DEPARTMENT OF THE ARMY
OFFICE OF THE SURGEON GENERAL
5109 LEESBURG PIKE
FALLS CHURCH, VA 22041-3258

REPLY TO
ATTENTION OF
DASG-PPM-NC

23 JAN 2004

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Cold Weather Injury Prevention Program

1. No unit is immune to the effects of a cold environment. The threat of cold weather injuries (CWIs) exists not only for troops who are deployed or participating in field exercises, but also for personnel in garrison. While freezing temperatures of arctic and sub-arctic regions pose an obvious threat, the occasional cold weather spell or wet or damp conditions in warmer areas represent a different, but equally important threat. Unit commanders in all locations must remain vigilant in order to prevent cold injuries.

2. The prevention of CWIs requires unqualified command emphasis. From 1997 to 2002, there have been 1,998 reported cases of CWIs among Soldiers. Unit surgeons, preventive medicine, and other medical personnel must advise Army unit commanders. They assure that commanders and leaders know how to define risks, assess hazards, and develop and implement controls to prevent cold weather injuries. Guidance for a "Cold Weather Injury Prevention Program" is enclosed. Ultimately, commanders prevent cold weather injuries.

3. Inappropriate use of heaters in tents caused two carbon monoxide poisoning deaths at Fort Irwin in January 2001. There is a new Army-approved Family of Space Heaters that will make it easier to heat tents safely, effectively, and efficiently.

4. My points of contact are COL P.K. Underwood, Preventive Medicine Staff Officer, Proponency Office for Preventive Medicine, Office of The Surgeon General, commercial (703) 681-3160, DSN 761-3160, or e-mail Paula.Underwood@otsg.amedd.army.mil and Mr. Terrence Lee, U.S. Army Center for Health Promotion and Preventive Medicine, commercial (410) 436-2464, DSN 584-2464, or e-mail Terrence.Lee@apg.amedd.army.mil.

Encl

JAMES B. PEAKE, M.D.
Lieutenant General
The Surgeon General

DASG-PPM-NC
Subject: Cold Weather Injury Prevention Program

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Cold Weather Injury (CWI) Prevention Program
2003-2004

1. References:

a. USARIEM Technical Note TN 02-2 "Sustaining Health & Performance in Cold Weather Operations" October 2001. http://www.usariem.army.mil/download/cold0102.pdf

b. USARIEM Technical Note 93-4, "Medical Aspects of Cold Weather Operations: A Handbook for Medical Officers" April 1993.[1] http://www.usariem.army.mil/download/weather.pdf

c. USACHPPM website: http://chppm-www.apgea.army.mil/coldinjury/.[2] This website contains a variety of cold injury prevention information and training products, produced by USACHPPM.

d. FM 100-14 Risk Management, 23 April 1998.

e. Countermeasure Magazine, "Family of Space Heaters (FOSH)—Emphasis on Safety," Joseph Mackoul, October 2003. http://safety.army.mil/home.html

2. A comprehensive cold weather injury (CWI) prevention program should follow principles of Risk Management by identifying hazards, assessing hazards in terms of severity and probability, and implementing appropriate controls to abate hazards. Spot-checking and supervision by first-line leaders should be employed to ensure control measures are implemented. Units train using Risk Management principles; therefore, it is imperative that commanders and leaders are educated on prevention of cold weather injuries using this terminology. **Cold weather casualty prevention is a Command responsibility**. Appendix 1 is a Risk Management Guide that can assist leaders in preventing cold weather injuries.

3. CWIs include freezing and non-freezing injuries. Appendix 2 provides guidance in distinguishing among the various types of CWIs. In addition, Appendix 2 discusses reporting requirements. Medical treatment facilities (MTFs) are required to report all cases of cold weather injury to the Army Medical Surveillance Activity as part of the Reportable Medical Events System (RMES). Preventive Medicine personnel at supporting MTFs should receive local reports of possible cold weather injuries, investigate and compile required information, and report injuries electronically to the RMES. Preventive medicine personnel need to synchronize CWI data with the Installation Safety Officer.

4. Appendix 3 provides general guidance that should be used when planning for physical fitness training in cold weather environments. Appendix 4 provides the Wind Chill Temperature Table adopted in 2001 by the Air Force Weather Agency for use at military installations worldwide. The 2001 chart identifies three "danger" zones. In addition, this appendix contains recommendations on training guidance and uniform wear, which correspond to the three "danger" zones.

