hr (Qts)	Hard Work/Rest (Minutes)	Water Intake/Hr (Qts)
0	< 78	NL	N/A	NL	N/A	NL	N/A
1	78-81.9	NL	1/2	NL	3/4	40/20	3/4
2	82-84.9	NL	1/2	50/10	3/4	30/30	1
3	85-87.9	NL	3/4	40/20	3/4	30/30	1
4	88-89.9	NL	3/4	30/30	3/4	20/40	1
5	> 90	50/10	1	20/40	1	10/50	1

N/A - Not Applicable
NL - No Limit

http://www.detrick.army.mil/ih/ehhot.cfm

HEAT STRESS MONITORING

- The LINK below will take you to the National Weather Service site for Pullman/Moscow Regional Airport…Heat Index can be found here.
  - http://forecast.weather.gov/MapClick.php?CityName=Pullman&state=WA&site=OTX&lat=46.7286&lon=-117.155#.VZLi9PlVhBc

QUESTIONS