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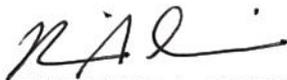
Training

PREVENTION OF HEAT AND COLD CASUALTIES

FOR THE COMMANDER:

OFFICIAL:

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History. This publication is major revision. The portions affected by this revision are listed in the summary of change.

Summary. This regulation prescribes policy and provides guidance to commanders in preventing environmental (heat or cold) casualties.

Applicability. This regulation applies to all Active Army and Reserve component training conducted at service schools, Army training centers, or other training activities under Headquarters, U.S. Army Training and Doctrine Command (TRADOC) control.

Proponent and exception authority. The proponent for this regulation is the Deputy Chief of Staff, TRADOC. The proponent has the authority to approve exceptions or waivers to this regulation that are consistent with controlling law and regulations.

Army management control process. This regulation does not contain management control provisions.

Supplementation. Supplementation of this regulation and establishment of command and local forms are prohibited without prior approval from the Command Surgeon's Office, TRADOC, ATTN: ATBO-M, 950 Jefferson Avenue, Fort Eustis, Virginia 23604-5750.

*This regulation supersedes TRADOC Regulation 350-29, 6 July 2012.

Suggested improvements. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) through channels to Command Surgeon's Office, TRADOC, ATTN: ATBO-M, 950 Jefferson Avenue, Fort Eustis, Virginia 23604-5750. Suggested improvements may also be submitted using DA Form 1045 (Army Ideas for Excellence Program (AIEP) Proposal).

Availability. This publication is distributed solely through the TRADOC Homepage at <http://www.tradoc.army.mil/tpubs/>.

Summary of Change

TRADOC Regulation 350-29
Prevention of Heat and Cold Casualties

This major revision, dated 18 Jul 2016 -

- o Adds requirements related to the heat illness prevention subcommittee of the executive safety council; and to ensure assigned safety and medical professionals are familiar with both safety and medical terminology and reporting requirements (paras 1-3b, c, and d).
- o Adds requirements for commanders at brigade and unit level to establish standing operating procedures to incorporate requirements/procedures contained in this regulation (paras 1-3e(1) and 1-3f(2)).
- o Replaces references to "Commander's, Senior NCO's and Instructor's Guide to Risk Management of Heat Casualties" with content in Appendix B.
- o Replaces references to "Unit Leader's and Instructor's Risk Management Steps for Preventing Cold Casualties" with content Appendix C.
- o Aligns informational matter with deliberate risk management processes, and consolidates informational matter into Appendixes B and C.
- o Updates and incorporates Deliberate Risk Assessment factor worksheets into risk management appendixes B and C.
- o Reorders appendixes (control measures first, then treatment measures) (apps B and C).
- o Aligns instructions on use of iced sheets with Training Circular 4-02.1 (First Aid) (paras B-2b(2)(d) and F-1c(2)).
- o Removes references to use of parachute ("550") cord for marking Soldiers who are at risk for heat and cold injury, and monitoring hydration status (app E).
- o Incorporates safety-related terminology and reporting requirements (app G).
- o Updates terminology and references throughout.

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Chapter 1

Introduction

1-1. Purpose

This regulation prescribes policy and provides guidance to commanders for preventing environmental (heat or cold) casualties.

1-2. References

Appendix A contains required and related publications and referenced forms.

1-3. Responsibilities

Commanders and supervisors at all levels are responsible for protecting Soldiers and civilian personnel from the adverse effects of heat and cold, and for ensuring subordinate leaders are trained in recognition and treatment of heat illness and cold injury.

a. Deputy Chief of Staff, G-3/5/7. Publish tasking orders annually reinforcing the requirement to conduct heat illness and cold injury prevention and treatment training (see paras 1-3b(2), 1-3d(7), and 1-3e(1) and (2) below.

b. U.S. Army Training and Doctrine Command (TRADOC) Surgeon.

(1) Co-chair the heat illness prevention subcommittee of the executive safety council.

(2) Prepare and disseminate memorandums on behalf of CG, TRADOC prompting compliance among TRADOC subordinate commands with heat illness and cold injury prevention training each year.

c. TRADOC Safety Director. Co-chair the heat illness prevention subcommittee of the executive safety council.

d. Commanders of major subordinate commands, TRADOC school/center/activity commanders and commandants, directors, and staff principals.

(1) Ensure appropriate hot weather and cold weather protective items (clothing, shelter) are available to Soldiers.

(2) Ensure potable (drinking) water, ice, and supplemental beverages are available to Soldiers. Plan for 3 gallons of water per day per Soldier for drinking. Consider alternating between water and carbohydrate-electrolyte beverage especially in hot and humid conditions (see para E-3 below).

Note. Three gallons per day per Soldier for drinking is 12 quarts per day, the maximum (i.e., not to exceed); see table B-1.

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(3) Ensure medical support and evacuation plans are tested at least semiannually (see TRADOC Regulation (TR) 350-6, para 3-9c) and evaluate compliance with the emergency medical services (EMS) goal of injured personnel to arrive at an EMS facility within 1 hour of any incident (see TR 350-6, Appendix H-2b).

(4) Establish policy for hourly measurement of wet bulb globe temperature (WBGT) when ambient temperature is over 75 °F.

(5) Establish guidance for adjustment of training schedules, locations, and intensity, based on the prior 2 days' physical activity and heat category.

(6) Establish coordination between the medical treatment facility and training organizations for assistance from preventive medicine service to:

(a) Present annual training (see paras 2-2 and 3-2).

(b) Assist in development of local risk management worksheets (see appendixes B and C).

(6) Report heat illnesses and cold injuries in accordance with TR 1-8, para 2-2a(5).

(7) Report compliance with heat illness prevention and treatment training prior to 15 April each year, and cold injury prevention and treatment training prior to 15 October each year, to the TRADOC Surgeon at usarmy.jble.tradoc.mbx.hq-tradoc-g-1-4-surgeons.

(8) Provide safety and medical professional representation to the heat illness prevention subcommittee of the executive safety council.

(9) Ensure assigned safety and medical professionals are familiar with both safety and medical terminology and reporting requirements (see appendix G).

(10) Ensure that local policy guidance includes heat illness as a risk factor throughout the year. Although the definition of "heat season" as 1 May through 30 September each year is generally appropriate at most US Army installations, exertional heat illnesses (EHI) are a year-round problem, with varying severity depending on the installation; approximately 17% of all EHI occur outside of the heat season (see appendix I).

e. Brigade commanders.

(1) Establish standing operating procedures to incorporate requirements/procedures contained in this regulation and establish techniques, protocols, and authorities for application of specific controls/mitigation measures such as those identified at appendixes E and F.

(2) Conduct heat illness prevention and treatment training for all subordinate leaders prior to 15 April each year.

(3) Conduct cold injury prevention and treatment training for all subordinate leaders prior to 15 October each year.

(4) Adjust training schedules (for example, train during the cooler part of the day) and locations (for example, indoors or in the shade) as needed to protect Soldiers against extremes of heat and cold.

(5) Refer to TR 385-2, para 1-5b, when making decisions on risk.

f. Unit leaders.

(1) Establish standing operating procedures to incorporate requirements/procedures contained in this regulation and establish techniques, protocols, and authorities for application of specific controls/mitigation measures such as those identified at appendixes E and F.

(2) Ensure Soldiers adhere to each of the elements of the “performance triad,” i.e., sleep, activity, and nutrition, to help defend against heat illnesses and cold injuries.

(a) Sleep is vital for health, performance, and wellbeing. Proper sleep hygiene practices (i.e. that promote optimal sleep duration and quality) are important for everyone. Soldiers need at least 7-8 hours of sleep every night. The better the sleep, the greater its benefits.

(b) Physical activity is essential to Soldiers’ performance, physical readiness, and health. This includes fitness level, exercise and workout plan, and movement throughout the day.

(c) Performance fueling requires “nutrient rich meals” and builds on nutritional fitness. Choosing nutrient-rich foods supports muscle growth, recovery, tissue repair, and immune function, and will improve mental and physical performance.

(3) Utilize field sanitation team members to monitor conditions of cold and heat and advise on risk factors (see TR 350-6, para 3-15).

(4) Ensure Soldiers' clothing and equipment is present and serviceable prior to the training day; recommend modifications of the uniform to senior leadership, based on local conditions.

(5) Identify and mark Soldiers who are at risk for heat illness and cold injury (see appendix E).

(6) Monitor conditions of heat and cold on the training site (see TR 350-6, para H-10b(2)). Recommend modifications for scheduling, location, and uniform to senior leadership.

(7) Plan for alternate activities and locations for conditions of extreme heat and cold (for example, physical activity or warming shelters in case of extreme cold).

(8) Be prepared to apply iced sheets in case of heat illness. See appendix F for procedures on use of iced sheets.

(9) Ensure Soldiers drink sufficient amounts of fluids and consume all their meals. Encourage Soldiers to drink frequently in small amounts and observe their fluid intake.

Note: The use of hydration salts is NO longer recommended. With proper fueling, and the use of available carbohydrate electrolyte solution and water, there is no need for hydration salts. Sodium and other electrolyte requirements are better met by ensuring Soldiers have adequate time (10-12 min) to consume their meals. See para E-3 below.

(10) Ensure Soldiers maintain their supply of sunscreen and apply it daily when needed.

(11) Develop and enforce work/rest cycles, guard rotation, and sleep plans during extended training hours.

(12) Be prepared to treat and evacuate Soldiers who demonstrate signs of heat illness or cold injury.

(13) Remind Soldiers to observe their buddies for signs of heat illness or cold injury (see TR 350-6, para 3-2a).

(14) Reevaluate the training mission if two or more heat illnesses occur at a given training site on the same day.

(15) Leaders at all levels are responsible for the care rendered by their subordinates to heat and cold casualties until fully recovered or transferred for definitive medical care.

Chapter 2

Heat illness risk basics and training resources

2-1. Basics of heat illness risk

a. The hazard. Exposure to high environmental temperature reduces the body's capacity to expel ("dump") heat. The body stores heat that it generates during work; as it attempts to compensate to environmental temperature, physiological strain or heat load results. This load, especially in the presence of continued work, dehydration, and fatigue, may lead to heat illness. Environmental conditions, namely air temperature (the temperature of surrounding objects), mass of water vapor in air in the air (humidity), and air movement influence the heat equilibrium of the body and its physiologic adjustments. There are minor and major types of heat illnesses, as follows (see para G-2a for fuller descriptions of heat illnesses).

(1) Minor heat-related illnesses and conditions include heat edema, miliaria rubra, sunburn, heat tetany, parade syncope (heat syncope), heat cramps, and heat exhaustion. (Note: heat exhaustion, though minor, is a reportable medical condition; see para G-2a(1).)

