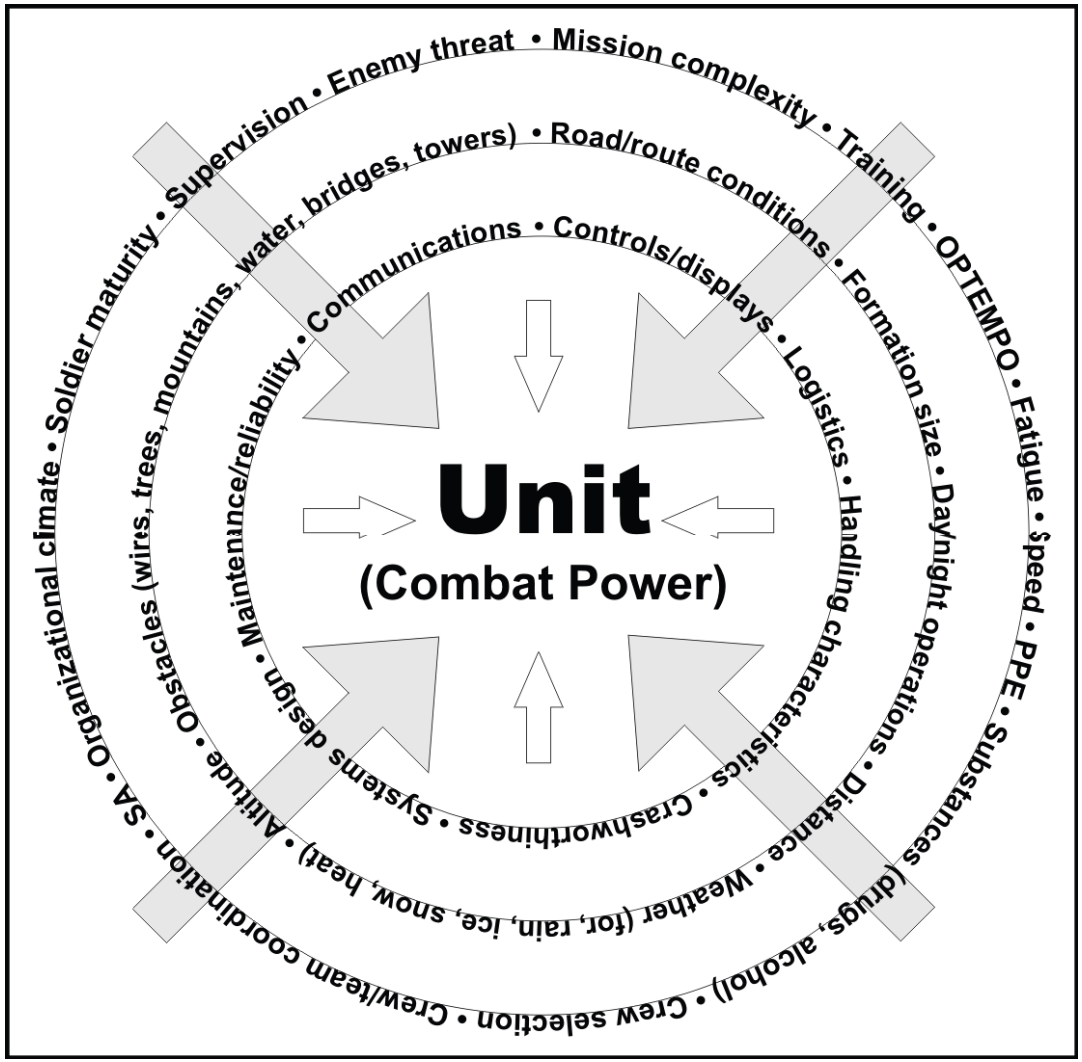
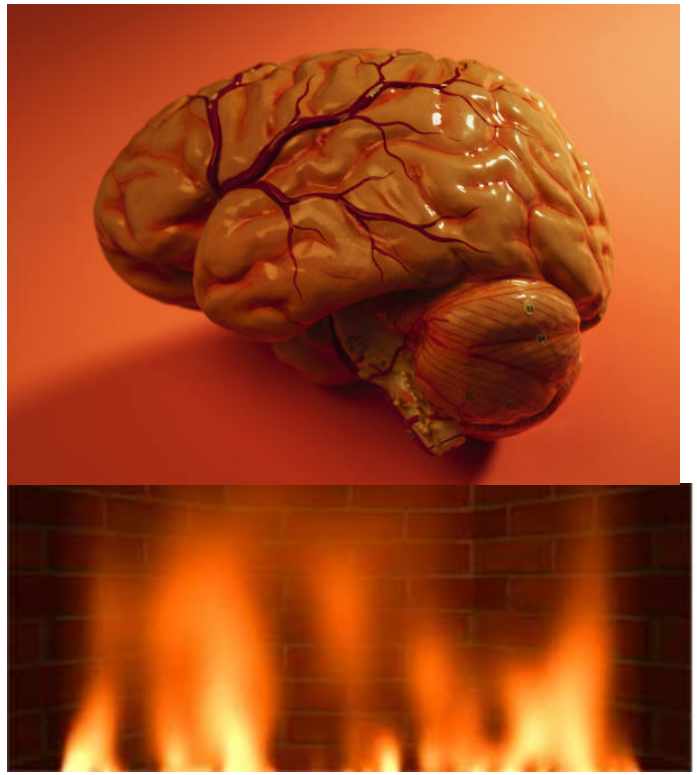




Workload + Hot Weather
Can = Heat Injury

TRADOC Leaders'
FY07 Heat Injury Prevention Program

IDENTIFY HAZARDS / ASSESSS HAZARDS / DEVELOP CONTROLS / IMPLEMENT CONTROLS / SUPERVISE-EVALUATE

Heat Injuries

- Heat Injuries are a major threat in both training and combat. They kill or disable Soldiers every year.

- Why? The human body is a small radiator that is easily overloaded by:

  - Exercise/work (15 times more heat is produced).
  - Hot/humid weather
  - Too little fluids
  - Too few electrolytes (salts or minerals)
    - this can be caused by too much water

- Heat injuries kill or disable by "cooking" internal organs.

- Human organs cannot be trained to tolerate heat (i.e. to not get cooked). When it occurs, organ damage is permanent; it cannot be overcome by willpower or motivation.

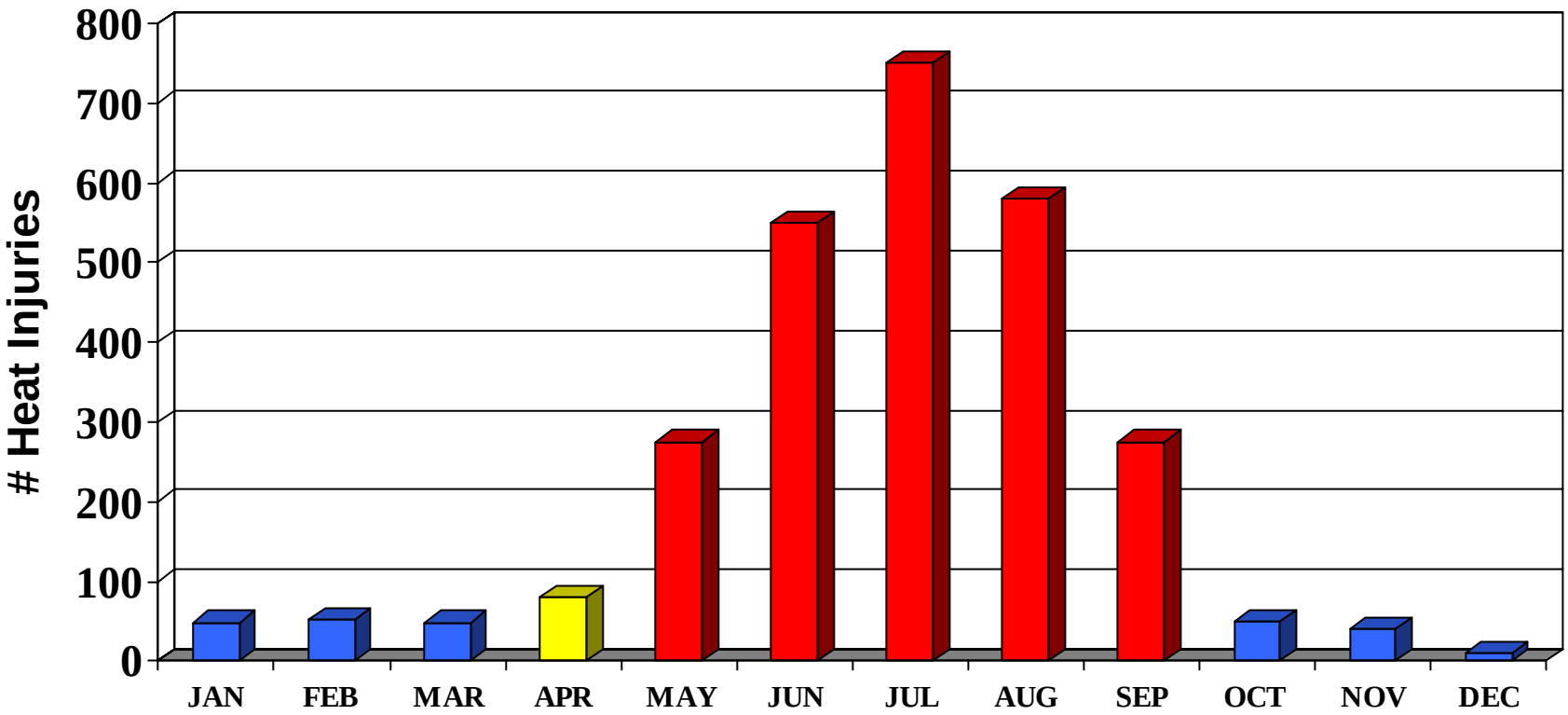
- The <u>best</u> solution is <u>prevention!</u>