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[1] Please note: Do NOT use the "Windchill Chart" in this handbook, because it has been updated since this handbook was printed. Instead, use the "Wind Chill Temperature Index" in reference 1 (a). Ration-Cold Weather described in this handbook has been replaced with Meal-Cold Weather.

[2] Please note that a new USACHPPM Fact sheet is available, "Guidance of the Use of Heathers inside Tents and Other Enclosed Shelters," http://chppm-www.apgea.army.mil/documents/FACT/55-007-1003.pdf

5. Commercial unvented kerosene or propane heaters release exhaust fumes directly into the living space that have resulted in injuries and deaths to soldiers inside the tent. There is a new Army approved Family of Space Heaters (FOSH) that will make it much easier to heat tents safely, effectively, and efficiently. These newly developed heaters use the latest advances in combustion, power generation, and microprocessor technology to replace the World War II-vintage M-1941 potbelly and M-1950 Yukon heaters. CHPPM factsheet reference (c) provides guidance on the use of heaters inside tents and other enclosures. In addition, reference (e) provides information on the Army regulations on the use of unvented space heaters in living quarters or enclosed locations where Soldiers sleep, on personal heater use, fire watches, and where proper heaters can be procured.

Appendices

1. Risk Management Steps for Preventing Cold Casualties
2. Clinical Guidance for Case Classification and Reporting Requirements
3. General Guidance for Cold-Weather Physical Fitness Training (PT)
4. Wind Chill Temperature Table with Training and Uniform Guidance (October 2001)

Appendix 1
Unit Leader's and Instructor's Risk Management Steps for Preventing Cold Casualties
Risk Management is the Process of Identifying and Controlling Hazards to Protect the Force

Possible Outcomes of Inadequate Climatic Cold Management:

- Chilblain (due to bare skin exposed to cold, humid air)
- Immersion Foot (Trench Foot) (due to wet feet)
- Frostbite (freezing of tissue and body parts)
- Hypothermia (whole body temperature dangerously low)
- Dehydration
- Snow Blindness
- Carbon Monoxide Poisoning

The Five Steps of Risk Management Are:

1 Identify Hazards

- Cold (temperature 40° F and below)
- Wet (rain, snow, ice, humidity) or wet clothes
- Wind (wind speed 5 mph and higher)
- Lack of adequate shelter/clothing
- Lack of provisions/water
- Other Risk Factors include:
  - 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
  - Cold casualties in the previous 2-3 days

2 Assess Hazards

Follow the Wind Chill Temperature Table to Determine the Danger Level

Do individuals have adequate shelter/clothing?

- Are clothes clean without stains, holes or blemishes (which could decrease heat-retaining function)?

Have meals been consumed?

- Are meals warm?

Are there other circumstances?

- Is there contact with bare metal or fuel/POL (petroleum, oils or lubricants)?
- Is the environment wet? Is there contact with wet materials or wet ground?
- Can soldier move around to keep warm?
- Are feet dry and warm?
- Is the soldier with a buddy who can assist/watch over to prevent cold injures?

USING THE WIND CHILL TEMPERATURE TABLE

The wind chill index (see table below) gives the equivalent temperature of the cooling power of wind on exposed flesh.

- Any movement of air (running, riding in open vehicles, or helicopter downwash) has the same effect as wind.
- Any dry clothing (mittens, scarves, masks) or material which reduces wind exposure will help protect the covered skin.

Trench foot injuries can occur at any point on the wind chill chart and -

- Are much more likely to occur than frostbite at "LITTLE DANGER" wind chill temperatures, especially on extended exercises/missions and/or in wet environments.
- Can lead to permanent disability, just like frostbite.