(2) Major heat illnesses include exertional heat illness (EHI), exertional rhabdomyolysis, and heat stroke. The diagnostic categories of heat exhaustion, EHI, and heat stroke have overlapping features and should be thought of as parts of a continuum.

Note. The descriptor “exertional” differentiates the form of heat illness experienced by physically active persons who are producing substantial metabolic heat loads (commonly among military personnel and athletes) from the “classical” form that occurs in vulnerable populations (young children, elderly persons, and those without drinking water), frequently with impaired thermoregulation due to illness or medication, exposed passively to heat, and often dehydrated; and often presents as an epidemic during urban heat waves.

b. The defense. The body rids itself of heat normally through the skin and by exhaled breath, constituting heat relief. Some heat is discharged by radiation from the skin, but the body relies mostly on evaporation of sweat from the skin to cool. The adverse impact of high environmental temperature can be reduced by resting after exposure to heat (proper work/rest ratios), becoming acclimatized to heat, drinking enough fluid, wearing clothing properly, and maintaining a high level of fitness. These measures contribute to the body’s normal mechanisms for dumping heat. Individuals can also dump heat) by spending time in air-conditioned-space, showering in cool water, and immersing their arms in cold water.

c. Acclimatization. Most Soldiers’ physiological responses to heat stress improve in 10-14 days of exposure to heat and regular strenuous exercise. Factors to consider in acclimatizing Soldiers are the WBGT index (see Appendix D); work rates and duration; uniform and equipment; and Soldiers’ physical and mental conditions.

2-2. Heat illness prevention training

a. The following resources are available:

(1) Army Public Health Center web site
(<https://phc.amedd.army.mil/topics/discond/hipss/Pages/HeatInjuryPrevention.aspx>).

(2) Joint Training Counter-Improvised Explosive Device (IED) Operations Integration Center – Training Video "Death of a Soldier: Heat Can Kill" (2011) (18:12)
<https://www.youtube.com/watch?v=xTSdM2MM64k>.

(3) U.S. Army Combat Readiness/Safety Center Seasonal Safety Campaigns website,
<https://safety.army.mil/MEDIA/SeasonalSafetyCampaigns.aspx>.

(4) Training Brain Operations Center – Training Video “Heat Can Kill 2” (2011) (14:42)
<http://www.youtube.com/watch?v=xOtcM2FIJdo>.

b. Heat illness prevention materials are available from the TRADOC Surgeon’s Army Knowledge Online (AKO) file (<https://www.us.army.mil/suite/folder/34737450>).

c. Risk management process. See Appendix B.

Chapter 3

Cold injury risk basics and training resources

3-1. Basics of cold injury risk

a. The hazard. The body loses heat by radiation, convection, conduction, and evaporation. Radiation of heat occurs when surrounding objects have lower surface temperatures than the body and is independent of air/water motion. Convection of heat occurs by the movement of a gas/liquid over the body, whether induced by body motion or natural movement of air (wind) or water, when air/water temperature is below body temperature. Conduction of heat occurs between two objects that are in direct contact and have different surface temperatures. Evaporative heat loss occurs when liquid turns to water vapor, i.e., with sweating and respiration. Evaporative cooling from sweating is useful in hot weather but problematic in cold weather, especially when sweat is trapped within clothing and diminishes the clothing's insulation. Cold weather-related injuries include the following (see para G-2b for fuller descriptions of cold weather-related injuries):

(1) Injuries due to decreased temperature (hypothermia, frostbite, nonfreezing cold injury).

(2) Impaired thermoregulation caused by an injury to the brain, peripheral nervous system, or other part of the body.

(3) Injuries due to heaters, carbon monoxide poisoning, and accidents due to impaired physical and/or mental function resulting from cold stress. Cold weather injuries can also occur in warmer ambient temperatures when an individual is wet due to rain or water immersion.

b. The defense. The body's normal response to the cold is to constrict the blood vessels in the skin and remote parts of the extremities, reducing heat loss and conserving warmed blood for the vital organs. The body may activate shivering to increase heat production for this purpose. Actions to aid the body's defenses against the cold include dressing properly for cold and cold/wet conditions, especially during low activity (such as lying on the ground); adding clothing in layers for cold and inactivity; removing layers for increased temperatures and activity in order to prevent sweating; staying well-nourished so the body has enough fuel; and drinking plenty of fluids, which is important in maintaining the circulation volume.

c. Acclimatization. Soldiers do not respond physiologically to cold exposure the same as to heat exposure. The adjustments to cold exposure are less pronounced, slower to develop, and less practical in terms of relieving strain. For this reason, it is more important for leaders to ensure Soldiers are properly clothed for the cold and wet, adjust the uniform requirements depending on activity, and provide for external warming measures (heated shelter).

3-2. Cold injury prevention training

a. The following resources are available:

(1) Army Public Health Center web site
(<https://phc.amedd.army.mil/TOPICS/DISCOND/CIP/Pages/ColdCasualtiesInjuries.aspx>).

(2) U.S. Army Combat Readiness/Safety Center Seasonal Safety Campaigns website,
<https://safety.army.mil/MEDIA/SeasonalSafetyCampaigns.aspx>.

(3) Cold weather injury prevention materials are available from the TRADOC Surgeon's
AKO file (<https://www.us.army.mil/suite/folder/24486772>).

b. Risk management process. See Appendix C.

Appendix A References

Section I Required Publications

TR 1-8
U.S. Army Training and Doctrine Command Operations Reporting

TR 385-2
U.S. Army Training and Doctrine Command Safety Program

Army Public Health Center (Provisional) TA-010-0711
HIP Pocket Guide (Heat Injury Prevention Pocket Guide)
<https://usaphcapps.amedd.army.mil/hioshoppingcart/> (order) or
<https://www.us.army.mil/suite/folder/34737450> (download and print)

Section II Related Publications

Armed Forces Medical Reportable Events – Guidelines & Case Definitions
Accessible at
http://afhsc.army.mil/documents/pubs/documents/TriService_CaseDefDocs/ArmedForcesGuidlinesFinal14Mar12.pdf

Army Public Health Center (Provisional) Training Aids
Are You Hydrated? Take the Urine Color Test Card
Are You Hydrated? Take the Urine Color Test Poster
Heat Can Kill (for Trainees) (poster)
Heat Can Kill Sticker

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Heat Injury Controls Poster

Sun Card

Sun Protection Poster

Work/Rest Times and Fluid Replacement Poster

<https://usaphcapps.amedd.army.mil/hioshoppingcart/> (order) or

<https://www.us.army.mil/suite/folder/34737450> (download and print)

Army Regulation 350-1

Army Training and Leader Development

Army Tactics, Techniques, and Procedures 3-97.11

Cold Region Operations

Field Manual 4-02.17

Preventive Medicine Services

Army Techniques Publication 4-25.12

Unit Field Sanitation Teams

Army Techniques Publication 5-19

Risk Management

Field Manual 21-10

Field Hygiene and Sanitation

Graphic Training Aid 05-08-012

Individual Safety Card

Training Circular 4-02.1

First Aid

Technical Bulletin MED 507

Heat Stress Control and Heat Casualty Management

Technical Bulletin MED 508

Prevention and Management of Cold-Weather Injuries

Technical Manual 10-8465-236-10

Operator's Manual for Modular Lightweight Load-Carrying Equipment (MOLLE) II

TR 350-6

Enlisted Initial Entry Training Policies and Administration

Heat Illness Prevention (Army Public Health Center (Provisional) webpage)

<http://phc.amedd.army.mil/topics/discond/hipss/Pages/HeatInjuryPrevention.aspx>

Cold Injury Prevention (Army Public Health Center (Provisional) webpage)
<http://phc.amedd.army.mil/topics/discond/cip/Pages/ColdCasualtiesInjuries.aspx>

Section III

Referenced Forms

Department of the Army (DA) Form 1045
Army Ideas for Excellence Program (AIEP) Proposal

DA Form 2028
Recommended Changes to Publications and Blank Forms

DD Form 2977
Deliberate Risk Assessment Worksheet

Appendix B

Heat Illness Risk Management and Casualty Identification and Treatment

B-1. Heat illness risk management

a. Identify the hazards.

(1) Know the WBGT. See appendix D for detailed instructions on use of WBGT equipment.

(2) Know the risk factors for exertional heat illness (EHI). Most commonly thought of risk factors are the climate/temperature and the level of physical activity/exertion, however there are numerous individual risk factors to be aware of – especially consider when a single individual has more than one of the listed risk factors.

(a) Environment:

- Higher temperature
- High humidity (WBGT)

(b) Activities:

- High exertion
- Heavy loads/gear
- Repeated strenuous days

(c) Lack of acclimatization: Acclimatization requires aerobic exercise in a warm environment. The body needs to adjust to environmental heat stressors prior to high exertion activities; simply being outside doing normal activities is not sufficient.

(d) Individual risk factors for EHI:

- Poor fitness (2 mile run > 16 minutes)
- Body mass index > 26
- Age > 40
- Gender (female)
- Minor illness
- Medication: Antihistamines (e.g., Benadryl, Atarax, Chlor-Trimeton), decongestants (e.g., Sudafed); high blood pressure medications (e.g., diuretics, beta blockers); psychiatric drugs (e.g., tricyclic antidepressants, antipsychotics). There is currently no scientific evidence that caffeine, energy drinks, "fat burners," or dietary supplements affect the body's ability to regulate heat.
- Alcohol in the past 24 hours
- Prior heat injury
- Skin rash, sunburn, or poison ivy
- Blood donation (< 3 days)
- Sleep deprived
- Highly motivated – the desire to meet or exceed standards may lead some Soldiers to continue to push themselves as early signs/symptoms of EHI occur. These Soldiers should not be discouraged from pushing themselves but cadre should be aware of their tendency so that they can be watched more closely.

b. Assess the hazards.

(1) Utilize the WBGT temperature index (see tables B-1 and B-2).

(a) Add 5 °F for rucksack or body armor.

(b) Add 10 °F if in mission-oriented protective posture (MOPP) 4.

Note. Table B-1 provides work/rest and fluid replacement guidelines for heat-acclimatized Soldiers in a training environment (average Soldier wearing combat uniform). The guidelines support at least 4 hours of work. Three time-weighted work intensities are provided representing easy (~250 watts (W)), moderate (~425 W), and hard (~600 W) military tasks; examples are provided. The users should determine the existing weather conditions at the site of training (WBGT index) and then read the recommended work-time. The work-rest cycle is the ratio of minutes of work to minutes of rest within each hour.