Heat Injury Risk Management*

1. **Identify hazards**
2. **Assess hazards to determine risk**
3. **Develop controls and make risk decisions**
4. **Implement controls**
5. **Supervise and evaluate**

Apply the process cyclically and continuously. CRM is a continuous process applied across the full spectrum of Army training and operations, individual and collective day-to-day activities and events, and base operations functions. It is a cyclic process that is used to continuously identify and assess hazards, develop and implement controls, and evaluate outcomes.
* FM 5-19, Composite Risk Management

1. Identify Hazards: Highest Risk Months



- **Greatest risk factor is a high Heat Category.**
- **Risk starts at 75 degrees Fahrenheit**
- **Most heat injuries occur between April and September**

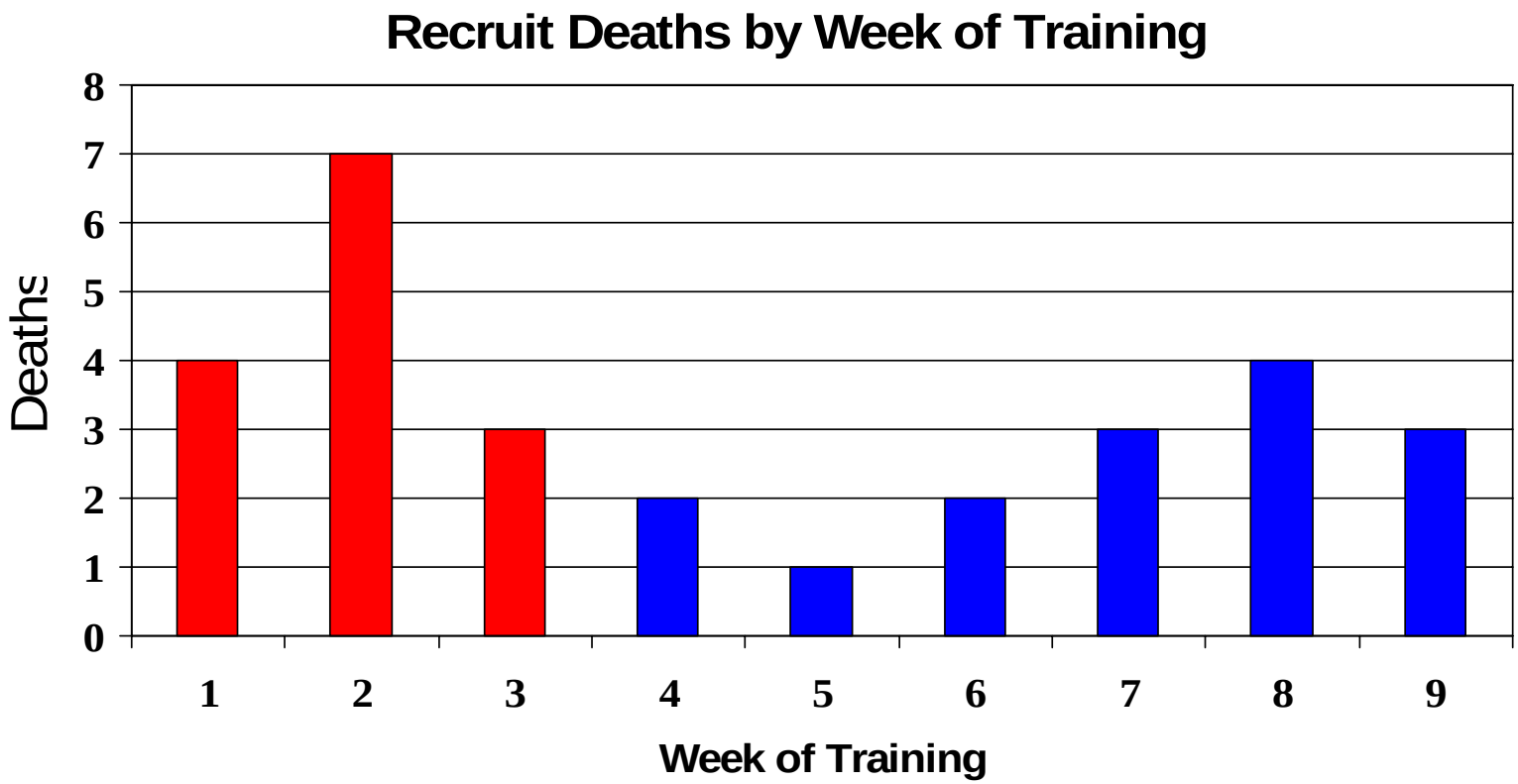
Data Source: Army Medical Surveillance Activity (AMSA) from Defense Medical Surveillance System (vol. 07/No. 03).

1. Identify Hazards: Time In Service

Soldiers in their first 18-24 months of active duty have significantly higher rates of heat injuries.

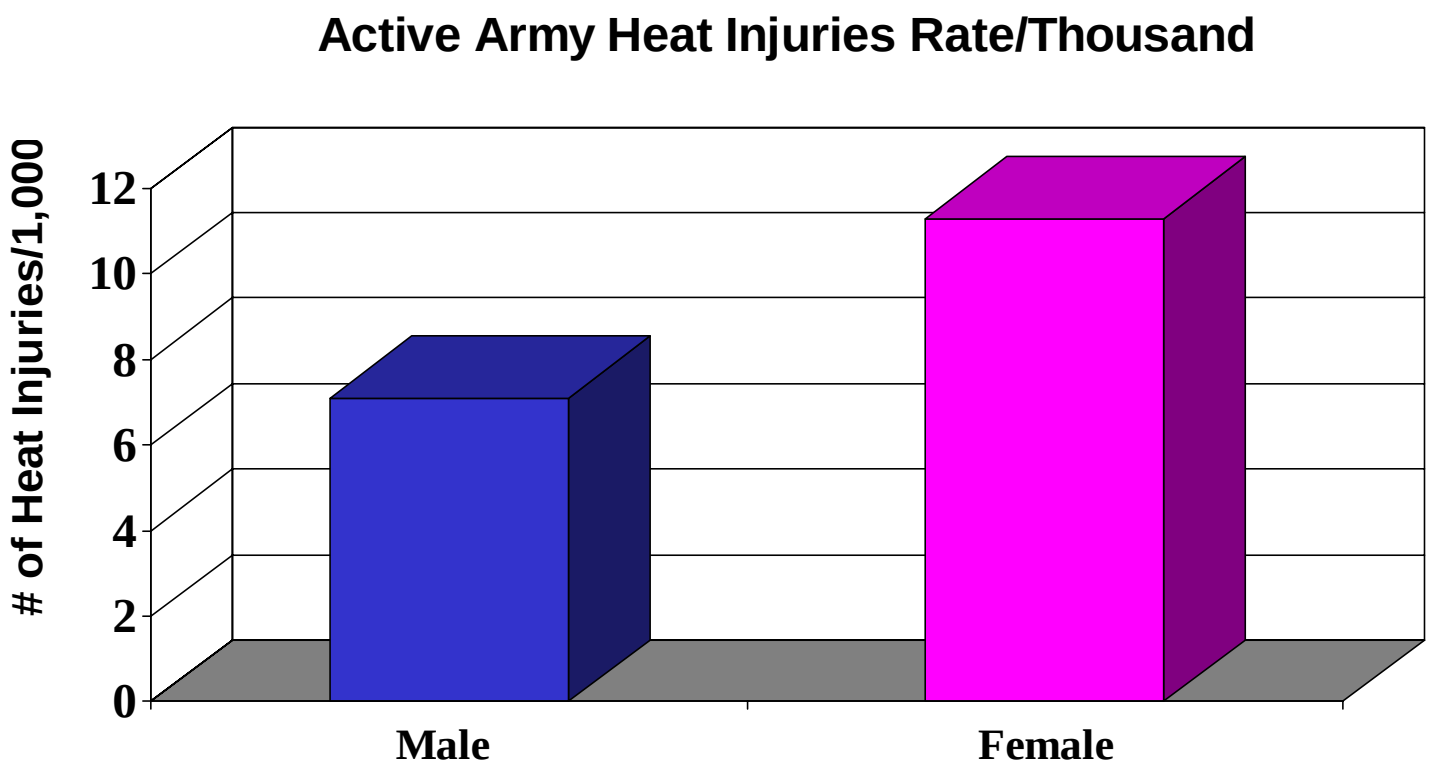
Data Source: Army Medical Surveillance Activity (AMSA) from Defense Medical Surveillance System (vol. 07/No. 03).