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	-18	-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
				LITTLE DANGER				INCREASED DANGER						GREAT DANGER				

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)

Wind Chill Category (see Wind Chill Temperature Table above)

Work Intensity	Little Danger	Increased Danger	Great Danger
High Digging foxhole, running, marching with rucksack, making or breaking bivouac	Increased surveillance by small unit leaders; Black gloves with liners mandatory below 32°F (0°C), mittens with liners mandatory below 10°F (-12°C)	ECWCS* or equivalent; Mittens with liners; No facial camouflage; Exposed skin covered and kept dry; Rest in warm, sheltered area; Vapor barrier boots below 0°F (-18°C) Provide warming facilities	Postpone non-essential training; Essential tasks only with <15 minute exposure; Work groups of no less than 2; Cover all exposed skin, Provide warming facilities
Low Walking, marching without rucksack, drill and ceremony	Increased surveillance; Cover exposed flesh when possible; Mittens with liner and no facial camouflage below 10°F (-12°C); Full head cover below 0°F (-18°C). Keep skin dry - especially around nose and mouth.	Restrict Non-essential training; 30-40 minute work cycles with frequent supervisory surveillance for essential tasks. See above.	Cancel Outdoor Training
Sedentary Sentry duty, eating, resting, sleeping, clerical work	See above; Full head cover and no facial camouflage below 10°F (-12°C); Cold-weather boots (VB) below 0°F (-18°C); Shorten duty cycles; Provide warming facilities	Postpone non-essential training; 15-20 minute work cycles for essential tasks; Work groups of no less than 2 personnel; No exposed skin	Cancel Outdoor Training

*ECWCS – Extended Cold Weather Clothing System

These guidelines are generalized for worldwide use. Commanders of units with extensive extreme cold-weather training and specialized equipment may opt to use less conservative guidelines.

3 CONTROL HAZARDS

MAIN POINTS TO STRESS TO SOLDIERS

When using Cold-Weather Clothing, Remember . . .

C-O-L-D

Keep it..... **C**lean

Avoid..... **O**verheating

Wear it..... **L**oose in layers

Keep it ..... **D**ry

MAIN POINTS TO STRESS TO LEADERS

Follow these **Wind Chill Preventive Medicine Measures based on Wind Chill Temperature**

30°F and below	Alert personnel to the potential for cold injuries
25°F and below	Leaders inspect personnel for wear of cold weather clothing. Provide warm-up tents/areas/hot beverages.
0°F and below	Leaders inspect personnel for cold injuries. Increase the frequency of guard rotations to warming areas. Discourage smoking.
-10°F and below	Initiate the buddy system. Have personnel check each other for cold injuries.
-20°F and below	Consider modifying or curtailing all but mission-essential field operations.

NOTE: TRENCH FOOT can occur at any temperature - Always Keep Feet Warm and Dry

GENERAL GUIDANCE FOR ALL COLD-WEATHER TRAINING

Skin: Exposed skin is more likely to develop frostbite, therefore cover skin. Avoid wet skin (common around the nose and mouth). Inspect hands, feet, face and ears frequently for signs of frostbite.

Clothing: Soldiers must change into dry clothing at least daily and whenever clothing becomes wet. Soldiers must wash and dry feet and put on dry socks.

Nutrition: 4500 calories / day / soldier. Equivalent to 3 meal packets in meal-cold weather (MCW) or 3-4 MRE's.

Hydration: 3-6 Liters (canteens) / day / soldier. Warm, sweet drinks are useful for re-warming.

Camouflage: Obscures detection of cold injuries; consider not using below 32° F; not recommended below 10°F.

Responsibilities: Soldiers are responsible for preventing individual cold injuries. Unit NCO's are responsible for the health and safety of their troops. **Cold injury prevention is a command responsibility.**

PERSONAL PROTECTION

Ensure Appropriate Clothes and Proper Wearing of Clothes –

- Wear clothing loose and in layers.
- Ensure all clothing is clean.
- Ensure proper boots are worn and are dry.
- Ensure clothes do not have holes, broken zippers, etc.
- Ensure hands, fingers, and head are covered and protected.
- Avoid spilling liquids on skin or clothes. Liquid stains will reduce clothing's protective efforts.
- Change wet, damp clothes ASAP.

Keep Body Warm

- Keep moving.
- Exercise big muscles (arms, shoulders, trunk, and legs) to keep warm.
- Avoid alcohol use (alcohol impairs the body's ability to shiver).
- Avoid standing on cold, wet ground.
- Avoid tobacco products which decrease blood flow to skin.
- Eat all meals to maintain energy.
- Drink water or warm non-alcoholic fluids to prevent dehydration.