Table B-1. Work/Rest and Water Consumption

Work/Rest and Water Consumption Table
Applies to average sized, heat-acclimated Soldier wearing ACU, hot weather. (See TB MED 507 for further guidance.)

Easy Work		Moderate Work		Hard Work	
<ul style="list-style-type: none"> • Weapon Maintenance • Walking Hard Surface at 2.5 mph, < 30 lb Load • Marksmanship Training • Drill and Ceremony • Manual of Arms 		<ul style="list-style-type: none"> • 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 		<ul style="list-style-type: none"> • 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	¼	40/20 min	¼
2 (green)	82° - 84.9°	NL	½	50/10 min	¼	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 (± ¼ 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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<http://phc.amedd.army.mil>
 1-800-222-9698

For additional copies, contact: U.S. Army Public Health Command Health Information Operations Division at (800) 222-9698 or USAPHC - Health Information Operations@apg.amedd.army.mil. For electronic versions, see <http://chppm-www.apgea.army.mil/heat>. Distribution unlimited. Local reproduction is authorized. CP-033-0811

Note. Table B-2 provides guidelines for the duration of continuous work at metabolic intensities representing easy, moderate, or hard military tasks. Factors increasing the metabolic intensity of a task include carrying heavier backpack loads, marching at faster paces or uphill and loading heavier objects. Remember, activities such as physical fitness runs usually elicit much higher metabolic rates (~1,000 W) than the "hard work" military activities (~600 W) represented in this table. It is assumed that Soldiers performing these continuous effort tasks shall not have incurred significant exercise-heat stress or dehydration prior to this activity and will have extended (several hours) rest and adequate rehydration afterwards.

Table B-2. Continuous Work/Water Consumption Guide (without rest)

Continuous Work/Water Consumption Guide (without rest)

Acclimatized (after approx two weeks training) wearing combat uniform

It is assumed the trainees performing these continuous effort tasks have not had heat stress or dehydration prior to this activity and will have extended rest afterwards!

Heat Category	WBGT Index, (F°)	Easy Work		Moderate Work		Hard Work	
		Work (min)	Water Intake (Qt/h)	Work (min)	Water Intake (Qt/h)	Work (min)	Water Intake (Qt/h)
1	78-81.9	No Limit (NL)	½	NL	¾	70	1
2 (Green)	82-84.9	NL	½	150	1	65	1 ¼
3 (Yellow)	85-87.9	NL	¾	100	1	55	1 ¼
4 (Red)	88-89.9	NL	¾	80	1 ¼	50	1 ¼
5 (Black)	> 90	180	1	70	1 ½	45	1 ½

- NL can sustain work for at least 4 hours in the specified heat category.
- Fluid needs can vary based on individual differences (plus or minus ¼ qt/hr) and exposure to full sun or full shade (plus or minus ¼ qt/hr)

- (2) Know your Soldiers – identify individuals at increased risk.
- (3) Monitor hydration status – assess morning and evening as well as during training.
- (4) Factor in previous days’ conditions and activities – consider temperature, activity levels, and illnesses.
- (5) Use a risk management matrix to identify the initial risk level and document and manage decisions.
- (6) Heat illness hazards are cumulative.

NOTE: Hot weather is a key risk factor for heat injuries, **HOWEVER:** Heat illnesses can occur under green flag temperature conditions due to previous days’ conditions and/or dehydration. See appendix I regarding the incidence of EHIs during non-“heat season” months.

Remember "H.E.A.T.":

- Heat category past 3 days
- Exertion level past 3 days
- Acclimation/ other individual risk factors
- Time (length of exposure and recovery time)

Two or more heat illnesses on prior days = HIGH RISK.

c. Develop controls and make risk decisions.

(1) Plan in advance:

(a) Estimate heat risk level 1 day prior.

(b) Consider:

- Previous 2 days of heat exposure & predicted temperature for that day
- Training events (e.g., distance, pace, breaks) and work-rest cycle, hydration guidelines
- Uniform/equipment
- Location, time of day

(c) Adjust activity distances, durations, pace, and loads (e.g., conduct high-intensity training in cooler morning hours).

(d) Ensure proper resources at appropriate locations.

- Functional WBGT equipment
- Water/electrolytes (see para E-3 below)
- Iced sheets (in cooler filled 1/3 water, 2/3 ice)
- Medical: Resources, locations, communication systems

(2) Establish standing operating procedures (SOP); train and test Soldiers:

(a) HIP Pocket Guide (Heat Injury Prevention Guide) cards and sunscreen to all.

Note. See under “Required publications” for obtaining the HIP Pocket Guide.

(b) Place heat illness prevention posters and urine color guides in bathrooms, bulletin boards, dining facility, training areas.

Note. See under “Related Publications” for obtaining posters and cards.

(3) Identify how to monitor hydration and high risk personnel.

(4) Prepare communication capabilities, water, food/snacks, medical, and evacuation support:

- (a) Recommend commercial electrolyte beverages in high-risk months, or when daily water consumption exceeds 4 quarts/day (see para E-3 below).
- (b) Ensure water control points throughout designated training areas.
- (c) Ensure canteens/hydration packs are properly cleaned daily (FM 21-10), especially when using flavored commercial electrolyte beverages.
- (d) Pre-plan changes if mission, enemy, terrain and weather, troops and support available, time available, and civil considerations (METT-TC) /heat category changes or if heat casualties occur.

d. Implement controls.

- (1) Monitor hydration and personnel.
 - (a) Identify high-risk personnel.
 - (b) Buddy system: Assign low-risk personnel to high-risk personnel.
 - Track individual hydration status (see appendix E)
 - Urine monitoring techniques (see figure B-1; see also under “Related Publications”)

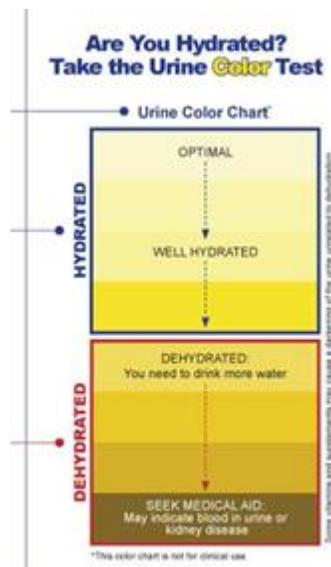


Figure B-1. Urine color chart

- Track high-risk personnel: Use red beads or red armband/Velcro® patch for "at-risk" Soldiers (see appendix E)
- Place water at key points, e.g., at land navigation training area objectives

- Provide and monitor: Electrolyte drinks and meal intake
- (2) Change events and activities to minimize heat load.
 - (a) Avoid back-to-back strenuous days, especially category 4-5.
 - (b) Modify time of day - complete activities earlier/later.
 - (c) Adjust activity.
- Wide spacing between Soldiers (~ 60 feet)
- Reduce pace and/or distance
- Breaks
- Shade Soldiers whenever possible
- (d) Reduce clothing and load:
 - Uniform
 - Backpacks, body armor, helmets, etc. (training)
- (e) Dump excess heat (see appendix E).
 - Allow/provide field shower
 - Cool overnight temperatures (fans, air conditioning, cool showers)
- e. Supervise and evaluate.
 - (1) Be familiar with signs/symptoms of EHI.
 - (a) Look for mild signs/symptoms and stop from progressing.
 - (b) Take immediate action when EHI is observed or suspected.
 - (c) When in doubt, summon a medic (MOS 68W), or call 911, and begin cooling!!
 - (2) Spot check troops/cadre/junior leaders.
 - (a) "What are heat illness signs/symptoms?"
 - (b) "Do you have your HIP (Heat Injury Prevention) Pocket Guide card?"

- (c) “What is the current Heat Category?”
- (d) “Who is at risk?” “Who is their buddy?”
- (e) “What actions would you take if ... ”
- (f) Is water available and accessible?
- (g) Are rapid cooling supplies on hand?
- (h) Do you have communications with medical support?
- (3) Spot check medical support.
 - (a) Check equipment, personnel, evacuation vehicle, communication, iced sheets.
 - (b) If no organic medical support, check for coordination of alternatives (e.g., gate access for off-post EMS, travel time, procedures).
- (4) If a heat injury occurs, stop training and assess situation.
 - (a) Confirm battle buddy system is in place.
 - (b) Monitor food intake (food/salty snack every 4 hours or less).
 - (c) Check for water intake (see para E-. Are they drinking BEFORE physical readiness training, especially in the morning?
 - (d) Monitor urine output (e.g., “color test,” and/or Soldiers should urinate a full bladder every 2-3 hours).
 - (e) Ask questions that require clear thinking:
 - What is your name?
 - What month is it? What year is it?
 - Where are you?
 - What were you doing before you became ill?
 - (f) Look for Soldiers who are visibly “wilting” or struggling.
 - (g) Look for Soldiers bypassing controls (e.g., not drinking in order to have a full canteen for an inspection).

This worksheet (figure B-2) is provided as an example only. Each worksheet should be developed specifically for each site.

DELIBERATE RISK ASSESSMENT WORKSHEET						
1. MISSION/TASK DESCRIPTION					2. DATE (DD/MM/YYYY)	
4. SUBTASK/SUBSTEP OF MISSION/TASK	5. HAZARD	6. INITIAL RISK LEVEL	7. CONTROL	8. HOW TO IMPLEMENT/ WHO WILL IMPLEMENT	9. RESIDUAL RISK LEVEL	
	WBGT (add 5 °f backpack or body armor)		Adjust activity distances, durations, pace, and loads (e.g., conduct high-intensity training in cooler morning hours). Ensure proper resources at appropriate locations. Employ cooling measures (shade, arm immersion, misting fans).			
	< Cat 1	Low (L) = 0 points				
	Cat 1	Medium (M) = 1 point				
	Cat 2-3	High (H) = 2 points				
	Cat 4-5	Extremely high (EH) = 3 points				
	Back-to-back Cat 5 days		“			
	0	L = 0				
	1	M = 1				
	2-3	H = 2				
	> 4	EH = 3				
	Heat illnesses in past 2 days		“			
	0	L = 0				
	Heat Cramps	M = 1				
	Heat Exhaustion	H = 2				
	Heat Stroke/ Death	EH = 3				
	Workload in past 2 days (see TR 350-29 workload classification chart)		“			
	Easy	L = 0				
	Easy or moderate	M = 1				
	Moderate or hard	H = 2				
	Hard	EH = 3				
	Projected workload		“			
	Easy	L = 0				
	Easy or moderate	M = 1				
	Moderate or hard	H = 2				
	Hard	EH = 3				
	Heat acclimatization days		“			
	> 13	L = 0				
	7-13	M = 1				
	3-6	H = 2				
	< 3	EH = 3				