1. Identify Hazards: Time In Training



- 30 Department of Defense recruits died between 1977-2001
- First 2-3 weeks of BCT/OSUT are a high risk period (acclimatization is incomplete)
- FTXs and 10-15k marches are potentially very high risk during summer months

1. Identify Hazards: Gender



- **Young women (<20 y/o) have higher rates of heat injuries than young men.**

1. Identify Hazards: Soldier Risk Factors

- Sickle Cell Trait (SCT) – 40x higher risk for Heat Injury*
- Non-acclimatized or recently hospitalized
- Poor physical fitness
- Overweight
- Sick (colds, flu, diarrhea, etc.)
- Taking drugs (they interfere with body processes)
  - Antihistamines (Benadryl®, Atarax®, etc.)
  - Decongestants (Sudafed®)
  - High Blood Pressure (diuretics, beta blockers)
  - Psychiatric Drugs (tricyclic antidepressants, antipsychotics)

* The Army currently does not test for SCT

1. Identify Hazards: Soldier Risk Factors

- Prior heat injury
- Donating blood (losing Red Blood Cells hurts heat adaptation)
- Skin damage (sunburn, rash, poison ivy)
- "Overly motivated"
- Nutritional supplements (Ephedra, Creatine, etc.)
- Alcohol (alcohol dehydrates)
- RECBN: Soldiers with a history of recent, rapid weight loss due to extreme measures (laxatives, vomiting, sweat boxes, food-water deprivation, etc.)

2. Assess Hazards: Continuous heat exposure

- **Leaders should assess the impact of 2 previous days of continuous heat exposure:**

- **H- Heat category past 2 days**
- **E- Exertion level past 2 days**
- **A- Acclimatization/ individual risk factors**
- **T- Temperature/rest overnight**

- **Cluster of heat injuries on prior 2 days = HIGH RISK**

NOTE: Approx. 40% of heat injuries may occur under green flag conditions. This is probably due to previous days' heat, work load, and dehydration.

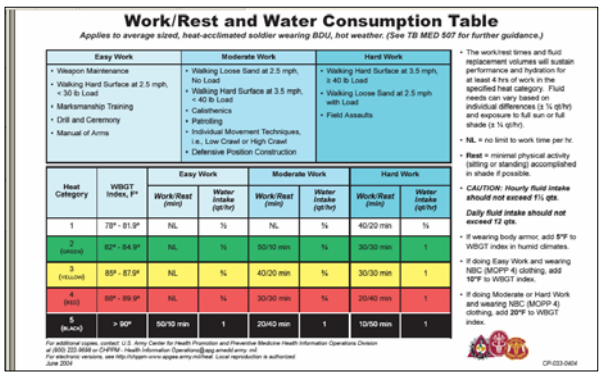
Heat Injury Risk Management Matrix (FEB 06)

Risk Factors	Risk Level Circle the appropriate condition for each factor			
	0 points/circle Low Risk	**1 point/circle Medium Risk**	**2 points/circle High Risk**	**3 points/circle Extreme Risk**
Risk Management Worksheet	All controls implemented			Not all controls implemented
WBGT at site NOTE: Add 5 F. for backpack or body armor	< Cat 1	Cat 1	Cat 2-3	Cat 4-5
Back-to-back Cat 5 days	0	1	2-3	>4
Heat Injuries in past 2 days	0	Heat Cramps	Heat Exhaustion	Heat Stroke/ Death
Workload in past 2 days (see TR 350-29 workload classification chart)	Easy	Easy or Moderate	Moderate or Hard	Hard
Projected workload	Easy	Easy or Moderate	Moderate or Hard	Hard
Heat acclimatization days	>13	7-13	3-6	<3
Leader/NCO presence	Full Time	Substantial	Minimal	None
Cadre duty experience	18 months	7-18 months	1-6 months	<1 month
Communication System (tested at training site)	Radio and landline phone	Landline phone only	Radio only	None
Previous 24 hours sleep	>7 hours	5-7 hours	2-4 hours	<2 hours
Food/salty snacks every 4 hours	<4 hours	4-6 hours	6-7 hours	>7 hours
Onsite 91W/CLS and iced sheets (min. 8 single bed sheets/company in cooler)	Both iced sheets & Medic, EMT, or CLS	Only Iced sheets	Medic, EMT, or CLS	None
Add Circled Blocks with points/circle				

Total Score: 0-7 = Low Risk; 7-15 = Medium Risk; 16-24 = High Risk; 25-39 = Extreme Risk

>11 Total Score should have onsite Medic, EMT, or CLS and organic evacuation transportation.

3. Develop Controls: Preparation



Work/Rest and Water Consumption Table

Applies to average sized, heat-acclimated soldier wearing BDU, hot weather. (See TB MED 507 for further guidance.)

Easy Work	Moderate Work	Hard Work
• Weapon Maintenance • Walking Hard Surface at 2.5 mph, < 30 lb Load • Marksmanship Training • Drill and Ceremony • Manual of Arms	• Walking Loose Sand at 2.5 mph, No Load • Walking Hard Surface at 3.5 mph, < 40 lb Load • Calisthenics • Patrolling • Individual Movement Techniques, i.e., Low Crawl or High Crawl • Defensive Position Construction	• Walking Hard Surface at 3.5 mph, ≥ 40 lb Load • Walking Loose Sand at 2.5 mph with Load • Field Assaults

Heat Category	WBGT Index, F°	Easy Work		Moderate Work		Hard Work	
		Work/Rest (min)	*Water Intake (qt/hr)*	*Work/Rest (min)*	*Water Intake (qt/hr)*	*Work/Rest (min)*	*Water Intake (qt/hr)*
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

- The work/rest times and fluid replacement volumes will sustain performance and hydration for at least 4 hrs of work in the specified heat category. Fluid needs can vary based on individual differences (± ¼ qt/hr) and exposure to full sun or full shade (± ½ qt/hr).
- **NL** = no limit to work time per hr.
- **Rest** = minimal physical activity (sitting or standing) accomplished in shade if possible.
- ***CAUTION: Hourly fluid intake should not exceed 1½ qts.***

  Daily fluid intake should not exceed 12 qts.
- If wearing body armor, add **5°F** to WBGT index in humid climates.
- If doing Easy Work and wearing NBC (MOPP 4) clothing, add **10°F** to WBGT index.
- If doing Moderate or Hard Work and wearing NBC (MOPP 4) clothing, add **20°F** to WBGT index.