Protect Feet

- Keep socks clean and dry.
- Wash feet daily, if possible.
- Carry extra pairs of socks.
- Change wet or damp socks ASAP; use foot powder on feet and boots.
- Avoid tight socks and boots; do not over-tighten boot or shoes.
- Wear overshoes to keep boots dry.

Protect Hands

- Wear gloves, mittens, or gloves/mittens with inserts.
- Warm hands under clothes if they become numb.
- Avoid skin contact with snow, fuel or bare metal. Wear proper gloves when handling fuel or bare metal.
- Waterproof gloves by treating with waterproofing compounds.

3 CONTROL HAZARDS CONTINUED

PERSONAL PROTECTION CONTINUED

Protect Face and Ears

- Cover face and ears with scarf. Wear insulated cap with flaps over ears or balaclava.
- Warm face and ears by covering them with your hands. Do NOT rub face or ears.
- Consider not using face camouflage when wind chill is 32° F or below; not recommended below 10° F.
- Wear sunscreen.
- Exercise facial muscles.

Protect Your Eyes

- Wear sunglasses to prevent snow blindness.
- If sunglasses are not available, protective slit goggles can be made from cutting slits in cardboard (e.g., MRE cardboard box).

Protect Each Other

- Watch for signs of frostbite and other cold weather injuries in your buddy.
- Ask about and assist with re-warming of feet, hand, ears or face.

Prevent Carbon Monoxide Poisoning

- Use only Army-approved heaters in sleeping areas.
- Do not sleep near exhaust of a vehicle while vehicle is running.
- Do not sleep in enclosed area where an open fire is burning.

LEADERSHIP CONTROLS

- Discontinue/limit activities/exercise during very cold weather (see chart page 2).
- Use covered vehicles for troop transport.
- Have warming tents available.
- Have warm food and drink on hand.

FACILITY CONTROLS

- Use only Army-approved heaters. (i.e., no kerosene or propane heaters).
- Ensure heaters are in working order and adequately ventilated.
- Ensure integrity of shelters for maximum protection from the cold.

4 Implement Controls

- Identified controls are in place
- Controls are integrated into SOPs
  - Educate soldiers about hazards and controls (including newly arrived soldiers)
  - Implement buddy system to check clothes/personal protection
- Decision to accept risk is a command responsibility
- Buddy System to check each other
- Self Checks

5 Supervise and Evaluate

- Ensure all soldiers are educated about prevention, recognition and treatment of cold weather injuries.
- Delegate responsibilities to ensure control measures have been implemented.
- Monitor adequacy/progress of implementation of control measures.
- Do frequent spot checks of clothes, personal protection and hydration.
- Record and monitor indicators of increasing cold risks, for example:
  - Increasing number of cold weather injuries
  - Increased complaints/comments about cold
  - Observations of shivering, signs of cold weather injuries
- Evaluate current control measures and strategize new or more efficient ways to keep warm and avoid cold injuries

See

for electronic versions of this document and other resources

Cold Weather Casualties and Injuries Chart

- Train soldiers on the proper use of cold weather clothing
- Remember the acronym C-O-L-D when wearing clothing in cold weather

(C: keep it Clean; O: avoid Overdressing; L: wear clothing Loose and in layers; D: keep clothing Dry)

