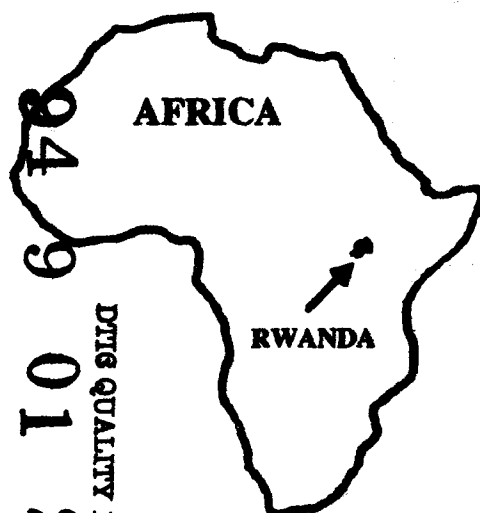


**SUSTAINING SOLDIER HEALTH AND PERFORMANCE DURING
OPERATION SUPPORT HOPE:**

GUIDANCE FOR SMALL UNIT LEADERS

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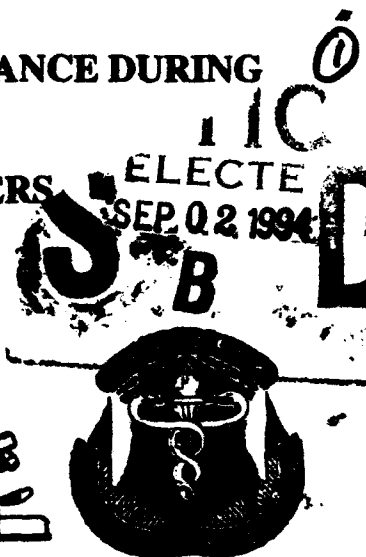


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**U.S. ARMY MEDICAL RESEARCH, DEVELOPMENT,
ACQUISITION & LOGISTICS COMMAND
FORT DETRICK, MARYLAND 21702-5012**

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AUGUST 1994**



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USARIEM Technical Note 94-3

***SUSTAINING SOLDIER HEALTH AND PERFORMANCE
IN OPERATION SUPPORT HOPE:
GUIDANCE FOR SMALL UNIT LEADERS***

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August 1994

U.S. ARMY MEDICAL RESEARCH, DEVELOPMENT,
ACQUISITION AND LOGISTICS COMMAND
FORT DETRICK, MARYLAND 21702-5012

**SUSTAINING SOLDIER HEALTH AND PERFORMANCE
IN OPERATION SUPPORT HOPE:
GUIDANCE FOR SMALL UNIT LEADERS**

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SUSTAINING SOLDIER HEALTH AND PERFORMANCE IN OPERATION SUPPORT HOPE:

FOREWORD

U.S. military personnel are deploying to Central Africa to provide humanitarian aid to Rwandan refugees who have concentrated in Rwanda, Uganda, Zaire, Burundi and Tanzania (RUZBT). Besides deployment stresses, personnel will encounter a harsh environment, disease risks and other mission stresses. Soldiers and airmen will confront an uncertain situation with great human suffering.

The U.S. Army Medical Research, Development, Acquisition and Logistics Command (USAMRDALC) has prepared this handbook of preventive medicine and behavioral guidance as a reference for unit commanders and NCOs deploying to RUZBT. It includes suggestions for sustainment of health and performance through predeployment, deployment, conduct of operations, and redeployment. It addresses important health issues including: disease hazards, environmental hazards, work-rest cycles, and soldier morale.

This guidance draws heavily upon knowledge and experience gained by USAMRDALC researchers over the past fifty years. Physicians, scientists and technicians obtained this knowledge by conducting laboratory and field research, and by observing

troops deployed around the world during training, humanitarian, peace-keeping and combat operations.

This document is not intended to replace policy or doctrine established by Headquarters, Department of the Army; the Training and Doctrine Command; Forces Command; Special Operations Command; Central Command; or that which is contained in other official publications. Rather it is intended as supplementary information, making this Command's "lessons learned" available to unit commanders.