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June 2004

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- **Establish SOPs and signals**
- **Train and test all personnel**
- **Issue Heat Injury cards to all cadre**
- **Place Heat Injury posters in bathrooms, bulletin boards, DFAC, training areas, etc.**
- **Identify "at risk" Soldiers**
- **Issue and use Ogden Cords (knotted cord on BDU lapel or under ACU name tape):**
  - **Use red or yellow cord for "at-risk" Soldiers**
  - **Use to monitor daily hydration (1 knot per canteen)**
- **Ensure one functional WBGT device for each training site.**
- **Emplace WBGT at training sites**

3. Develop Controls: Planning

- **Revise training 1 day prior, considering:**
  - **Previous 2 days of heat exposure**
  - **Predicted Heat Category**
  - **Training events (distance, pace, breaks, etc.)**
  - **Uniform/equipment**
  - **Location**
  - **Time of day**
  - **Work-rest cycle, hydration guidelines, etc.**

- **Plan communication capabilities, water, food/snacks, medical, and evacuation support.**
  - **Recommend commercial electrolyte beverages in high-risk months (or when daily water consumption exceeds 1-1.5 gallons/day)(see pg 46).**
  - **Recommend commercial electrolyte beverages be diluted to half-strength, if used.**
  - **Ensure canteens/hydration packs are properly cleaned daily (FM 21-10), especially when using flavored beverages.**

- **Pre-plan changes if METT-T/Heat Category changes <u>or</u> if heat casualties occur**

3. Develop Controls: Risk Reducing Measures

Work/Rest and Water Consumption Table

Applies to average sized, heat-acclimated soldier wearing BDU, hot weather. (See TB MED 507 for further guidance.)

Easy Work	Moderate Work	Hard Work
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June 2004

CP-033-0404

NOTE: All fluids provide water, whether milk, fruit juice, etc.

3. Develop Controls: Adapt

- **Monitor WBGT hourly in the training area (not at one or two central areas). Roads or ranges can be far hotter than surrounding terrain.**

- **Adjust training as necessary based on the local WBGT to decrease the heat load.**

- **Power down: authorize the officer or Senior NCO on the ground to make risk reducing decisions.**

3. Develop Controls: Issues

"At Risk" Soldiers

- Positive for SCT
- Overweight or underfit
- Sick, previous heat injury, recently hospitalized, or skin damage (sunburn, rash),
- Donated blood (< 3 days)
- Taking certain drugs

Control:

- Ensure a low-risk person is charged with monitoring high risk Soldiers.
- Have high risk Soldiers wear red or yellow Ogden Cord.
- Require daily weighings for at-risk Soldiers (standardize: same time each day after bathroom call and before shower while in underwear).
- Proper rehydration should restore previous day's weight; a weight loss of 1 lb or more in one day is almost always water loss (a pint weighs 1 pound).

3. Develop Controls: Issues

Blood Donations:

- Loss of Red Blood Cells interferes with heat and exercise adaptation
- Takes 6 weeks to fully recover
- Blood donations in RECBN and first 3 weeks of BCT-OSUT are forbidden (TR 350-6)

Control:

- No strenuous physical activity for 24 hours after blood donation.
- Rehydrate after donation with electrolyte beverage.
- Use caution on troop movements to classes, DFAC, etc., due to the risk of "passing out."
- Avoid Heat Category 3-5 exposure, APFT, road marches, etc., for 3 days after donation.

3. Develop Controls: Issues

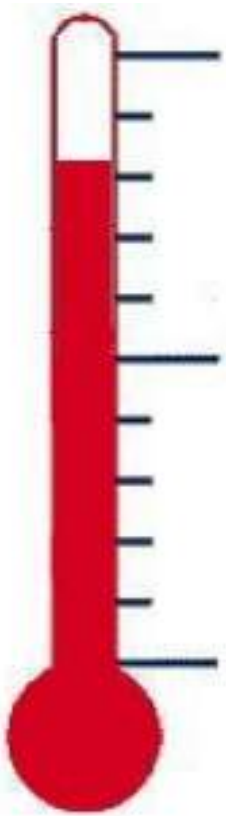
Drugs that Interfere with heat adaptation

- Antihistamines (Benadryl®, Atarax®, CTM®)
- Decongestants (Sudafed®)
- High Blood Pressure (diuretics, beta blockers)
- Psychiatric Drugs (tricyclic antidepressants, antipsychotics)

Control:

Ask medical treatment facility to annotate risk on medication bottles and issue profile as necessary.

4. Implement Controls: Minimizing Heat Load



- **Change Schedule (time of day and location):**
  - Move training (workload) to cooler parts of day
  - Move training to cooler locations (shade, covered bleachers, etc.).
  - Avoid direct sun, if possible

- **Change clothing-equipment: CDR /Leader/ NCO may authorize:**

  NOTE: Add 5 degrees to WBGT for rucksack or body armor. Add 10 degrees to WBGT if in MOPP 4; Add 20 degrees if moderate to heavy work

  - **Heat Category 3:**
    - > Unblouse BDU or ACU trousers; roll up to boot top
    - > Unbuckle web belt
    - > Remove Body Armor

  - **Heat Category 4: All Heat Category 3 controls plus:**
    - > Roll BDU or ACU sleeves up.
    - > Remove t-shirt or remove BDU-ACU (remove t-shirt and wear BDU-ACU top if there is direct sun exposure or biting insects)
    - > Replace helmet with soft cap unless helmet needed for safety
    - > Decrease backpack load to <30 lbs

  - **Heat Category 5: All Heat Category 3 & 4 controls plus:**
    - > Remove backpack

4. Implement Controls: Minimizing Heat Load

- **Change events:**

- Avoid strenuous, back-to-back events
- Double space formations (60” between each Soldier)
- Shade Soldiers whenever possible
- Overhead shelters in training areas
- Field showers for cooling and personal hygiene
- Cool showers at day’s end
- Schedule high-heat load events (like Victory Road Marches) so that they start and finish prior to the onset of Category 4 weather
- Modify events in Category 4-5 weather:
  - > Increase breaks; Synchronize rest breaks for timed events
  - > Shorten distance/adjust pace
  - > Adjust uniform
  - > Decrease load (remove backpacks, body armor, equipment, helmets, decrease weight, etc.)
  - > Train during cool (early am or night) temperatures

5. Supervise-Evaluate: Leader Prevention Actions

- **Spot check troops by:**
  - **Confirm Buddy System is in place.**
  - **Monitor food intake (food/salty snack every 4 hrs or less).**
  - **Check Ogden cords for water intake. Are they drinking BEFORE PT in morning?**
  - **Monitor urine output. Soldiers should be urinating a full bladder every 2-3 hours.**
  - **Ask questions that require clear thinking (What day is it? Who is your DS? Where are you?).**
  - **Look for Soldiers who are visibly 'wilting' or struggling.**
  - **Be alert for Soldiers bypassing controls (e.g. not drinking in order to have a full canteen for an inspection).**
  - **Ensuring at-risk Soldiers weigh themselves daily – check the weight log and ensure it is occurring. Ask Soldiers the significance of weight loss, and what they do to correct weight losses (see slide 16)**

5. Supervise-Evaluate: Leader Prevention Actions

- **Spot check cadre**

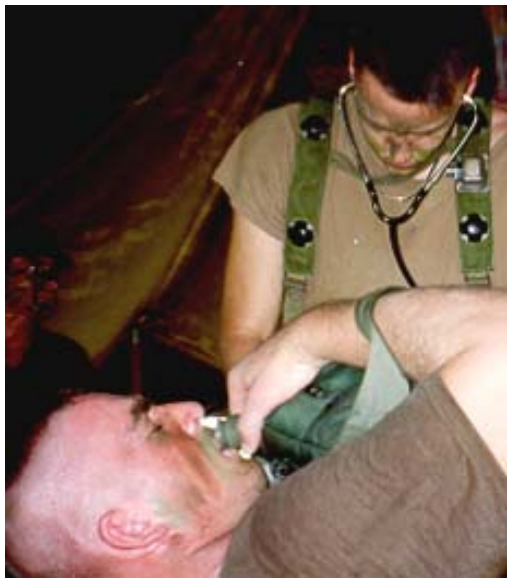
  - **Are your Soldiers checking their weights every day? What are they doing about any weight loss between days?**
  - **"What is the current Heat Category?"**
  - **"Who is at risk?" "Who is their buddy?"**
  - **"What actions would you take if … "**
  - **Is water available and accessible?**
  - **Are rapid cooling supplies on-hand?**
  - **Do you have commo with medical support?**
  - **Do you have your Heat Pocket-card?**