- Maintain adequate hydration and ensure nutritional requirements are met

Cold Weather Casualties and Injuries			
Chilblain			
Cause	Symptoms	First-Aid	Prevention
■ Repeated exposure of bare skin for prolonged periods from 20°-60°F with high humidity (for those not acclimated to cold weather).	■ Swollen, red skin (or darkening of the skin in dark-skinned soldiers). ■ Tender, hot skin, usually accompanied by itching.	■ Warm affected area with direct body heat. ■ Do not massage or rub affected areas. ■ Do not wet the area or rub it with snow or ice. ■ Do not expose affected area to open fire, stove, or any other intense heat source.	■ Use contact gloves to handle all equipment; never use bare hands to handle equipment, especially metal. ■ Use approved gloves to handle all fuel and POL* products. ■ In the extreme cold environment, do not remove clothing immediately after heavy exertion (PT); until you are in a warmer location. ■ Never wear cotton clothing in the cold weather environment.
Immersion foot (trench foot)			
Cause	Symptoms	First-Aid	Prevention
■ Prolonged exposure of feet to wet conditions 32°-60°F. Inactivity and damp socks and boots (or tightly laced boots that impair circulation) speed onset and severity.	■ Cold, numb feet may progress to hot with shooting pains. ■ Swelling, redness, and bleeding.	■ If you suspect trench foot, get medical help **immediately!** ■ Re-warm feet by exposing them to warm air. ■ Do not allow victim to walk on injury. ■ Evacuate victim to a medical facility. ■ Do not massage, rub, moisten, or expose affected area to extreme heat.	■ Keep feet clean and dry; change wet or damp socks as soon as possible. ■ Wet or damp socks should be dried as soon as possible to allow them to be re-used. ■ The inside of Vapor Barrier boots should be wiped dry once per day, or more often as feet sweat. ■ Dry leather boots by stuffing with paper towels.
Frostbite			
Cause	Symptoms	First-Aid	Prevention
■ Freezing of tissue. e.g.: fingers, toes, ears, and other facial parts. ■ Exposure to bare skin on metal, extremely cool fuel and POL*, wind chill, and tight clothing - particularly boots - can make the problem worse.	■ Numbness in affected area. ■ Tingling, blistered, swollen, or tender areas. ■ Pale, yellowish, waxy-looking skin (grayish in dark-skinned soldiers). ■ Frozen tissue that feels wooden to the touch.	■ **Frostbite can lead to amputation! Evacuate immediately!** ■ Start first-aid immediately. Warm affected area with direct body heat. ■ Do not thaw frozen areas if treatment will be delayed. ■ Do not massage or rub affected areas. ■ Do not wet the area or rub it with snow or ice. ■ Do not expose affected area to open fire, stove, or any other intense heat source.	■ Use contact gloves to handle all equipment; never use bare hands to handle equipment. ■ Use approved gloves to handle fuel and POL*. ■ Never wear cotton clothing in the cold weather environment. ■ Keep face and ears covered and dry. ■ Keep socks clean and dry. ■ Avoid tight socks and boots.
Hypothermia			
Cause	Symptoms	First-Aid	Prevention
■ Prolonged cold exposure and body-heat loss. May occur at temperatures well above freezing, especially when a person is wet.	■ Shivering may or may not be present. ■ Drowsiness, mental slowness or lack of coordination. Can progress to unconsciousness, irregular heartbeat, and death.	■ This is the most serious cold exposure medical emergency and can lead to death! Get the soldier to a medical facility as soon as possible! ■ Even if a victim is cold and is not breathing, never assume someone is dead until determined by medical authorities! ■ Strip off wet clothing and wrap victim in blankets or a sleeping bag. ■ Place another person in sleeping bag as an additional heat source. ■ For the person with unconsciousness and very low heartbeat, minimize handling of the victim so as to not induce a heart attack.	■ Never wear cotton clothing in the cold weather environment. ■ Anticipate the need for warming areas for soldiers exposed to cold, wet conditions.
Additional Medical Considerations in the Cold Weather environment:			
Dehydration			
Cause	Symptoms	First-Aid	Prevention
■ Depletion of body fluids.	■ Dizziness. ■ Weakness. ■ Blurred vision.	■ Replace lost water. Water should be sipped, not gulped. ■ Get medical treatment.	■ At a minimum drink 3-6 quarts of fluid per day.
Snow Blindness			
Cause	Symptoms	First-Aid	Prevention
■ Burning of the cornea of the eye by exposure to intense UV rays of the sun in a snow-covered environment.	■ Pain, red, watery or gritty feeling in the eyes.	■ Rest and total darkness; bandage eyes with gauze. ■ Evacuate if no improvement within 24 hours.	■ Use sunglasses with side protection in a snow-covered environment. ■ If sunglasses are not available use improvised slit glasses.
Carbon Monoxide Poisoning			
Cause	Symptoms	First-Aid	Prevention
■ Replacement of oxygen with carbon monoxide in the blood stream caused by burning fuels without proper ventilation.	■ Headache, confusion, dizziness, excessive yawning. ■ Cherry red lips and mouth, grayish tint to lips and mouth (in dark-skinned individuals). ■Unconsciousness.	■ Move to fresh air. ■ CPR if needed. ■ Administer oxygen if available. Evacuate.	■ Use only Army-approved heaters in sleeping areas and ensure that personnel are properly licensed to operate the heaters. ■ Never sleep in running vehicles. ■ Always post a fire guard when operating a heater in sleeping areas.