Figure B-2. Deliberate Risk Assessment Worksheet factors – heat illness

DELIBERATE RISK ASSESSMENT WORKSHEET								
1. MISSION/TASK DESCRIPTION							2. DATE (DD/MM/YYYY)	
	4. SUBTASK/SUBSTEP OF MISSION/TASK	5. HAZARD	6. INITIAL RISK LEVEL	7. CONTROL	8. HOW TO IMPLEMENT/ WHO WILL IMPLEMENT	9. RESIDUAL RISK LEVEL		
		Leader/NCO presence		“				
		Full time	L = 0					
		Substantial	M = 1					
		Minimal	H = 2					
		None	EH = 3					
		Cadre duty experience		“				
		18 months	L = 0					
		7-18 months	M = 1					
		1-6 months	H = 2					
		< 1 month	EH = 3					
		Communication System (tested at training site)		“				
		Radio and landline phone	L = 0					
		Landline phone only	M = 1					
		Radio only	H = 2					
		None	EH = 3					
		Previous 24 hours sleep		“				
		> 7 hours	L = 0					
		5-7 hours	M = 1					
		2-4 hours	H = 2					
		< 2 hours	EH = 3					
		Food/salty snacks every 4 hours		“				
		< 4 hours	L = 0					
		4-6 hours	M = 1					
		6-7 hours	H = 2					
		> 7 hours	EH = 3					
		Onsite 68W/CLS and iced sheets (min. 8 single bed sheets/ company in cooler)		“				
		Both iced sheets & medic, EMT, or CLS	L = 0					
		Only iced sheets	M = 1					
		Medic, EMT, or CLS	H = 2					
		None	EH = 3					
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.								
DD FORM 2977, SEP 2014								

Figure B-2. Deliberate Risk Assessment Worksheet factors – heat illness (cont.)

B-2. Heat illness casualty identification and treatment

Heat illnesses result from the combined stresses of exertion and heat stress. Heat illnesses may be minor in terms of injury to the body (e.g., heat exhaustion) but are still reportable, and can progress to more severe forms (e.g., EHI and heat stroke) that can result in permanent injury or death. See TC 4-02.1 (First Aid).

a. Heat exhaustion. “Canaries in the coal mine” – catch these before they get to a more extreme case of heat stroke – catch early as they need rest/water/evaluation and possible medical care.

(1) Symptoms.

(a) Dizziness.

(b) Headache.

(c) Loss of appetite.

(d) Nausea.

(e) Weakness.

(f) Clumsy/unsteady walk.

(g) Profuse sweating and pale (or gray), moist cool skin.

(h) Normal to slightly elevated body temperature.

(i) Muscle cramps.

(j) Heat cramps.

(2) Treatment.

(a) Rest Soldier in shade.

(b) Loosen uniform/remove head gear.

(c) Have Soldier drink 2 quarts of water over 1 hour.

(d) Seek medical aid.

(e) Evacuate if there is no improvement in 30 minutes, or if Soldier's condition worsens

b. Heat stroke. Medical emergency – these cases already have abnormal brain function and can be fatal – initiate rapid cooling and EVAC!

(1) Symptoms.

(a) Hot dry skin.

Note. In the early progression of heat stroke, the skin may be moist or wet.

- (b) Headache.
- (c) Convulsions and chills.
- (d) Dizziness.
- (e) Nausea.
- (f) Weakness.
- (g) Pulse and respirations are weak and rapid.
- (h) Vomiting.
- (i) Confusion, mumbling (do mental check questions to see if brain is working correctly).
 - What is your name?
 - What month is it? What year is it?
 - Where are you?
 - What were you doing before you became ill?
- (j) Combative.
- (k) Passing out (unconscious).

(2) Treatment. COOL and CALL!! – the faster the body is cooled, the less damage to the brain and organs.

- (a) Cool the casualty with any means available, even before removing clothes.
- (b) Strip (if possible, ensure a same gender helper is present).
- (c) Rapidly cool by immersing the casualty in cold water.
- (d) Rapidly cool with ice sheets as follows:
 - Cover all but face with iced sheets.
 - Ensure the iced sheet is soaked prior to applying to the casualty.
- (e) Place ice packs, if available, in groin, axillae (armpits) and around the neck.

- (f) Fan the entire body.
- (g) Stop cooling if casualty starts shivering.
- (h) Seek medical aid.
- (i) Evacuate immediately, and continue cooling during transport, if necessary (until casualty starts shivering).
- (j) Give nothing by mouth.

Note. The same person should observe the Soldier during cooling and evacuation in order to spot symptom changes.

c. Hyponatremia ("water intoxication"). This is a Medical Emergency – EVAC immediately. Can be mistaken for heat stroke, though treatment is very different.

Note. This condition most often occurs in TRADOC initial entry training units, especially during basic combat training/ one-station unit training.

- (1) Signs and symptoms.
 - (a) Mental status changes.
 - (b) Vomiting.
 - (c) Excessive water consumption.
 - (d) Poor diet.
 - (e) Abdomen bloated.
 - (f) Large amounts of clear urine.

Note. Large amounts of clear urine may also be the result of a kidney or endocrine disorder, and should be evaluated by healthcare personnel.

- (2) Treatment:
 - (a) Do not give more water, or intravenous fluids.
 - (b) If awake, allow Soldier to consume salty foods or snacks.
 - (c) Seek medical aid.
 - (d) Evacuate immediately.

d. Reacting to a heat illness casualty:

(1) Remember "M.A.D.E. in the Shade":

(a) MOVE victim to cool location (e.g., shade, air conditioned car, building).

(b) ASSESS victim to determine type of EHI.

- Signs/symptoms
- Hydration assessment for possible hyponatremia
- Risk level (see para B-1a(2) above)
- Mental status (for heat stroke)
- Designate single person to continue monitoring. It is critical that a specific person is assigned to STAY with victim and continuously monitor all changes including mental status – Even the slightest changes that can occur in minutes may not be noticed if different personnel are checking victim – these slight changes can be critical in ensuring the best outcome for the victim.

(c) DECIDE which EHI and take proper management approach.

- Heat exhaustion: rest in shade, rehydrate
- Heat stroke: begin rapid cooling, evacuate immediately
- Hyponatremia: evacuate immediately

(d) EVALUATE other Soldiers and adjust training as necessary.

Appendix C

Cold Injury Risk Management and Casualty Identification and Treatment

C-1. Cold Injury Risk Management

a. Identify the hazards. Cold weather may present a hazard if any one of the following is present:

(1) Cold (temperature 40 °F and below).

(2) Wetness (rain, snow, ice, humidity); immersion; or wet clothes at temperatures below 60 °F.

- (3) Wind (wind speed 5 miles per hour and higher).
- (4) Lack of adequate shelter/clothing.
- (5) Lack of provisions/water.
- (6) Other risk factors, such as –
 - (a) Previous cold injuries or other significant injuries.
 - (b) Use of tobacco/nicotine or alcohol.
 - (c) Skipping meals/poor nutrition.
 - (d) Low activity.
 - (e) Fatigue/sleep deprivation.
 - (f) Little experience/training in cold weather operations.
 - (g) Cold casualties in the previous 2 to 3 days.
- b. Assess the hazards. The potential for cold casualties can be assessed by determining –
 - (1) The magnitude of cold exposure (see table C-1). Reliable measurement equipment must be used to determine –
 - (a) Air temperature (thermometer).
 - (b) Wind speed (anemometer).
 - (c) Wetness.
 - (d) Weather forecast (local weather station or another source such as the worldwide web).

Table C-1. Wind Chill Temperature

Wind Chill Temperature Table

Wind Speed (mph) ↓	Air Temperature (°F)																	
	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
0	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95

RISK OF FROSTBITE (see times on chart below)

GREEN LITTLE DANGER (frostbite occurs in >2 hours in dry, exposed skin)
 YELLOW INCREASED DANGER (frostbite could occur in 45 minutes or less in dry, exposed skin)
 RED GREAT DANGER (frostbite could occur in 5 minutes or less in dry, exposed skin)

- (2) The readiness of troops. Soldiers must have—
 - (a) Appropriate clothing in good condition (clean and without stains, holes or blemishes that could decrease the insulation).
 - (b) Adequate shelter.
 - (c) Proper fitness.
 - (d) Proper food and hydration.
- (3) Mission-related concerns, to include—
 - (a) Degree of mobility, which impacts on Soldier heat generation.
 - (b) Contact with ground or other surfaces that may increase conductive cooling.
 - (c) Exposure to wet conditions (for example, stream crossings).
- c. Develop controls and make risk decisions. Cold casualties can be controlled through —
 - (1) Education.

(a) Troop education, to include –

- Assessing cold stress.
- Recognizing and preventing cold injuries.
- Limiting the effects of cold through clothing, shelter, and nutrition.
- Learning how to work effectively in cold environments.

(b) Leadership education, to include –

- Supervising troops who often have only a superficial understanding of cold.
- Evaluating the impact of cold on the mission (for example, everything takes longer; troops will be more fatigued, more likely to make mistakes).

(c) Experiential learning, to include –

- Remembering that true effectiveness in cold environments only comes with experience.
- Practicing the clothing principles of layering and staying dry. These principles must be tailored to the individual, and must be practiced so that Soldiers will learn when to dress down (before sweating begins) and when to add layers (before shivering begins). Remember the acronym COLD:

Keep it **C**lean
 Avoid **O**verheating
 Wear it **L**oose and in **L**ayers
 Keep it **D**ry

Layers can be removed as ambient temperature or physical activity increases, which can reduce sweating and moisture build-up within clothing.

Note. See tables C-2 and C-3, and figure C-1, for recommended cold weather uniform and equipment usage.

- Avoid cotton clothing, which holds perspiration in cold-weather environments.
- In extreme cold environments, do not remove clothing immediately after heavy exertion (e.g., physical readiness training); wait until you are in a warmer location.
- Using equipment in the cold. Everything takes longer, so practice is needed. Soldiers also need to be able to identify where special tools or clothing (for example, contact gloves) may be necessary.