We encourage users to provide critical comments and examples of their own "lessons learned" during operations in RUZBT to:

Commanding General
U.S. Army Medical Research, Development,
Acquisition and Logistics Command
ATTN: SGRD-OP
Fort Detrick, Maryland 21702-5012

Telephone: DSN: 343-7137
Commercial (301) 619-7137
FAX: (301) 619-2982

KEY POINTS

A. MOST IMPORTANT HEALTH HAZARDS TO SOLDIERS DEPLOYING TO RUZBT

<u>HAZARD</u>	<u>RESULT</u>
FOOD & WATER CONTAMINATION	DIARRHEA (e.g. CHOLERA, DYSENTERY) & OTHER DISEASES
DISEASES FROM LIVING & DEAD	AIDS, HEPATITIS & OTHER DISEASES
ANIMALS, TICKS & BITING INSECTS	MALARIA & OTHER ILLNESSES
CLIMATE & TERRAIN	ALTITUDE, COLD & HEAT ILLNESSES, TRAUMA
ACCIDENTS/VIOLENCE	UNPREDICTABLE CASUALTIES

B. KEY PREVENTIVE MEDICINE MEASURES

PREDEPLOYMENT PHASE:

- Start taking malaria medicine as prescribed.
- Get required immunizations.
- Review SOPs for field sanitation, water treatment and sleep discipline.
- Review SOPs for altitude, heat, cold, work/rest cycles, water discipline and buddy-aid/first-aid.
- Pack gear for hot-humid and cool-humid weather.
- Pack individual skin & eye protection (insect repellent, sunglasses, sunscreen, lip balm).
- Treat uniforms and mosquito netting with insect repellent (permethrin).
- Review African culture and current situation.
- Bring two pair of prescription eye glasses.
- Pack 6-month supply of prescription medication.
- Pack 6-month supply of feminine hygiene products.
- Maintain physical fitness.

DEPLOYMENT PHASE:

- Emphasize safety (injuries are common during early phases).
- Minimize sleep loss and jet lag.
- Drink plenty of fluids and eat regular meals.

OPERATIONAL PHASE:

- Assume all water, beverages and food from non-US military sources are contaminated.
- Enforce appropriate altitude, cold, heat and water discipline SOPs.
- Schedule and eat regular meals.
- Enforce sleep discipline.
- Bathe or shower daily if possible.
- Defecate only in constructed latrines or designated areas.
- Enforce use of DEET and permethrin insect repellent.
- Avoid wild and domestic animals.
- Keep soldiers informed and updated.
- Schedule regular recreation and stress alleviation debriefings.
- Emphasize safety at all times.
- Assume that prostitutes are infected with AIDS.

REDEPLOYMENT PHASE:

- Prepare for reunion with family.
- Schedule stress reduction debriefings.
- Report any illness to medical professionals.
- Continue malaria medicine, as prescribed, following return.

SUSTAINING HEALTH AND PERFORMANCE DURING OPERATION SUPPORT HOPE

INTRODUCTION

In Rwanda, Uganda, Zaire, Burundi and Tanzania (RUZBT), large numbers of refugees are living and dying in impoverished conditions that create a vast array of health hazards. Public health services are nearly non-existent and disease incidence is very high. In addition, ethnic tensions can result in sporadic violent acts between rival groups. U.S. military personnel will be exposed to serious health hazards while in RUZBT. Personnel will also face a potentially harsh environment that includes mountainous terrain and humid weather. If these hazards are allowed to affect unit personnel, the unit's ability to perform its mission will be seriously degraded.