*POL – Petroleum, oil or lubricants

ARMY COLD INJURY PREVENTION PROGRAM

Avoid Cold Casualties!

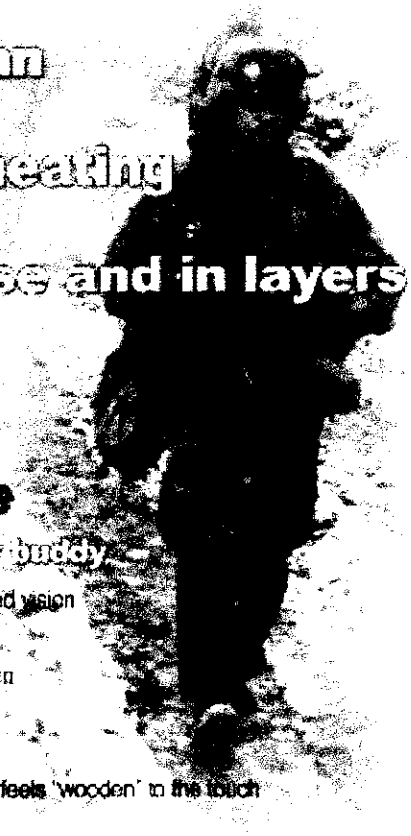
When using Cold-Weather Clothing, Remember C-O-L-D

C ~ Keep It...Clean

O ~ Avoid...Overheating

L ~ Wear It...Loose and in layers

D ~ Keep It...Dry



How to Spot Trouble

Notify an instructor if you or your buddy experience:

- Dizziness, weakness or blurred vision
- Swollen red or darkened skin
- Painful, tender, hot or itchy skin
- Numbness or tingling
- Bleeding or blistered skin
- Numb, gray or waxy skin that feels "wooden" to the touch
- Vigorous shivering
- Lack of coordination and impaired judgment
- Painful, red, watery or gritty feeling in the eyes (snow blindness)

Enclosed areas where heaters are used:

- Excessive yawning, cherry red lips or grayish tint to lips and mouth
- Confusion, disorientation or mental slowness
- Drowsiness, lack of coordination or unconsciousness

Army Values:
Loyalty
Duty
Respect
Selfless - Service
Honor
Integrity
Personal Courage

Appendix 2

Clinical Guidance for Case Classification and Reporting Requirements

Cold Weather Injuries (CWIs) include both freezing and non-freezing injuries. The guidance provided below is intended to help clinicians distinguish between the different types of injury.

1. **Freezing Cold Injuries** (Frostbite).

a. First-degree frostbite is an epidermal injury. The affected area is usually limited in extent, involving the skin that has had brief contact with very cold air, liquid (e.g. extremely cold fuel) or metal (e.g., touching an outside door handle). The frozen skin is initially a white or yellow plaque. It thaws quickly becoming wheal-like, red and painful. Since deep tissues are not frozen (though they may be cold) mobility is normal. The affected area may become edematous but does not blister. In 7-10 days, complete clinical healing follows desquamation of the frostbitten skin.

b. Second-degree frostbite involves the whole epidermis and may also affect superficial dermis. The initial frozen appearance is the same as in first-degree frostbite. Since the freezing involves deeper layers and usually occurs in tissue with prolonged cold exposure, some limitation of motion is present early. Thawing is rapid with return of mobility and appearance of pain in affected areas. A bulla, with clear fluid, forms in the injured area over several hours after thawing. The blister fluid is extravasated from the dermis. Usually, the upper layers of dermis are preserved which permits rapid re-epithelialization after injury. Second-degree injuries produce no permanent tissue loss. Healing is complete but takes three to four weeks. Some amount of first-degree injury is frequently present in the immediate vicinity of second-degree frostbite. Frostbite should be looked for on all other exposed areas. Following second-degree frostbite, cold sensitivity may persist in the injured area.

c. Third-degree frostbite involves the dermis to at least the reticular layer. Initially, the frozen tissue is stiff and restricts mobility. After thawing, mobility is restored briefly, but the affected skin swells rapidly and hemorrhagic bullae develop due to damage to the dermal vascular plexus. The swelling restricts mobility. Significant skin loss follows slowly through mummification and sloughing. Healing is also slow, progressing from adjacent and residual underlying dermis. There may be slight permanent tissue loss. Residual cold sensitivity is common.