5. Supervise-Evaluate: Leader Prevention Actions

- **Spot check medical support**
  - **Check equipment, personnel, evacuation vehicle, commo, rapid cooling supplies**
  - **If no organic medical support, check for coordination of alternatives (gate access for off-post EMS, travel time, procedures, etc.)**

Evaluate: Heat Injuries

RECOGNIZE HEAT INJURIES



- Weakness or inability to work
- Muscle cramps
- Dizziness
- Headache
- Clumsiness, unsteadiness, staggering gait
- Irritability (grouchy)
- Involuntary bowel movement

Heat Cramps-Exhaustion

- Convulsions and chills
- Vomiting
- Confusion, mumbling
  (Does not know Who, When, Where)
- Combative
- Passing out (unconscious)

Heat Stroke

Treat: Heat Cramps or Exhaustion (STOP-REST-COOL)

- **STOP. Stop activity.**
- **REST. Rest Soldier flat with feet elevated on their helmet, sand bags, etc.**
- **COOL.**
  - **Move Soldier to cool location (shade, A/C car, or building, etc.).**
  - **Loosen uniform/ remove BDU or ACU blouse/ remove head gear.**
  - **Have Medic, EMT, or CLS evaluate Soldier.**
    - > **Excessive water intake, large clear urination, poor food intake, vomiting, and/or distended abdomen? Give salty snack if conscious. Do not give water or IV in this scenario.**
    - > **Poor water intake, poor urination, etc.? Then have casualty sip cool electrolyte beverage as tolerated over twenty-thirty minutes. Do not force water.**
    - > **Medic takes vital signs, symptoms, mental status, and notes training environment conditions.**
  - **Evacuate if no improvement in 30 min, or if Soldier's condition worsens.**
  - **When in doubt, EVACUATE.**
  - **NOTE: The same person should observe the Soldier during treatment and evacuation in order to spot symptom changes.**

- **Check other Soldiers: reassess situation, and adjust training as necessary.**

- **Goal: prevent Heat Exhaustion from becoming Heat Stroke**

Treat: Heat Stroke (STOP-REST-COOL-CALL)

- **STOP. Stop activity.**
- **REST. Put conscious Soldier flat with feet elevated on a helmet, sand bag, etc. If unconscious, roll on one side (helps prevent casualty from choking on vomit).**
- **COOL.**
  - **Move to cool location (shade, etc.)**
  - **Strip BDU or ACU and boots off to underwear (t-shirt/briefs).**

    NOTE: Ensure a same gender helper is present, if possible.
  - **Immediately cool Soldier with iced sheets. Cover everything except the Soldier's face with the iced sheets. Ensure the iced sheet is soaked prior to applying to the casualty. Fan the entire body.**
  - **Stop cooling if shivering occurs.**
  - **CLS, EMT, or Medic evaluate casualty:**
    - > **History of excessive water intake, large clear urination, poor food intake, vomiting, and/or distended abdomen? Give salty snack if conscious. Do not give water or IV.**
    - > **Poor water intake, poor urination, etc.? Then have casualty sip cool electrolyte beverage as tolerated (if awake). Do not force water.**
    - > **If evac delayed >10 min, CLS/91W give 500 cc Normal Saline IV.**
- **CALL. Call for evacuation. Continue cooling enroute.**
- **Check other Soldiers. Treat any other Soldier with abnormal mental status as a heat stroke victim. Adjust training-uniform-equipment as necessary.**

Treat: Immediate, rapid cooling

Cooling is first priority- it can reduce death rate from 50% to 5%

- Lay Soldier flat with feet elevated.
- Strip BDU or ACU off to underwear (t-shirt/briefs). Life is more important than modesty!
- Apply iced sheets. Cover top of head and body with iced sheets.
- Soak with ice water.
- Fan.
- Massage large muscles while cooling.
- When sheets warm up, apply fresh, cold sheets or put them back into cooler and then reapply.
- 100% observation by the same Soldier.
- Stop cooling if shivering occurs or when rectal temp drops to 100 F. (Medic or EMT task)
- CLS, Medic, or EMT evaluate casualty before giving water or IV.
- Evacuate. Continue cooling enroute.

Iced Sheet Treatment

Stop cooling when casualty starts shivering or rectal temp is 100 F. (Medic or EMT task)

Basic load: 8 sheets/company in large cooler of ice water.

Soldier has suspected heat illness
(dizziness, headache, dry mouth, nausea, weakness, muscle cramps)
Are there?
Mental status changes?
OR
Vomits 2x or more?
OR
Unconsciousness > 1 minute?
OR
Rectal temperature >104º F (Medic or EMT task)?

NO

TREAT: Stop-Rest-Cool

- Loosen clothing
- Place Soldier in shade or cool area
- Provide fluids by mouth – 1 qt/30 Min min X 2
- Give salty snack

Soldier gets worse or does not improve in 30 minutes?

YES
Evacuate

NO

- **Limited indoor duty for remainder of day.**
- **Medical evaluation within 24 hours .**

YES

EVACUATE: Stop-Rest-Cool-Call

- **Place conscious Soldier flat with legs elevated in cool area. If unconscious, place Soldier on side.**
- **Strip clothing to underwear.**
- **Apply iced sheets, soak, & fan Soldier.**
- **Evaluate Soldier:**
  - **Too much water intake, urine output, vomiting? Give salty snack.**
  - **Poor water intake, urine output? Sip cool electrolyte drink. Never force water.**
- **IF evacuation delayed >10 min, only one 500 cc IV Normal Saline (IV preferably chilled in ice water).**
- **Stop cooling if shivering or rectal temp is 100 F. (Medic or EMT task).**
- **Reconfirm core temperature when evacuation arrives (EMT or Medic task).**

Field Expedient rapid cooling

- If no iced sheets are available, use any Field Expedient rapid cooling option at hand:
  - Creek or stream
  - Hole filled with cool, cold, or ice water
  - Poncho-lined hole filled with cool, cold, or ice water
- MUST have 100% constant supervision with a Soldier-helper holding the casualty's head.
- Stop cooling when casualty starts shivering or rectal temp is 100 F (Medic or EMT task)

Heat Injury Evacuation criteria

- Soldier treated with Iced Sheets due to presumed Heat Exhaustion or Heat Stroke
- Loss of consciousness or mental status changes
- Vomits more than once
- No improvement after 30 min of rest and hydration
- Gets worse during treatment
- Rectal temp >104 (Medic or EMT task)

- Evacuate any Soldier that requires cooling with iced sheets due to abnormal mental status

Water Intoxication (Hyponatremia)

- **Frequently occurs in IET units, especially during BCT/OSUT**
- **Mental status changes**
- **Vomiting**
- **History of consumption of large volume of water**
- **Poor food intake**
- **Abdomen distended/bloated**
- **Large amounts of clear urine**

- **Do <u>not</u> give more water or IV! If awake, allow Soldier to consume salty foods or snacks**

Medical Support Issues

- Some installations only have clinics instead of hospitals. Some have no Emergency Room.
- Some units have no organic ground ambulance support.
- What are alternatives?
  - Medical professionals train CLSs on heat injury evacuation decision guidance and iced sheet treatment.
  - Carry iced sheets. Plan on 8 sheets per company in large ice water cooler.
    NOTE: Wash wet sheets and clean cooler daily
  - Coordinate for non-military ambulance support (garrison or off-post).
    - What support can they provide?
    - What is their level of training?
    - Do they have gate access?
  - Coordinate unit transport as necessary.
  - Conduct tests to ensure 100% communication (Cell phone dead zones, radio interfaces).

Summary: What Decreases Heat Injury Risk?

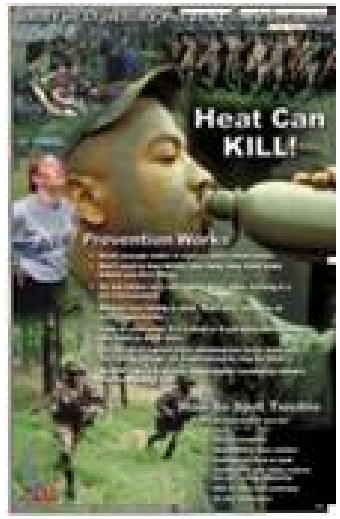
- Moving work to cooler times/places (always drink BEFORE early am runs).
- Adjust work-rest cycles (TR 350-29).
- Drink cool water frequently (but no more than 1.5 qts/hr or 12 qts/day).
- Eat food (vegetables, fruits, salty snacks, electrolyte-carb-protein beverages or gels* (every 4 hrs or less).
- Consume sufficient electrolytes (salty snacks, salty soups, electrolyte beverages or gels*).
- Ensure cooling capabilities (showers, fans).
- Adjusting clothing-equipment. Allow senior Leader/NCO on the ground to make the call.
- Wear sunscreen lotion (SPF 50, sweatproof, with vitamins).