- Planning for longer missions (weather may change quickly and hinder operations, and troop fatigue impacts even routine operations).
- (d) The posting of cold-casualty prevention information as an ongoing reminder.
- (e) Establishing standing operating procedures for most routines.
- (2) Training.
 - (a) Clothes are to be appropriate and worn properly.
 - Clothing must be kept dry; wet and damp clothes changed as soon as possible.
 - Clothing is to be worn loose and in layers; hands, fingers, and the head are to be covered and protected.
 - All clothing must be clean and in good repair (no broken zippers or holes).
 - Proper boots must be worn, ones that are not too tight and are dry.
 - Socks must be clean and dry, an extra pair of socks must be carried, wet or damp socks must be changed as soon as possible, and foot powder must be used on feet and in boots.
 - Wipe dry the inside of vapor barrier boots at least once per day, or more often as feet sweat.
 - Dry leather boots by stuffing with paper towels.
 - Feet are to be washed daily if possible.
 - Gaiters are to be worn to keep boots dry when necessary.
 - Gloves or mittens are to be worn.
 - Hands must be warmed under clothes before hands become numb.
 - Skin contact with snow, fuel, or bare metal is to be avoided, and proper gloves are to be worn when handling fuel or bare metal.
 - Gloves are to be waterproofed by treating them with waterproofing compounds.
 - Face and ears are to be covered with a scarf, and an insulated cap with flaps over the ears or a balaclava is to be worn.

- Face and ears are to be warmed by covering them with warm hands. The face and ears must not be rubbed.
- Face camouflage is not to be used when the air temperature is below 32 °F.
- Sunscreen is to be worn.
- Sunglasses are to be worn to prevent snow blindness.

Table C-2. Army Cold Weather Uniform and Equipment Posture – 55 °F to 33 °F

Area of Consideration	Special Requirements and Recommended Actions		
	Clothing Layer:	ECWCS Generation II	ECWCS Generation III
Available Personal Clothing and Equipment	Base layer	<ul style="list-style-type: none"> • Lightweight polypropylene top and bottom and/or • Midweight polypropylene top and bottom 	<ul style="list-style-type: none"> • Lightweight cold weather undershirt and drawers and/or • Midweight cold weather shirt/drawers
	Insulating layer	<ul style="list-style-type: none"> • Shirt, cold weather, black fleece and/or • Liner, cold weather, coat 	<ul style="list-style-type: none"> • Green fleece jacket
	Outer shell	<ul style="list-style-type: none"> • Generation II GORE-TEX® jacket • Generation II GORE-TEX® trousers 	<ul style="list-style-type: none"> • Wind cold weather jacket (wind shirt) • Extreme cold/wet weather jacket (hard shell) • Extreme cold/wet weather trousers (hard shell)
	Other:	<ul style="list-style-type: none"> • Issued GORE-TEX® gloves with liners • Issued wool socks with synthetic liner sock • Temperate boots; cold weather boots recommended (Belleville 795, Danner Ft. Lewis 400g Tan Military Boots) 	
Training	<ul style="list-style-type: none"> • Knowledge of cold region environmental hazards • Knowledge of cold weather clothing capabilities and limitations • Skill to use cold weather clothing and equipment to provide protection from the elements • Skill to prevent, recognize, and treat cold injuries 		
Shelter and Heat	<ul style="list-style-type: none"> • Patrol bag • GORE-TEX® bivouac cover • Sleeping mat • Poncho • Poncho liner (optional) 		
Additional Control Measures	<ul style="list-style-type: none"> • Water re-supply plan • Sanitation plan 		

Table C-3. Army Cold Weather Uniform and Equipment Posture – 32 °F to 14 °F

Area of Consideration	Special Requirements and Recommended Actions		
	Clothing Layer:	ECWCS Generation II	ECWCS Generation III
Available Personal Clothing and Equipment	Base layer	<ul style="list-style-type: none"> • Polypropylene undershirt and drawers • Drawers cold weather, polyester, brown lightweight undershirt and drawers 	<ul style="list-style-type: none"> • Lightweight cold weather undershirt and drawers • Midweight cold weather shirt/drawers
	Insulating layer	<ul style="list-style-type: none"> • Shirt and overalls, cold weather, black fleece and/or • Liner, cold weather, coat and trousers 	<ul style="list-style-type: none"> • Green fleece jacket
	Outer shell	<ul style="list-style-type: none"> • Generation II GORE-TEX® jacket • Generation II GORE-TEX® trousers 	<ul style="list-style-type: none"> • Wind cold weather jacket (wind shirt) • Extreme cold/wet weather jacket (hard shell) • Extreme cold/wet weather trousers (hard shell) • Extreme cold weather parka (puffy Jacket)
	Other: <ul style="list-style-type: none"> • Issued GORE-TEX® gloves with liners • Issued wool socks with synthetic liner sock • Cold weather boots (Belleville 795, Danner Ft. Lewis 400g Tan Military Boots) • Arctic necklace (lighter and lip balm worn around neck) 		
Training	Northern Warfare Training Center Arctic Light Individual Training Program or similar program		
Shelter and Heat	Individual: <ul style="list-style-type: none"> • Medium Shelter System, all components 		<ul style="list-style-type: none"> • Sleeping mat, poncho and poncho liner
Additional Control Measures	<ul style="list-style-type: none"> • Begin leader/medic checks for cold injuries; 2-3 times daily at minimum • Water re-supply and storage plan (to prevent water from freezing) • Sanitation plan • No skin camouflage below 32 °F (0 °C) 		<ul style="list-style-type: none"> • Contact gloves must be worn when working outdoors • POL gloves must be worn when working with fuel • Consider four-season, 2-4 man shelters for personnel that work away from support base

Note. See ATTP 3-97.11 for further information.

Endurance and Mobility				
	Temperature			
	60 or +	50 - 59	40 - 49	39 & below
Uniform Items				
S/S Shirt	X			
Shorts	X	X	X	X
L/S Shirt		X	X	X
Outer-garment Shirt			X	X
Outer-garment Pants				X
Gloves w/ Inserts				X
Watch Cap				X

Strength and Mobility				
	Temperature			
	60 or +	50 - 59	40 - 49	39 & below
Uniform Items				
S/S Shirt	X	X		
Shorts	X	X	X	X
L/S Shirt		X	X	X
Outer-garment Shirt			X	X
Outer-garment Pants			X	X
Gloves w/ Inserts				X
Watch Cap				X

Figure C-1. Clothing recommendations for physical readiness training

Note. “Endurance and Mobility” and “Strength and Mobility” refer to components of physical readiness training; see FM 7-22 for explanations.

(b) The body is to be kept warm.

- Soldiers are to keep moving.
- Large muscles (arms, shoulders, trunk, and legs) are to be exercised to keep warm.

(c) Health and nutrition must be sustained.

- Alcohol use is to be avoided (alcohol impairs the body’s ability to shiver).
- Tobacco products are to be avoided (tobacco products decrease blood flow to the skin).
- All meals are to be eaten to maintain energy and proper electrolyte balance.

- Water or warm nonalcoholic fluids are to be drunk to prevent dehydration.
- Carbon monoxide poisoning must be prevented by using only Army-approved heaters in sleeping areas, by not sleeping near the exhaust of a vehicle while the vehicle is running, and by not sleeping in an enclosed area where an open fire is burning.

(d) Soldiers will protect each other.

- Soldiers are to watch for signs of frostbite and other cold weather injuries in their buddies.
- Soldiers are to ask about and assist with rewarming of feet, hands, ears or the face.

(e) Leadership initiatives will be practiced.

- Activities or exercises will be limited or discontinued during very cold weather.
- Covered vehicles are to be used for troop transport.
- Warming tents are to be available.
- Warm food and drink will be on hand.
- All equipment is to be checked and working properly.

d. Implement controls. Cold casualty controls can be implemented through –

(1) Identified controls already in place (buddy checks, sock changes, available shelter, and warm meals).

(2) Controls that are integrated into standing operating procedures.

(a) Soldiers (including newly arrived Soldiers) will be educated about hazards and controls.

(b) The buddy system will be implemented to check clothes and personal protection.

(c) Soldiers will be encouraged and allowed to speak up about any problem (self-checks).

(3) A decision to accept risk at the appropriate level.

e. Supervise and evaluate. The final step in the risk-management process is the supervision and evaluation of the controls taken to prevent cold casualties. Examples are—

(1) Ensuring all Soldiers and leaders are educated and experienced in the prevention, recognition, and treatment of cold-weather injuries, as well as effective measures for working in cold environments.

(2) Delegating responsibilities (inspections, buddy checks) to ensure control measures have been implemented.

(3) Monitoring the adequacy/progress of implementation of control measures.

(4) Performing spot checks of shelters, rewarming facilities, and food and drink supplies.

(5) Recording and monitoring indicators of increasing cold risks, such as—

(a) An increase in the number of cold-weather injuries.

(b) An increase in the number of complaints/comments about cold.

(c) Observations of shivering and signs of cold-weather injuries.

(6) Continuously evaluating current control measures and strategizing new or more efficient ways to keep warm and avoid cold injuries.

C-2. Cold weather casualty identification and treatment

Cold weather-related injuries include: injuries due to decreased temperature (hypothermia, frostbite, nonfreezing cold injury), injuries due to heaters, carbon monoxide poisoning, and accidents due to impaired physical and/or mental function resulting from cold stress. Cold weather injuries can also occur in warmer ambient temperatures when an individual is wet due to rain or water immersion. See TC 4-02.1 (First Aid).

a. Hypothermia. Hypothermia occurs when heat loss is greater than heat production. This can occur suddenly, such as during partial or total immersion in cold water, or over hours or days, such as during extended operations or survival situations. Hypothermia may occur at temperatures above freezing, especially when a person's skin or clothing is wet.

(1) Symptoms.

(a) Vigorous shivering is typically present.

(b) Shivering may decrease or cease as core temperature continues to fall.

(c) Conscious, but usually apathetic or lethargic.

(d) Confusion.

- (e) Sleepiness.
- (f) Slurred speech.
- (g) Shallow breathing.
- (h) Very slow respirations.
- (i) Weak pulse.
- (j) Low or unattainable blood pressure.

(k) Change in behavior with or without poor control over body movements with or without slow reactions.

(1) With severe hypothermia, the casualty may be unconscious or stuporous.

(2) Treatment. The goals for field management of hypothermia are to rescue, examine, insulate, and rapidly transport. If untreated, hypothermia is a true medical emergency and requires evacuation. Rewarming techniques include:

- (a) Remove the casualty from the cold environment.
- (b) Replace wet clothing with dry clothing.
- (c) Cover the casualty with insulating material or blanket.
- (d) Wrap the casualty from head to toe.
- (e) Avoid unnecessary movement from the casualty.
- (f) If casualty is conscious, slowly give high caloric sweet warm fluids.
- (g) Seek medical aid.
- (h) Evacuate as soon as possible with the casualty lying down.

b. Frostbite. Frostbite is freezing of skin, and is most prevalent in the fingers, toes, ears and face. It occurs with exposure to below-freezing temperatures (< 32 °F) and during direct contact with cold metal and super-cold petroleum (fuel), oil, and lubricants (POL). As the wind chill temperature goes below minus 15, the risk of frostbite substantially increases. Both natural and man-made wind increase the risk of frostbite. Man-made wind includes riding in open vehicles, exposure to propeller/rotor-generated wind, running, and skiing. Importantly altitude exposure increases risk as temperatures become lower at higher elevations and often there is little tree cover to protect against the wind. Other contributing factors include tight clothing, which constricts blood flow. This is problematic particularly in boots. Blood flow to the arms can become constricted from backpack straps.