d. Fourth-degree frostbite involves the full thickness of the skin and underlying tissue, even including bone. Initially the frozen tissue has no mobility. Thawing restores passive mobility, but intrinsic muscle function is lost. After thawing, reperfusion of the skin is poor. Bullae and edema do not develop. The affected area shows early necrotic change. The injury evolves slowly (weeks) to mummification, sloughing, and auto-amputation. Whatever dermal healing occurs is from adjacent skin. Significant permanent anatomic and functional loss is the rule.

e. Corneal frostbite is a rare, but profoundly disabling injury. The evolution is similar to any deep ocular keratitis. Permanent corneal opacification requiring corneal transplant is a common outcome.

2. **Non-Freezing Cold Injuries** (NFCI) can occur when conditions are cold and wet (air temperatures between 32 and 55 degrees F) and the hands and feet cannot be kept warm and dry. The most prominent non-freezing cold injuries are chillblain and trenchfoot.

a. Chilblain is a non-freezing cold injury that, while painful, causes little or no permanent impairment. It appears as red, swollen skin, which is tender, hot to the touch and may itch. This can worsen to an aching, prickly ("pins and needles") sensation and then numbness. It can develop in only a few hours in skin exposed to cold.

b. Trench foot is a serious non-freezing cold injury, which develops when skin of the feet is exposed to moisture and cold for prolonged periods (twelve hours or longer, usually many days or weeks). The combination of cold and moisture softens skin, causing tissue loss and, often, infection. Untreated, trench foot can eventually require amputation. Often, the first sign of trenchfoot is itching, numbness or tingling pain. Later the feet may appear swollen, and the skin mildly red, blue to black. Commonly, trench foot shows a

distinct "water-line" coinciding with the water level in the boot. Red or bluish blotches appear on the skin, sometimes with open weeping or bleeding. The risk of this potentially crippling injury is high during wet weather or when troops are deployed in wet areas. Soldiers wearing rubberized or tight-fitting boots are at risk for trenchfoot regardless of weather conditions, since sweat accumulates inside these boots and keeps the feet wet.

c. Hypothermia. Hypothermia is the clinical syndrome that results from reduced core temperature. By definition, hypothermia is considered to be present when the "core" temperature (clinically usually taken to be the same as rectal temperature) is below 95 degrees F (35 degrees C). Hypothermia is:

- *Mild* if temperature is between 89.6 degrees F (32 degrees C) and 95 degrees F.
- *Moderately severe* if temperature is between 82 degrees F (28 degrees C) and 89.5 degrees F.
- *Profound* if temperature is less than 82 degrees F.

Patients with a core temperature of 86 degrees F or less must be observed carefully for dysrhythmias. Hypothermia is always the product of loss of heat to the environment in excess of the rate of heat production by the body.

3. Distinguishing among first-degree frostbite, chilblain, and cold sensitivity. There is often confusion among practitioners when attempting to distinguish among first-degree frostbite, frostnip, and cold sensitivity. Often the patient history is not helpful, so reliance must be placed upon the clinical presentation. Consider the following guidance in distinguishing among these syndromes.

a. To make the diagnosis of first degree frostbite there must be clinical evidence of tissue damage (persistent erythema or numbness, edema, desquamation).

b. Frostnip is superficial and does not cause tissue damage.

c. Soldiers with a vasospastic disorder (like Raynaud's Disease) or prior history of CWI may have blanching or numbness upon exposure to cold temperatures, even when wearing appropriate cold weather clothing. This is cold sensitivity and should not be reported as a cold weather injury unless there is evidence of acute tissue injury (edema, desquamation, bullae, etc.).

4. Follow-up and profiling of CWIs.

a. Desquamation and bullae may take up to 72 hours to develop. Practitioners should consider scheduling follow-up visits in 72 hours to reassess injury evolution before diagnosing a cold weather injury.

b. Soldiers with CWI receive a profile IAW AR 40-501 para 3-46.