* Gels must be consumed with water

Summary: What Increases the Risk for Heat Injuries?

- Pushing Soldiers who are showing heat symptoms.
- Requiring uniform and training change approval away from work site.
- Food deprivation.
- Not using previous 2 days of heat and workload to adjust training.
- Not reassessing unit & training when Heat Injuries occur.
- Not adjusting workload, rest breaks, uniform, and equipment to Heat Category.
- Not hydrating before early morning runs and throughout training day.
- Ineffective Attitudes/Myths:
  - "Breaking them in training prevents them from breaking in war."
  - "Working harder in heat prepares them for the desert."

- Reality:
  - Training IAW heat prevention doctrine prepares Soldiers for OIF and saves lives.
  - Do it right so Soldiers learn it right!



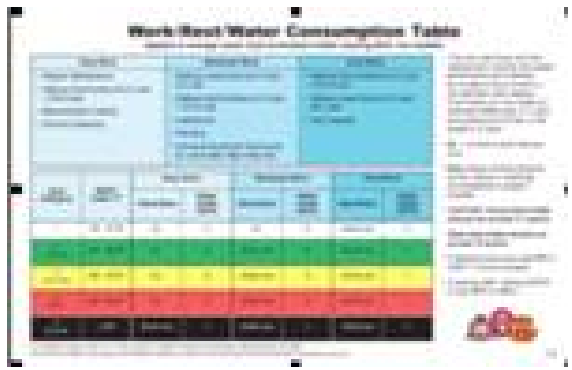
Heat Injury Prevention posters and cards at:

http://www.tradoc.army.mil/surgeon/index.htm

http://chppm-www.apgea.army.mil/heat/

Post posters in

- **barracks**
- **bathrooms**
- **DFACs**
- **Training areas**



Download Heat Injury Risk Management Videos

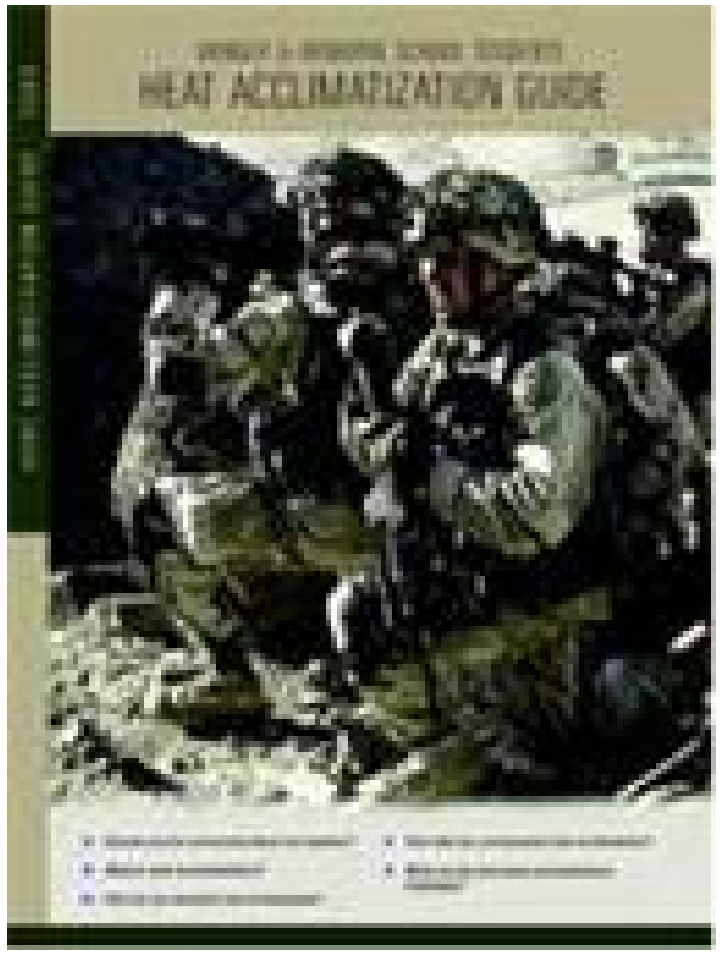
https://crc.army.mil/

Order videos at:
http://dodimagery.afis.osd.mil/davis/

Search by title or PIN and order

1. Heat Injury Risk Management (PIN 711658)
2. Heat Injury part II Prevention & Treatment (PIN 711839)

Questions?



BACK-UP

Optional Group AAR Exercises

- Apply the Heat Injury Prevention Risk Management steps to the following scenarios as a group AAR.
- Any scenario will not always have every last detail or fact you might think is important. Use this as an opportunity to discuss the issue.
- An alternative is to use the scenarios as a "What do you do now?" exercise.

Exercise 1: Post-FTX 15k march

- **SITUATION**: A BCT company is at the 5k point on a 15k march from the FTX site to the barracks at 0300 hours in a regular formation. It is Week 9.
- WBGT: It is WBGT 3 (Yellow). It has been WBGT 3 all week.
- **UNIFORM/EQUIPMENT**: Soldiers are wearing BDUs, helmets, and 40 pound backpacks. Sleeves are down and pants are bloused.
- **EXERCISE/WORKLOAD**: Soldiers have been training all day since 0500 to include a night exercise.
- **SOP**: Installation SOP requires the installation CDRs approval for any uniform or POI changes.
- **SUPPORT**: Unit does not have organic medical support. Ambulance service is provided by a local civilian hospital 20 minutes away. Each platoon has CLS-trained Drill NCOs.
- **EVENT**: 4 Soldiers collapse. The CLS concludes they have heat stroke and immediately begins iced sheet rapid cooling. 4 Soldiers are evacuated, cooling enroute.

- **Conduct an AAR**.

  - ❑ What actions IAW the Risk Management process should have been taken?
  - ❑ What actions should you as the senior leader on the ground take NOW?

NOTE: Recommendations on the NOTES page.

Exercise 2: Rifle Range

- **SITUATION**: An OSUT company is on a 5k march from the rifle range to the barracks at 1500 hours in a regular formation. Pace is 2.5 mph on a hard surface. It is Week 4.
- **WBGT**: It is WBGT 2 (Green). It has been WBGT 3/4 previous 3 days.
- **UNIFORM/EQUIPMENT**: Soldiers are wearing BDUs, patrol caps, web belts with canteens and ponchos, and rifles. Sleeves are down and pants are bloused.
- **EXERCISE/WORKLOAD**: Soldiers have been training all day since 0500. They took the PT test yesterday and the obstacle course the previous day.
- **SOP**: Installation SOP allows the Senior Leader on-the-ground to make any uniform or POI changes to reduce the heat load.
- **SUPPORT**: Unit does not have organic medical support (field ambulance and Medic/EMT). Ambulance service is provided by a local civilian hospital 20 minutes away. Each platoon has CLS-trained Drill NCOs.
- **EVENT**: Pvt Alpha wanders off into the tree line and is talking to the trees, mumbling incoherently. The Platoon NCO, SSG November, puts Pvt Alpha back into the marching formation at the head of the formation "to slow the march pace down." Pvt Alpha wanders off again, talking to himself, unresponsive to questions.

- **Conduct an AAR**.

  - ❑ What actions IAW the Risk Management process should have been taken?
  - ❑ What actions should you as the senior leader on the ground take NOW?

  NOTE: Recommendations on the NOTES page.