Rwanda's population consists of three ethnic groups: Hutus (88%), Tutsis (11%), and Twa pygmies (1%). The main religions are Roman Catholic (65%), Protestant (9%), and Muslim (1%). The official languages are French and Kinyarwanda with Kiswahili spoken in commercial centers. The Republic of Rwanda has been torn apart by ethnic division and a civil war between the majority Hutu and minority Tutsi. An estimated 1 million people were killed within a recent three month period. The Tutsi-led Rwanda Patriotic Front was victorious and has formed a new government. Subsequently, many refugees (mostly Hutus) have fled Rwanda to neighboring Zaire (~2 million), Tanzania (~480,000), Burundi

(~200,000) and Uganda (~10,000). In addition, another 1 million refugees are believed to be within Rwanda. These refugees have concentrated in huge numbers at barren places with no sanitation, polluted water and little food. These conditions have caused great suffering and mass death.

The RUZBT region, which straddles the equator, encompasses a variety of terrain and climate. In the Zaire River Basin of western Zaire, heat and humidity can be severe, with temperatures reaching the low to mid 90's. To the east of this basin, terrain rises to Zaire's central plain with elevation ranging from 700 to 1,600 feet above sea level. At this elevation, the heat is less severe. Temperatures in the central plain range from 72 to 80 °F, although it is humid and rainy. During the wet season, the rivers crossing Zaire's central plain (the Ubangi, Zaire and Kasai are the largest) often flood, creating mobility problems. To the west and south of Zaire's central plain, the terrain becomes hilly reaching elevations of 1,600 to 3,300 feet above sea level. The rugged Mutumba Mountain Range runs north to south through Zaire's eastern highlands. Here, elevations over 3,300 feet are common, and mountain peaks reach nearly 17,000 feet. It is considerably cooler in the central highlands, particularly at night when temperatures occasionally fall to freezing. To the west of the highlands, the terrain falls away toward the western arm of the Rift valley. This valley forms a natural border between Eastern Zaire and Western Rwanda and Uganda.

Rwanda's western border with Zaire is formed by the Great Rift Valley, Lake Kivu and the Rusizi River. Most of this region is more than 3,000 feet above sea level, and Lake

Kivu is at about 4,800 feet. To the east of the valley are the rugged volcanic Virunga Mountains, running North to South. This region averages 9,000 feet above sea level, and some peaks reach almost 15,000 feet. To the east of the mountains, Rwanda's central region is hilly with elevations ranging from 3,300 to 6,600 feet. Rwanda's eastern region consists of grassy savannas that stretch toward the swamps and marshlands of the Kagera River which borders Tanzania. Despite Rwanda's location just below the equator, the climate is very moderate, with highs in the upper 70's and lows in the 50's throughout most of the country. Temperatures are cooler in the higher elevations of the Virunga Mountains, sometimes falling as low as freezing during the night, with occasional snow and frost. Rwanda has two rainy seasons: October through December, and March through May. The heaviest rain falls in the western regions bordering Zaire, with less rainfall in the central plateaus and eastern grasslands.

North of Rwanda and east of Zaire lies Uganda. The Rift Valley runs north to south along Uganda's western border with Zaire. The countries lowest elevations are in this region, with depressions as low as 3,000 feet below sea level. East of the Rift Valley are Uganda's highest mountains, the Mufumbiro and Ruwenzori ranges. Elevations there are generally higher than 5,000 feet above sea level, with peaks reaching nearly 12,000 feet. To the east, most of Uganda lies in the Central African Plateau that extends to Uganda's eastern border with Kenya and the southern border with Tanzania. The central plateau has an average elevation of 3,300 feet above sea level. North and northeast of the central plateau, the Imatong Mountains, the Labwor Hills and the Kenya Highlands reach

elevations ranging from 6,000 to 8,300 feet. Like Rwanda, Uganda's climate is fairly temperate despite its equatorial location, due to the higher elevations. Temperatures range from highs in the low 80's to lows in the mid 60's, except in the higher mountains where temperatures are cooler. The rainy seasons vary regionally throughout Uganda, but generally occur between March and May and again between September and November.

This guide is designed to help unit leaders accomplish the mission by providing information on how to sustain soldier's health and fitness while deployed to RUZBT. It provides an aid to identify anticipated health hazards and describes some actions which can be taken to minimize the effects of these hazards. Because it is designed to meet the needs of non-medical units it does not provide detailed medical information. The guide is organized to be both a predeployment planning resource and a reference for use during operations.