5. Reporting Cold Weather Injuries.

a. Reporting of CWIs is mandatory. Providers and supporting Preventive Medicine activities will collect appropriate clinical information and report cases within 72 hours through the Reportable Medical Events System. The Tri-Service Reportable Events list can be downloaded from the Army Medical Surveillance Activity website at the following URL: http://amsa.army.mil

b. In the "Comments" section of the report, indicate the following items:

- The anatomic location of the injury
- The degree of frostbite
- The core body temperature (for hypothermia cases)
- If the injury was duty-related
- Any unusual circumstances

c. Preventive Medicine personnel should synchronize injury data with the Installation Safety Officer

Appendix 3

General Guidance for all Cold-Weather Physical Training (PT)

1. Responsibilities: Cold Weather Injury prevention is a command responsibility. Unit non-commissioned officers are responsible for the health and safety of their troops and must set the example in how to conduct PT in the cold. Realistically, leadership at all levels, including platoon and squad leaders, need to ensure that Soldiers are compliant with actions to prevent individual cold injuries.

2. PT can be conducted outside during inclement weather. However, leaders should conduct PT indoors when severe environmental conditions exist. PT should not be conducted outside under the following conditions:

a. Extensive ice on roads, which is a potential risk for significant injury

b. Limited visibility, due to heavy rain or fog.

3. PT at or below 0 °F ambient air temperature or 0 °F wind chill is considered high-risk training. The Unit commander should take action under these conditions to conduct PT indoors.

4. The Unit commander should seek advice regarding specific additions to the standard PT uniform (e.g., black stocking cap, gloves, balaclava, neck gaiters, etc.) based on weather requirements.

a. First-line leaders should monitor individual uniform modifications in extreme weather.

b. During cold weather, the Army Physical Fitness Uniform (PFU) jacket and pants will be worn. Soldiers traveling to PT are allowed to wear extra clothing, such as the cold weather parka (Gortex jacket) as an outer garment.

c. Minimum cold weather PT uniform guidance should correspond to the wind chill categories as below:

COLD WEATHER RISK	PT UNIFORM GUIDANCE
LITTLE DANGER	PFU, jacket and pants, black knit cap, black gloves with inserts, neck gaiter.
INCREASING DANGER	PFU, jacket and pants, polypropylene top and bottom, balaclava, trigger finger mittens.
GREAT DANGER	Add ECW* Mittens, parka.

*ECWCS – Extended Cold Weather Clothing System

d. After physical fitness training, appropriate warming and changing facilities need to be provided. Individuals need to change into dry clothing as soon as possible. Fluid losses need to be replenished, preferably with warm, sweet drinks.

Appendix 4
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
				LITTLE DANGER				INCREASED DANGER					GREAT DANGER				

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)

Wind Chill Category

Work Intensity	Little Danger	Increased Danger	Great Danger
High **Digging foxhole, running, marching with rucksack, making or breaking bivouac**	Increased surveillance by small unit leaders; Black gloves with liners mandatory below 32°F (0°C), mittens with liners mandatory below 10 °F (-12°C)	ECWCS* or equivalent; Mittens with liners; No facial camouflage; Exposed skin covered and kept dry; Rest in warm, sheltered area; Vapor barrier boots below 0°F (-18°C) Provide warming facilities	Postpone non-essential training; Essential tasks only with <15 minute exposure; Work groups of no less than 2; Cover all exposed skin, Provide warming facilities
Low **Walking, marching without rucksack, drill and ceremony**	Increased surveillance; Cover exposed flesh when possible; Mittens with liner and no facial camouflage below 10°F(-12°C); Full head cover below 0°F (-18°C). Keep skin dry - especially around nose and mouth.	Restrict Non-essential training; 30-40 minute work cycles with frequent supervisory surveillance for essential tasks. See above.	Cancel Outdoor Training
Sedentary **Sentry duty, eating, resting, sleeping, clerical work**	See above; Full head cover and no facial camouflage below 10°F (-12°C); Cold-weather boots (VB) below 0°F (-18°C); Shorten duty cycles; Provide warming facilities	Postpone non-essential training; 15-20 minute work cycles for essential tasks; Work groups of no less than 2 personnel; No exposed skin	Cancel Outdoor Training

These guidelines are generalized for worldwide use. Commanders of units with extensive extreme cold-weather training and specialized equipment may opt to use less conservative guidelines.

Source: USARIEM Technical Note "SUSTAINING HEALTH & PERFORMANCE IN COLD WEATHER OPERATIONS," Oct. 2001
*ECWCS – Extended Cold Weather Clothing System