Exercise 3: Training

- **SITUATION**: A BCT company was doing a 3k road march in a regular formation at 1400 hrs (June). Pace is 3.5 mph on an asphalt road. It is Week 2.
- **WBGT**: It is WBGT 2 (Green)(84° WBGT). It has been WBGT 2 the previous 3 days.
- **UNIFORM/EQUIPMENT**: Soldiers are wearing BDUs, patrol caps, body armor without plates, web belts with canteens and ponchos, and rifles. Sleeves are down and pants are bloused.
- **EXERCISE/WORKLOAD**: Soldiers have been training all day since 0500. Last 3 days have been classroom training.
- **SOP**: Installation SOP allows the Senior Leader on-the-ground to make any uniform or POI changes to reduce the heat load.
- **SUPPORT**: Ambulance service is provided by a local military hospital. Each platoon has CLS-trained Drill NCOs.
- **EVENT**: Pvt Bravo collapses and is unconscious for >5 minutes. The SGT Delta, the Platoon CLS, thinks it is a Heat Stroke and starts Rapid Cooling. Pvt Bravo regains consciousness after 5 minutes and appears ok. SGT Delta takes Pvt Bravo to the BN medic's office to get his opinion, but the medic is not in. SGT Delta then takes Pvt Bravo to the BDE medic to get her opinion, but she is not in. Finally, as Pvt Bravo's condition worsens, SGT Delta takes him to the hospital at 1700 hrs.
- **Conduct an AAR**.

  - ❑ What actions IAW the Risk Management process should have been taken?
  - ❑ What actions should you as the senior leader on the ground take NOW?

  NOTE: Recommendations on the NOTES page.

Exercise 4: Qualifying

- SITUATION: Officers enroute from other installations to OIF are qualifying on the M16 on your installation. They have been bused to the range in an A/C bus. A Range Control Officer is in charge of the range.
- WBGT: It is WBGT 4 (RED). It has been WBGT 4 the previous 3 days.
- UNIFORM/EQUIPMENT: Soldiers are wearing BDUs, helmets, body armor with plates, and rifles. Sleeves are rolled up and pants are bloused.
- EXERCISE/WORKLOAD: Soldiers have been processing all day indoors in A/C since 0500.
- SOP: Installation SOP requires any uniform or POI changes to reduce the heat load to be made by Post HQ.
- SUPPORT: Ambulance service is provided by the local military hospital. An ambulance with a Medic/EMT is on the range.
- EVENT: MAJ Echo, a nurse enroute to OIF, goes to the LTC Charlie, the Range OIC, and reports she feels ill. She fails to tell the OIC she is a previous heat injury. The OIC directs her to hydrate and to continue qualifying. MAJ Echo moves on to the range, begins firing, and collapses unconscious. The medic, SP4 Whiskey, puts MAJ Echo in the A/C bus, does not have Rapid Cooling supplies, and attempts to start an IV 3 times without success. He advises LTC Charlie he needs a MEDEVAC immediately. LTC Charlie declines the request, stating a MEDEVAC will close the range, throwing off the training schedule, and he will get in trouble if he has an heat injury on the range. SP4 Whiskey loses MAJ Echo's pulse and starts CPR, requesting a MEDEVAC again. LTC Charlie requests the MEDEVAC.
- Conduct an AAR.
-

  - ❑ What actions IAW the Risk Management process should have been taken?
  - ❑ What actions should you as the senior leader on the ground take NOW?

  NOTE: Recommendations on the NOTES page.

WBGT

WBGT Kit with Tripod

NSN 6665-01-381-3023

Electrolyte Beverage Considerations

Electrolyte carb/protein gels

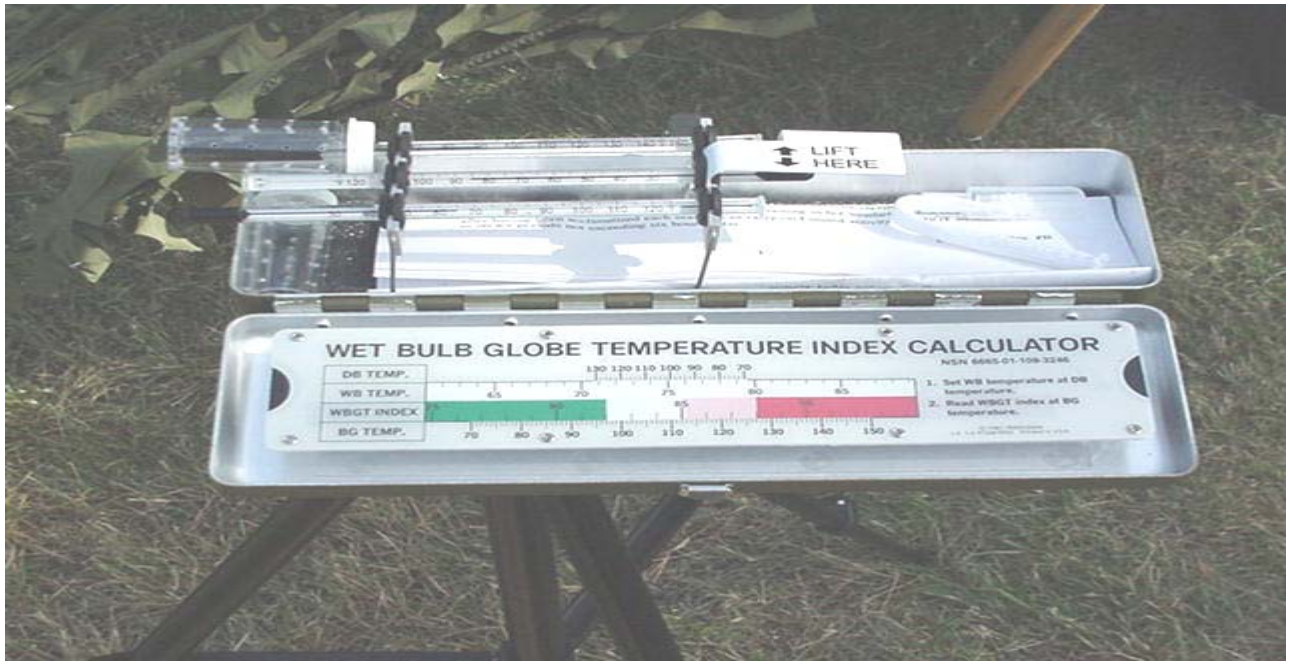
Electrolyte carb/protein beverages

- Stock electrolyte beverages in training area vending machines.
- Authorize Soldiers to buy/use electrolyte beverages in PX.
- Do NOT stock beverages with caffeine or herbal supplements. Avoid high-acid citrus flavors.
- Example good beverages:
  - AccelerAde® (adds protein)(reduces muscle damage)
  - GatorAde ® Endurance
  - PowerAde ®
- Authorize Soldiers to buy/use electrolyte gels. Gels MUST be used with water! They can be mixed into canteens or hydration packs.
- Do NOT stock gels with caffeine, herbal supplements, or whose single serving provides >100% of any fat-soluble vitamins (A,D, E).
- Example gels:
  - AccelerAde ® (adds protein)
  - Carb Boom Pro ® (adds protein)
  - Cliff Shot ®
  - GU ®
  - Powerbar® PowerGEL ®

NOTE: Brand names and images are for illustration only. It does not constitute endorsement by the Army.

Drug or drug class	Proposed mechanism of action
Anticholinergics	Impair sweating
Antihistamines	Impair sweating
Gluthemide	Impair sweating
Phenothiazines	Impair sweating, (possibly) disturbed hypothalamic temperature regulation
Tricyclic Antidepressants	Impair sweating, increased motor activity and heat production
Amphetamines, Cocaine	Increase psychomotor activity, activate vascular endothelium
Ergogenic aids	Increase heat production
Lithium	Nephrogenic diabetes insipidus and water loss
Diuretics	Salt depletion and dehydration
Beta-blockers	Impair sweating, reduced skin blood flow, reduced blood pressure
Ethanol	Diuresis, possible effects on intestinal permeability