- (1) Symptoms.
 - (a) Numbness in affected area.
 - (b) Tingling, blistered, swollen, or tender areas.
 - (c) Pale, yellowish, waxy-looking skin (grayish in dark-skinned Soldiers).
 - (d) Frozen tissue that feels wooden to the touch.
 - (e) Significant pain after rewarming.
- (2) Treatment.

CAUTION: Avoid thawing the affected area if it is possible that the injury may refreeze before reaching the medical treatment facility.

- (a) Local rewarming at room temperature or using body heat.
- (b) Loosen or remove constricting clothing and remove jewelry.

CAUTION: DO NOT massage the skin or rub anything on the frozen parts.

- (c) Move the casualty to a sheltered area, if possible.
- (d) Protect the affected area from further cold or trauma.
- (e) Once a tissue is thawed, it must not freeze again. If there is the possibility of tissue refreezing, it is better not to thaw it in order to avoid damaging tissue further.
- (f) Avoid exposure to excessive heat (open flame, stove tops, steam, heat packs) or rubbing affected tissue.
- (g) All Soldiers with a peripheral freezing injury must be suspected of being hypothermic and treated appropriately. During field management, it is more important to prevent hypothermia than to rewarm frostbite rapidly.
- (h) Seek medical aid.
- (i) Evacuate the casualty.

c. Non-freezing cold injury. The most common non-freezing cold injuries are chilblain and trenchfoot. Trench foot occurs when tissues are exposed to temperatures from 32-60 °F for prolonged periods of time (> 12 hours), whereas chilblain, which is a more superficial injury, can occur after just a few hours of exposure. A non-freezing cold injury is classified by the symptoms and stages of recovery.

(1) Chilblain. Chilblain is a non-freezing cold weather injury that can occur after 1-5 hours in cold-wet conditions when skin temperature is $> 32^{\circ}\text{F}$. The most commonly affected areas are the backs of the fingers, but the ears, face, and other exposed skin are also areas of occurrence. There are no lasting effects from chilblain.

(a) Symptoms.

- Chilblain lesions are swollen, tender, itchy and painful.
- With re-warming, the skin becomes swollen, red (or darkening of the skin in dark-skinned Soldiers) and hot to the touch.
- An itching or burning sensation may continue for several hours after exposure.

Note. Early diagnosis of chilblain becomes evident when symptoms do not resolve with re-warming.

(b) Treatment. Re-warm affected area; keep warm and dry.

(2) Immersion foot (trench foot) is caused by prolonged (> 12 hours) exposure of tissue, especially the feet, to wet cold and conditions at 32°F to 60°F . Inactivity and damp socks and boots (or tightly laced boots that impair circulation) speed onset and severity.

(a) Symptoms.

- Cold, numb feet that may progress to hot with shooting pains
- Slight sensory change for 2 to 3 days
- Swelling, redness, and bleeding may become pale and blue
- Accompanied by aches, increased pain sensitivity and infection
- Loss of sensation
- Severe edema and gangrene
- Loss of tissue

(b) Treatment.

- Remove wet or constrictive clothing; gently wash and dry affected extremities
- Elevate affected limbs and cover with layers of loose, warm, dry clothing

- Do not pop blisters, apply lotions or creams, massage, expose to extreme heat or permit Soldiers to walk, which can increase tissue damage and worsen the injury
- Seek medical attention
- Evacuate for medical treatment

This worksheet (figure C-2) is provided as an example only. Each worksheet should be developed specifically for each site.

DELIBERATE RISK ASSESSMENT WORKSHEET						
3. MISSION/TASK DESCRIPTION						4. DATE (DD/MM/YYYY)
4. SUBTASK/SUBSTEP OF MISSION/TASK	5. HAZARD	6. INITIAL RISK LEVEL	7. CONTROL	8. HOW TO IMPLEMENT/ WHO WILL IMPLEMENT	9. RESIDUAL RISK LEVEL	
	Cold (temperature 40°F and below)		Buddy checks Sock changes Available shelter Warm beverages and meals Ensure heated spaces are well ventilated			
	Wetness (rain, snow, ice, humidity) or wet clothes at temperatures below 60 °F.		“			
	Wind (wind speed 5 miles per hour and higher)		“			
	Lack of adequate shelter/clothing		“			
	Lack of provisions/water		“			
	Previous cold injuries or other significant injuries		“			
	Use of tobacco/nicotine or alcohol		“			
	Skipping meals/ poor nutrition		“			
	Low activity		“			
	Fatigue/ sleep deprivation		“			
	Little experience/training in cold weather operations		“			

Figure C-2. Deliberate risk assessment worksheet factors – cold injury

Appendix D

Instructions on use of the wet bulb globe temperature (WBGT)

D-1. Types of WBGTs

Wet bulb globe temperature is a composite temperature used to estimate the effect of temperature, humidity, wind speed, and visible and infrared radiation (e.g., sunlight) on humans. The WBGT index was developed in 1956 by the United States Marine Corps at Parris Island to reduce heat stress injuries in recruits. It is determined with special equipment and calculated to reflect components of air, humidity and wind that affect “actual temperature” experienced by personnel:

WBGT is derived from the formula: $0.7T_w + 0.2T_g + 0.1T_d$

T_w = Natural wet-bulb temperature (with dry-bulb temperature indicates humidity)

T_g = Globe thermometer temperature (also known as black globe thermometer)

T_d = Dry-bulb temperature (actual air temperature)

and yields a category or “flag color;” see table D-1.

Table D-1. WBGT Categories

Wet Bulb Globe Temperature (WBGT) Categories			
Category	WBGT, °F	WBGT, °C	Flag color
1	< 82	< 27.8	White
2	82-84.9	27.8-29.3	Green
3	85-87.9	29.4-31.0	Yellow
4	88-89.9	31.1-32.1	Red
5	=> 90	=> 32.2	Black
<ul style="list-style-type: none"> ➤ Add 5 °F for rucksack or body armor ➤ Add 10 °F if in MOPP 4 			

a. The mechanical WBGT kit is the U.S. Army standard. Commanders may use digital WBGTs at their discretion.

b. The TRADOC Surgeon’s Office recommends the use of a regularly calibrated, mechanical WBGT kit (NSN 6665-01-566-1454, WBGT Kit with Tripod: NSN 6665-01-381-3023).

c. Commanders may, at their discretion, use alternative digital WBGT measurement devices also known as heat stress monitors (HSMs).

(1) Should commanders choose the digital alternative, such measuring instruments must receive yearly calibration via appropriate calibrating activities (such as test, measurement and diagnostic equipment). Inaccuracies may occur if the operator is in close proximity to the unit (that is, when using a handheld device) or when digital WBGT/HSM devices are left outside for long periods without use.

(2) Acceptable commercially-available HSM devices include the QUESTemp™ 32, the QUESTemp™ 48N, and the Kestrel 4400 (see appendix H below for national stock numbers). Consult with the installation Environmental Health Section, Safety, and Department of Public Works for assistance in choosing a device.

D-2. Method for use of the WBGT

a. The standard method for measuring the heat category is to calculate the values of radiant heat, humidity, air movement, and shaded temperatures via WBGT thermometer. This device requires reading the mercury levels in ruled glass columns and using a slide rule-type index to obtain the heat category. The less expensive mechanical WBGT kits can be used at various sites in the training area at a significantly lower cost. Refer to TB MED 507, Heat Stress Control and Heat Casualty Management, accessible at http://armypubs.army.mil/med/dr_pubs/dr_a/pdf/tbmed507.pdf, appendix B, for instructions on employing the mechanical WBGT device.

b. Any WBGT device, whether mechanical or digital, should be calibrated by test, measurement and diagnostic equipment support personnel on schedule in accordance with guidelines for the equipment.

c. Employ field sanitation team members to maintain and operate WBGT devices.

Appendix E**Methods for Controlling Risk of Heat Illness and Cold Injury****E-1. Marking Soldiers at risk**

a. See para B-1 above to determine individual Soldiers' risk factors for heat and cold injury.

Note. Soldiers who have sustained prior heat or cold injuries should be assessed by healthcare personnel, and are subject to duty-limiting profiles and disposition in accordance with AR 40-501 (Standards of Medical Fitness). Any limitations in Soldiers' profiles with respect to heat or cold exposure should be adhered to.

b. Ensure cadre identify and mark Soldiers who are at risk for heat and cold injury:

(1) Colored, square Velcro[®] patch affixed to the upper left sleeve (such as red for heat injury risk and blue for cold injury risk).

(2) Colored wrist or armbands (red for heat and blue for cold).

c. Commanders may provide for Soldiers to choose their own clothing combinations in extremes of heat or cold, based on their individual responses. See TB MED 508, para 3-2h.

E-2. Monitoring hydration status

The currently-issued personal hydration system (HydroMax[™]) bladder holds 100 ounces of water (about 3 liters, or 3.125 quarts). Hydration status may be monitored by assuring full personal hydration systems at the start of the day, and spot checking water consumption by compressing the bag during/after events (see figure E-1), or by counting number of bags consumed.



Figure E-1. Checking a Soldier's hydration system

E-3. Sports drinks

a. Sports drinks are an effective source for electrolyte replacement, however they should be used only under the following conditions:

(1) To increase compliance with fluid intake. Soldiers who are unaccustomed to hydrating with water and may lack the discipline needed to drink enough water.

(2) If the training event is strenuous, and takes place outside the normal span of time between meals (4 hours), e.g., before breakfast or at night.

(3) Integrated with standard water consumption (before, during, and/or after activity).

(4) Sports drinks should contain:

(a) Sodium, 55-160 milligrams (mg) per 8-oz. serving.

(b) Potassium, 20-45 mg per 8-oz. serving.

(c) Carbohydrate, 11-19 grams per 8-oz. serving.

b. Sports drinks are unnecessary for Soldiers who are consuming meals regularly, and drinking enough water – these provide all the electrolytes and fluid needed for normal activities.

E-4. Arm immersion cooling system (AICS)

a. Principle. The AICS is a simple, efficient method for facilitating body (core and skin) temperature cooling, and reducing the risk of serious heat illness. The AICS takes advantage of the rapid rate of heat transfer from the skin directly into cool water (compared to transfer into evaporative sweat or air), and the large surface area-to-mass ratio of the forearms. Several studies have reported that hand and forearm immersion in cool (50-68 °F) water reduces core and skin temperature faster than a non-cooling control, extends tolerance time, and increases total work time.

b. Description.