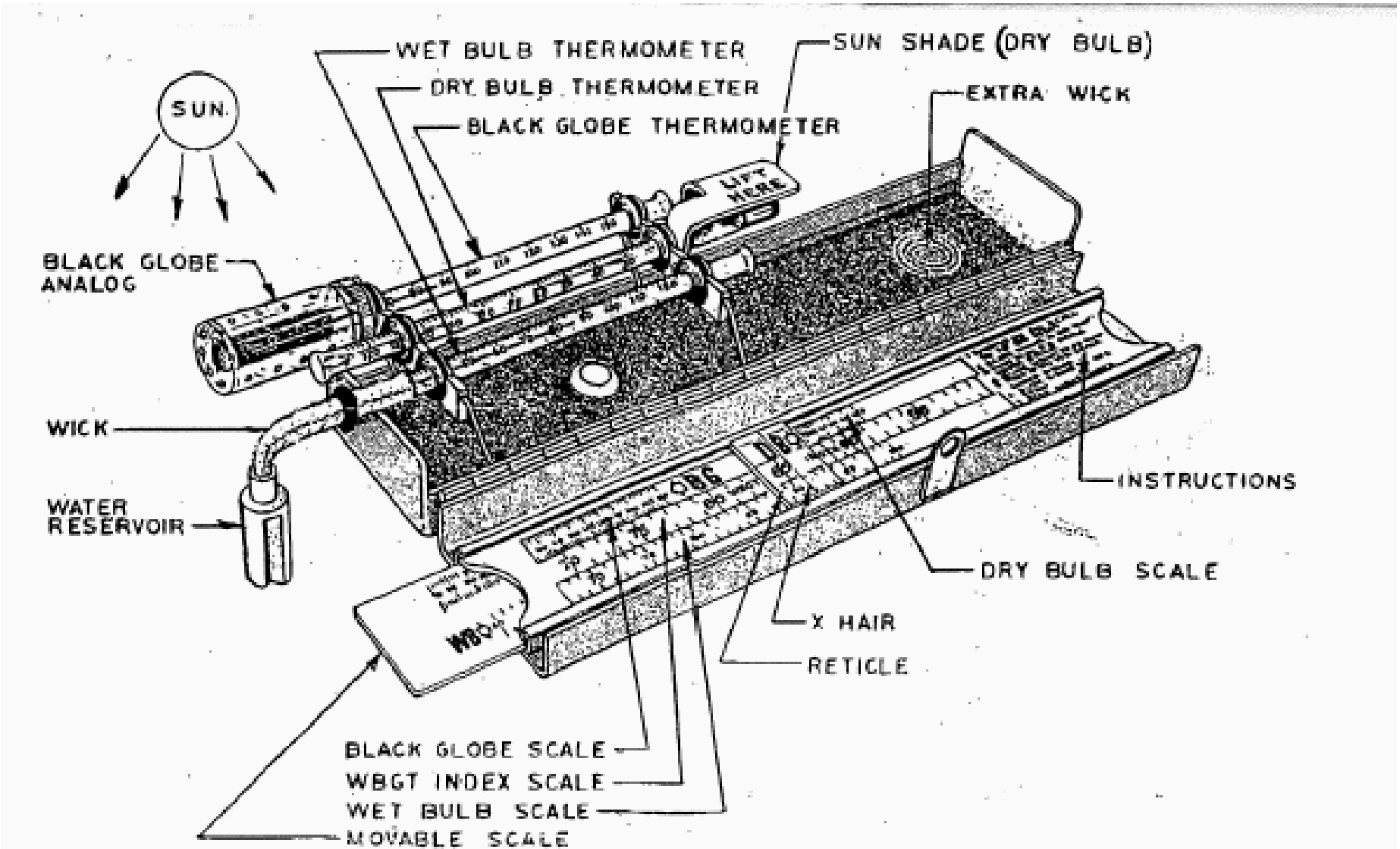
WBGT



WBGT Kit: NSN 6665-00-159-2218

WBGT Kit with Tripod: NSN 6665-01-381-3023

NSN Source: FM 4-25.12


SUN.
WET BULB THERMOMETER
DRY BULB THERMOMETER
BLACK GLOBE THERMOMETER
SUN SHADE (DRY BULB)
EXTRA WICK
BLACK GLOBE ANALOG
WICK
WATER RESERVOIR
INSTRUCTIONS
DRY BULB SCALE
X HAIR
RETICLE
BLACK GLOBE SCALE
WBGT INDEX SCALE
WET BULB SCALE
MOVABLE SCALE

Instructions on use of the Wet Bulb Globe Thermometer

D-1. Background. The WBGT guidance provided in this appendix is for units in garrison, and in the field, that will conduct continuous activity in hot weather. It provides practical guidance to obtain optimal work and training productivity for acclimatized and unacclimatized personnel. Readings from the WBGT can differ at various locations throughout an installation. Depending on the wind speed, humidity, and cloud cover, the WBGT index can be different in a wooded area, as opposed to an open field. Because of these influencing factors, WBGT readings must be taken in the immediate vicinity of the activity site, and read every hour.

D-2. General instructions, Wet Bulb Globe Temperature Index (FSN 6665-159-2218).

a. The wet bulb-globe temperature kit is an instrument for providing information on hot weather risks affecting the health of troops undergoing training. The information is in the form of an index computed by the weighted readings obtained from three different thermometers (see figure D-1):

(1) The stationary wet bulb (WB) thermometer, with the bulb covered by a moistened, white absorbent wick, is exposed to the sun and prevailing wind.

(2) A similarly exposed "black globe" (BG) thermometer, with copper sheath painted black, that is enclosed in a perforated shield.

(3) A dry bulb (DB) thermometer, with bulb shielded from the direct rays of the sun by an aluminum shield.

Figure D-1. Wet Bulb Globe Thermometer

b. The index is computed as follows:

WBGT = 0.7 WB temperature + 0.2 BG temperature + 0.1 DB temperature

The three readings are added on the attached slide rule, with the weighting of each automatically achieved by the proportional scale sizes.

c. The thread in the bottom of the case is for attachment to a standard lightweight photographer's tripod (not supplied with this kit).

(1) Open kit by depressing box gently to disengage the latch.

(2) Position thermometer assembly up and out (see figure D-1). NOTE: Examine the bore of each thermometer. If the liquid has separated, heat the thermometer bulb slowly and carefully until the liquid reunites.

(3) Wet the bulb wick thoroughly. NOTE: The little bottle may be filled with clean, preferably deionized or distilled water, and utilized as indicated in figure D-1. The water should be changed daily and the wick washed with soap and water. To avoid erroneous readings, the water and wick must be free of salt and soap.

(4) Hold the kit with thermometers toward the sun, with the "black globe" thermometer closest to the sun. Wait 10 minutes for stabilization of temperatures.

(5) Review instructions on face of the slide ruler assembly. Assume for purposes of instruction that BG reading is 120, DB reading is 100, and WB reading is 80:

(a) Move 70 on BG scale to 70 on WBGT scale.

(b) Slide X-hair to 120 on BG scale.

(c) Move 70 on DB scale under X-hair.

(d) Slide X-hair to 100 on DB scale.

(e) Move 70 on WB scale under X-hair.

(f) Slide X-hair to 80 on WB scale.

(g) Read WBGT index. NOTE: If calculations have been performed correctly, the index should read 90.

D-3. Replacement parts. Replacement parts for WBGT are listed in table D-1.

Table D-1
Replacement parts

ITEM	**WEKSLER PART NO.**
Black Globe Thermometer	23-68
Web Bulb Thermometer	23-69
Dry Bulb Thermometer	23-70
Braided Wick	29-40
Water Reservoir	M27-562
Transparent Perforated Shield (Black Globe Analog)	M12-979
Receiver, Radiant Energy	M12-978

Determining the Heat Index

WBGT

Wet Bulb (WB) = humidity

Black Globe (BG) = solar load

Dry Bulb (DB) = ambient temperature

Taking WBGT Measurements

- **Location of WBGT Device**
  - same vicinity of training or mission, or similar environment (open field, wooded area, etc)
- **Position of Device**
  - 4 feet off ground (use tripod); away from metallic objects
- **Calculating the WBGT Using the Slide Rule**
  - Set WB Temp. at the DB Temp.
  - Read WBGT Index at the BG Temp.

*** Cannot calculate a “no solar” WBGT Index using slide rule.**

Calculating the WBGT Manually

With a Solar Load (Outdoors with partial to full sun)

WB Temp. X 0.7

BG Temp. X 0.2

DB Temp. X 0.1

Example

- If the wet bulb temperature reading is 82° F, the black globe temp. is 95° F, and the dry bulb is 90° F:

WB 82° F x 0.7 = 57.4

BG 95° F x 0.2 = 19.0

DB 90° F x 0.1 = 9.0

WBGT Index = 85.4

Calculating the WBGT Manually

- Without Solar Load (Indoors or complete overcast; no sun)

WB Temp. X 0.7

BG Temp. X 0.3

Dry bulb temperature is not used; Black globe value is multiplied by 0.3 Instead of 0.2.

Example

If the wet bulb temperature reading is 82° F and the black globe is 90° F:

WB 82° F x 0.7 = 57.4

BG 90° F x 0.3 = 27.0

WBGT Index = 84.4