(1) The AICS prototype units stand ~40” tall and the trough is 60” long x 24” wide. Folded size is 62”x24”x4” for ease of portability. Weight without water is ~55-60 lbs, making it fairly easy for 2 Soldiers to move and set up. The AICS includes an integrated thermometer for monitoring water temperature, and assembly and use instructions stenciled on the fabric. Also included are coolers for supplying water and ice, an integrated drain and hose, and an optional support table for the coolers. See figure E-2.



Figure E-2. Prototype arm immersion cooling system units

(2) AICS units can be fabricated locally at a much lower cost for materials and labor than the AICS prototype units. The locally-fabricated AICS units can be constructed with 50-gallon plastic drums cut in half, and use fabricated metal hooks to hold the drum in place. See figure E-3.



Figure E-3. Locally-fabricated arm immersion cooling system

c. To achieve approximately 1.5 °F body temperature reduction, submerge forearms and hands into chilled water for the indicated cooling time, alternating users on each side will accommodate a maximum number of users. Replace water when the water temperature reaches 80 °F (see table E-1).

Note. If desired, a capful of bleach may be added to each trough of water to reassure Soldiers the water is clean; there is no proven risk from microorganism viability or transfer in water that is colder than 80 °F.

Table E-1. Temperature of water and cooling time

Temperature (degrees)	Cooling time (minutes)
> 80 °F	Replace water
71-80 °F	12-15
55-70 °F	8-12
45-54 °F	5-8
35-44 °F	3-5

E-5. Reduce heat load

a. The practice of designating and equipping sites for deliberate cooling and rest (“cool zones”) is recommended for reducing the heat effects of Soldiers in training. Cool zones provide a break area for those who are exposed to the debilitating effects of the heat during physical activity. These break areas are specially designed to provide shade from the sun and include devices or items to aid the body in dumping heat. Such devices include camouflage cover or solar shades (see figure E-5), water trailers/tanks, coolers containing water and sports drinks, power breezers/fans and misters (see figure E-6), and the AICS.



Figure E-4. Solar shade



Figure E-5. Misting fan

(Source: <http://www.mistingfans.com/blog/>.)

b. Provide for Soldiers to spend time in air-conditioned-space or shower unclothed in cold water at the end of a day of moderate and heavy training in category 3 and above, in order to reduce heat load.

E-7. Army compatible heaters and tents

See Army Tactics, Techniques, and Procedures (ATTP) 3-97.11, appendix B, for Army compatible heaters and tents.

Appendix F

Use of ice packs and iced sheets

F-1. Concept

a. The use of commercial ice packs and ice sheets for treatment of heat stroke in the field is recommended in TB MED 507, paras 4-6 and 5-2. Ice packs and ice sheets may be procured, or iced sheets may be prepared with readily-available items.

Note. The term “ice sheet” refers to commercially-available products; the term “iced sheet” refers to the locally-produced item.

b. Units may elect to purchase ice packs and ice sheets. The advantages of these over locally-prepared iced sheets is that there is no need to launder linen, procure ice, or carry heavy containers of ice and water.

c. Units may elect to prepare iced sheets locally. The advantages of these over commercially-prepared ice packs and ice sheets is lower cost (including replacement of damaged or spoiled

products), readily-available components, and no need to refrigerate or freeze the products. The use of bed sheets cooled with ice water has been proven to significantly improve the recovery and outcome of persons suffering from heat stroke.

(3) The recommended indications and procedures for use of iced sheets are as follows:

(a) Provide iced sheets in accordance with risk assessment and local guidance. For planning purposes, the recommended number of sheets is 4 per potential heat casualty, in Igloo[®]-type ice chests. Determine the means of procurement for the chests, sheets, and ice through organizational supply personnel.

(b) Prepare iced sheets by placing ordinary bed sheets in iced water.

- Keep iced water ready in Igloo[®]-type ice chests filled with 1/3 water and 2/3 ice.
- Have sheet readily available, either soaking in iced water or in resealable plastic bags.
- When needed, immerse sheet in iced water and ensure it is saturated; this can be done as Soldier's outer clothing is being removed.

(c) Depending on the risk, the ice chests can be maintained at training sites by drill sergeants; carried on ambulances or nonstandard evacuation vehicles; and maintained at troop medical clinics.

(d) Iced sheets should be applied anytime a Soldier has a change in their mental status and environmental heat exposure is the likely cause of this change (that is, either during environmental heat extremes or following days of exposure to environmental heat extremes). Mental status changes include confusion, inability to properly follow commands, and loss of consciousness. The mental status changes of heat illness are more important than the Soldier's temperature when deciding on the treatment of heat illnesses. Ask the following questions to assess mental status:

- What is your name?
- What month is it? What year is it?
- Where are you?
- What were you doing before you became ill?

(e) Iced sheets should always be applied as follows (see figure F-1):

- Lay the first sheet down on a litter or stretcher
- Place the casualty on top of the first iced sheet
- Place wadded or rolled iced sheets in the casualty's groin, armpits, and around the neck

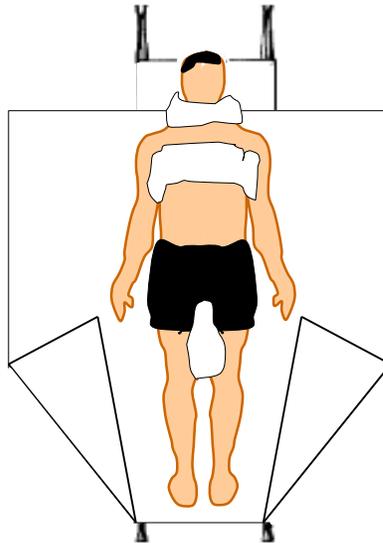


Figure F-1. Application of iced sheets

- (a) Fan the entire body.
 - (b) When sheets warm up, put them back into cooler and then reapply.
 - (c) Stop cooling if casualty starts shivering.
 - (d) Seek medical aid.
 - (e) Evacuate immediately, and continue cooling during transport, if necessary (until casualty starts shivering).
 - (f) Give nothing by mouth.
- f. Iced sheets should be re-iced and re-applied (or completely replaced) whenever the iced sheets become warm (because the sheets are no longer delivering cooling therapy). Cooling should be continued until EMS arrives. Do not disrupt cooling on the basis of a temperature measurement (for example, with ear or skin thermometer).
- g. Evacuate any Soldier who requires cooling with iced sheets to the nearest emergency room via EMS.
-

Appendix G

Safety and Medical Terminology and Reporting Requirements

G-1. Safety terminology and reporting of heat illnesses and cold injuries

a. Heat illnesses and cold injuries are reported as Army accidents in accordance with AR 385-10 (The Army Safety Program), chapter 3; and TR 1-8 (U.S. Army Training and Doctrine Command Operations Reporting), para 2-2a(5), as follows:

(1) Class A. An injury and/or occupational illness resulting in a fatality or permanent total disability.

(2) Class B.

(a) An injury and/or occupational illness resulting in permanent partial disability; or

(b) When three or more personnel are hospitalized as inpatients as the result of a single occurrence.

(3) Class C.

(a) A nonfatal injury or occupational illness that causes 1 or more days away from work or training beyond the day or shift on which it occurred; or

(b) Disability at any time (that does not meet the definition of Class A or Class B and is a day(s)-away-from-work case).

(4) Class D. A nonfatal injury or illness that results in restricted work; transfer to another job; medical treatment greater than first aid; needle stick injuries; cuts from sharps that are contaminated from another person's blood or other potentially infectious material; or medical removal under medical surveillance requirements of an OSHA standard.

b. Limited use safety accident investigation reports. These are DA accident investigation reports used solely for the prevention of subsequent DA accidents. Limited use accident reports include investigations of operations or exercises (see AR 385-10, para 3-10a).

G-2. Medical terminology and reporting of heat illnesses and cold injuries

a. Heat illnesses.

(1) The following heat illnesses are reported as reportable medical events in accordance with AR 40-5 (Preventive Medicine), para 2-18; and TR 1-8, para 2-2a(5), as follows:

(a) Heat exhaustion (HE) (International Classification of Diseases, 10th revision (ICD-10) code T67.3). A syndrome of elevated core body temperature (though temperature may be in the normal range at presentation for care, especially if oral) with physical collapse or debilitation

occurring during or immediately following exertion, with no more than minor central nervous system (CNS) symptoms (such as headache, dizziness). HE resolves rapidly with minimal cooling intervention.

(b) Heat injury (HI) (no separate ICD-10 code). Heat exhaustion with clinical evidence of organ (for example, liver, renal, stomach) and/or muscle (for example, rhabdomyolysis) damage but lacking neurological signs or symptoms characteristic of heat stroke.

(c) Heat stroke (HS) (ICD-10 code T67.0). A seriously elevated temperature (> 104 °F or 40 °C) that causes CNS injury. Clinically, HS presents as hyperthermia, physical collapse or debilitation, and brain dysfunction as evidenced by delirium, stupor, or coma, occurring during or immediately following exertion or significant heat exposure. HS may be complicated by organ and/or tissue damage, systemic inflammatory activation, and disseminated intravascular coagulation.

(2) The following heat illnesses are not reportable in accordance with AR 40-5, but are recorded in health records and may be reported for command interest; also, an accident/incident case that meets criteria as defined in para G-1a above must be reported through safety channels.

(a) Parade syncope (heat syncope) (ICD-10 code T67.1). A temporary circulatory failure due to pooling of blood in the peripheral veins – especially those of the lower extremity – and a consequent decrease in diastolic filling of the heart. Symptoms range from lightheadedness to loss of consciousness. Parade syncope often, but not always, occurs during prolonged standing and is often associated with hot weather environments.

(b) Heat edema (ICD-10 code T67.7). Swelling and discomfort of the hands and or feet. Victims of heat edema may complain that their shoes feel tight or are ill fitting. The symptoms usually resolve within a few days, as the person becomes heat acclimatized. Treatment for this self-limiting condition is reassurance and leg elevation.

(c) Heat cramps (ICD-10 code T67.2). Brief, recurrent, and often are agonizing skeletal muscle cramps of the limbs and trunk. The cramp in an individual muscle is usually preceded by palpable or visible contractions and lasts 2 to 3 minutes. Cramps tend to be recurrent and may be precipitated by vigorous use of affected muscles. The cramp produces a hard lump in the muscle. Heat cramps often occur in salt-depleted persons during a period of recovery (up to many hours) after a period of intense work in the heat.

(d) Miliaria rubra (heat rash or prickly heat) (ICD-10 code L74.0). Impairment of sweating from blockage of sweat ducts. Rashes of 20 percent of body surface area will markedly elevate core temperature and reduce physical work capabilities for up to 3 weeks after the rash has resolved. Therefore, skin hygiene is important during hot weather deployments. Mild sunburn impairs sweating so Soldiers should minimize skin exposure to ultraviolet radiation.

(e) Sunburn (ICD-10 code L55.0) impairs sweating over the affected skin and predisposes Soldiers to heat injury from systemic effects, including fever, that influence central thermoregulation.

(f) Hyponatremia (ICD-10 code E87.1) refers to low blood sodium (below 135 milliequivalents per liter (mEq/L); symptoms develop at 130 mEq/L). Hyponatremia is associated with prolonged (> 6 hours) physical work and arises primarily from fluid overload, under-replacement of sodium losses, or usually a combination of both. Hyponatremia and heat exhaustion share many symptoms. If a Soldier has been given oral fluids (maximum of 1 quart per hour) and does not improve quickly, he or she should receive further medical evaluation. Repeated vomiting is more often seen with hyponatremia.

(g) Rhabdomyolysis (ICD-10 code M62.82). Exertional rhabdomyolysis may occur without elevations in body core temperature or brain dysfunction but frequently occurs as part of the clinical syndromes of severe heat casualty. Exertional rhabdomyolysis is caused by skeletal muscle damage with release of cellular contents into the blood circulation, including myoglobin, potassium, phosphate, creatine kinase, and uric acid. Rhabdomyolysis is incorporated in the diagnosis of heat injury (see para I-2(a)(2) above).

(h) Dehydration (ICD-10 code E86.0). Dehydration (> 2 percent body weight loss) increases the risk of heat illness, adversely affects physical work performance, and may also impair some mental functions.

b. Cold injuries.

(1) The following cold injuries are reported as reportable medical events in accordance with AR 40-5, para 2-18; and TR 1-8, para 2-2a(5), as follows:

(a) Hypothermia (ICD-10 codes T69.8, T69.9). Reduction of core body temperature to 95 °F or lower due to environmental cold exposure, diagnosed by measurement of temperature rectally with a low-reading thermometer.

(b) Frostbite (ICD-10 codes T33.0, T33.52, T33.8, T33.9, T34). Frostbite occurs only with exposure to temperatures below freezing. It results from the freezing of tissue fluids in the skin and/or layers under the skin. It occurs relatively rapidly, however the extent of injury often takes weeks to determine.

- Superficial: Partial or full thickness freezing of the skin without involvement of the underlying layers. Mobility is unaffected, and blistering may occur.
- Deep (producing loss, or necrosis, of tissue): Full-thickness freezing of the skin (including underlying layers) and which may involve muscles, tendons, and bones as severity increases.

(c) Immersion foot (ICD-10 code T69.02). Non-freezing injuries, usually of extremities (e.g., foot or hand) due to prolonged blood vessel constriction in response to cold that leads to tissue injury and destruction. These injuries develop over a period of hours to days. They may occur at temperatures below or above freezing and can occur at temperatures as high as 60 °F with prolonged exposure. Injury is accelerated by exposure to damp conditions. (Note: The term “trench foot” is also sometimes used to describe a tropical foot injury or “jungle rot.”)

(3) The following cold injuries are not reportable in accordance with AR 40-5, but are recorded in health records and may be reported for command interest:

(a) Chilblain (ICD-10 code T69.1) is a superficial cold injury typically occurring after 1 to 5 hours in cold-wet conditions, at temperatures below 50 °F. Small red bumps appear on the skin, most often on the back surface of the fingers, but the ears, face and exposed shins are also common areas for occurrence. The bumps are swollen, tender, itchy, and painful. Upon rewarming, the skin becomes inflamed, red and hot to the touch, and swollen, with an itching or burning sensation that may continue for several hours after exposure. There are no lasting effects from chilblain.

(b) Carbon monoxide poisoning (ICD-10 code T58). Carbon monoxide is a poisonous gas that cannot be seen or smelled. Carbon monoxide binds to red blood cells more readily than oxygen so less oxygen is available to vital organs and tissues. It is contained in the exhaust from stoves and vehicles. Carbon monoxide can build up in closed spaces that are poorly ventilated. Early signs of carbon monoxide poisoning are headache, confusion, dizziness, and drowsiness. Persons found unconscious in a closed tent or vehicle may be victims of carbon monoxide poisoning, especially if the lips and skin are bright red.

(c) Snow blindness (ICD-10 code H16.13) and sunburn (ICD-10 code L55.0). Snow blindness and sunburn are caused by exposure of unprotected eyes and skin to ultraviolet (UV) radiation. The threat of snow blindness and sunburn depends on the intensity of sunlight, not the air temperature. Snow, ice, and lightly colored objects reflect the sun's rays, increasing the risk for injury.

- Snow blindness results when solar radiation “sunburns” unprotected eyes. Eyes may feel painful, gritty, and there may be tearing, blurred vision, and headache. The use of protective eyewear or goggles that block more than 90 percent of UV radiation will help to prevent snow blindness.
- Sunburn to the skin increases heat loss during cold exposure, increasing susceptibility to hypothermia. It also leads to uncomfortable/painful feelings that decrease Soldier performance. Sunburn can be prevented by using a sunscreen that contains para amino benzoic acid of at least a 15 sun protection factor. For cold weather, an alcohol-free sunscreen lotion will be used that blocks both ultraviolet A and ultraviolet B rays.

c. Skin cancer, including basal and squamous cell carcinomas and melanoma, is the most common of all cancers. Exposure to ultraviolet radiation from the sun (regardless of cloud cover or low temperature) sets the conditions for skin cancer. Soldiers with fair skin that burns and freckles easily, light blue/green eyes, and either red or blonde hair are at highest risk for developing melanoma; however, anyone can develop skin cancer.

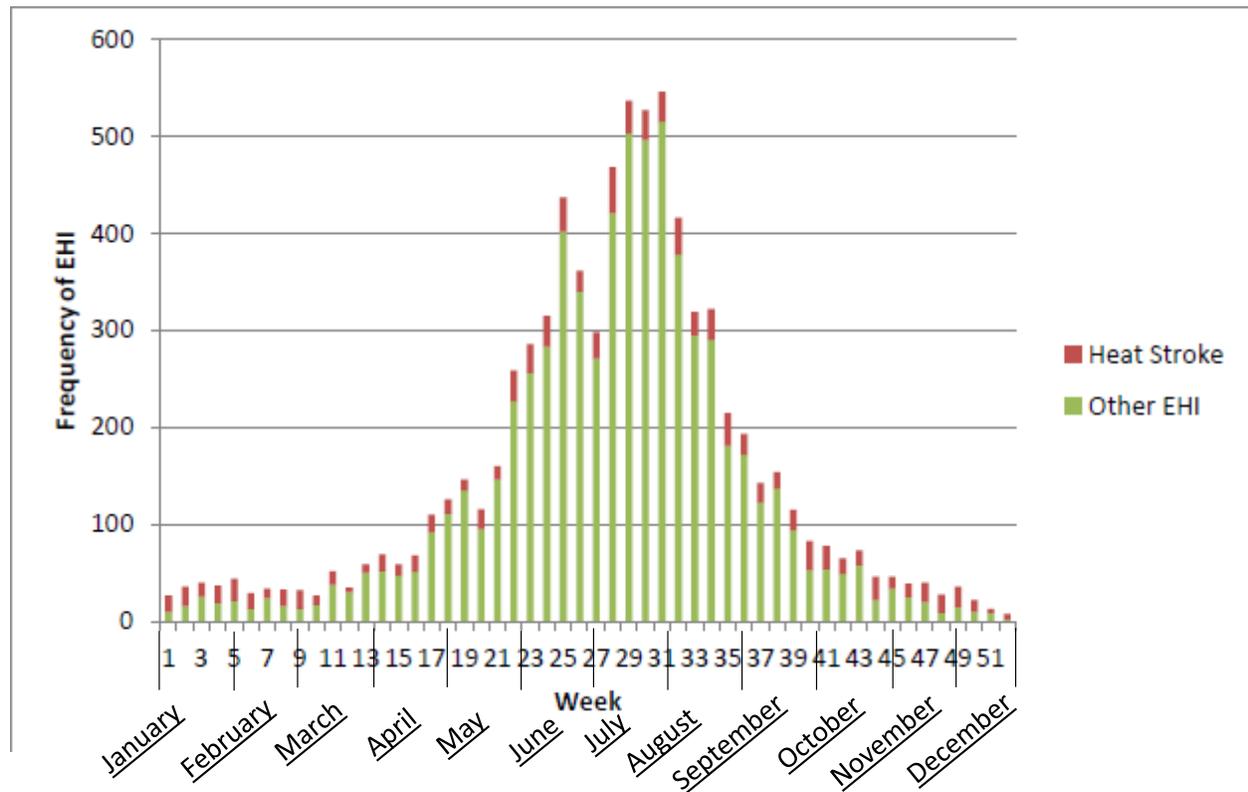
**Appendix H
Supply list**

List of supplies that are available in the system:

- 6505 01-508-7248 Sunscreen preparation, SPF 30, UVA-UVB, sweatproof, waterproof, 1oz, 12s
- 6508-01-265-0079 Lipstick, anti-chap, cold or hot climate, SPF 15, 100 per package
- 6625-01-478-9030 Monitor, heat stress, portable (QUESTemp™ 32)
- 6685-01-584-0785 Monitor, heat stress, uses waterless wet bulb sensor (QUESTemp™ 48N)
- 6660-01-631-0330 Recording set, weather data (Kestrel 4400)
- 5410-01-519-7185 Solar system, type II, 600x600x168", tan, for hot climates
Heaters and tents – see para E-7 above

**Appendix I
Within-year exertional heat illness incidence**

Although the definition of “heat season” as 1 May through 30 September each year is generally appropriate at most US Army installations, exertional heat illnesses (EHI) are a year-round problem, with varying severity depending on the installation; approximately 17% of all EHI occur outside of the heat season. See figure I-1.



For EHI incidence information for a specific location, see “Within-year Exertional Heat Illness Incidence in U.S. Army Soldiers, 2008-2012,” Public Health Report No. WS.0022479-15, Aberdeen Proving Ground, MD, June 2015 (accessible from the TRADOC Surgeon’s AKO file (<https://www.us.army.mil/suite/folder/34737450>)).

Glossary

Section I

Abbreviations

DA	Department of the Army
EMS	emergency medical service
HSM	heat stress monitors
ICD-10	International Classification of Diseases, 10th revision
TR	TRADOC Regulation
TRADOC	U.S. Army Training and Doctrine Command
W	watt
WBGT	wet bulb globe temperature