INFECTIOUS DISEASE HAZARDS & HYGIENE

Many more serious infectious diseases exist in RUZBT than in the United States. Soldiers will be in close contact with local populations, as such they are vulnerable to contagious diseases. Many diseases not only seriously affect individual soldiers but rapidly degrade the mission capability of entire units. For these reasons great care is needed to prevent infectious diseases before epidemics occur. U.S. soldiers are particularly vulnerable because they have not been exposed to many of these diseases and

consequently have no immunity to them. Fortunately, leaders and soldiers can control the risk of infection. Many of the diseases encountered in RUZBT, even some of the potentially life threatening ones, begin with these symptoms: headache, muscle aches, and fever. These flu-like symptoms should be treated seriously.

A. DISEASES FROM FOOD & WATER CONSUMPTION

1. Problems with Food & Water Consumption

Infectious diarrhea results from contamination of water and food by bacteria, viruses and parasites. Contamination occurs because of improper purification of water, inadequate cooking, handling or storage of food and water, and breakdowns in field sanitation. Water and food borne diarrheal diseases are of particular concern to the military because they can be spread to large numbers of soldiers simultaneously with disastrous consequences for mission readiness. Diarrhea is the principal symptom, but nausea, vomiting, fever and other symptoms can be caused by these diseases. Some of these diseases, like **cholera** and **typhoid**, and **dysentery** can be severe and life-threatening. Parasites (amoebas, giardia, tapeworms, etc.) consumed in water or undercooked food, especially meat and fish, can cause prolonged diarrhea. Diarrhea, especially when vomiting or fever are present, can cause dehydration.

**WATER IN RUZBT MUST BE
CONSIDERED CONTAMINATED**

**All local, non-U.S. military water supplies must be
disinfected prior to use, even for washing.**

2. Countermeasures for Disease from Food & Water Consumption

a. **Drink water or beverages only from approved U.S. military water sources,** which are properly treated and routinely tested. Be aware that even bottled water from unknown or unapproved sources can be contaminated. If in doubt, soldiers should treat water in their canteens with iodine tablets. **Assume all ice is contaminated.**

b. Disinfect water in canteens with iodine tablets (NSN 6850-00-985-7166). Disinfection of water in Lyster bags or 5 gallon cans is done with Chlorine Ampules (Chlorine Kit, Water Purification, Type 1, (NSN 6850-00-270-6225). Disinfection of water in 400 gallon water trailers is done with Calcium Hypochlorite Powder (Calcium Hypochlorite, 6 ounce jar, NSN 6810-00-255-0471).

c. Do not add beverage flavoring directly to bulk water storage containers. Beverage flavoring reduces the effectiveness of water disinfectants.

d. Safeguard water from contamination or theft. Animals will attempt to lick the spouts of unprotected Lyster bags. This may contaminate the spout and infect the next person drinking from it. Elevate Lyster bags well above the ground or take other protective steps.

e. **Consume food only from approved U.S. military sources.** Perishable food must be refrigerated, adequately cooked and served steaming hot. Soldiers eating only standard military rations (MREs or tray packs) are at low risk of diarrheal disease.

f. Do not eat or store any MRE components if the packet has been opened.

g. Follow proper field sanitation for disposal of waste and maintenance of latrines.

h. Practice good personal hygiene. Wash your hands to protect yourself and others from infectious disease. Do not bathe, swim or wash clothes in local water such as lakes, rivers and ponds.

3. Care & First Aid for Diarrheal Disease

- a. Individuals with severe or prolonged diarrhea and/or vomiting should be medically evaluated.
- b. Diseases causing diarrhea and vomiting will cause dehydration. Assure that adequate fluids and salts are consumed. If "A" rations are available, the ingredients for replacement fluids can be obtained from field kitchens. See Appendix "C" for fluid replacement recipes which can be used to treat fluid loss due to dehydration. Commercial "sport-drinks" (U.S.) are also acceptable.

B. DISEASES FROM INSECTS

1. Problems with Insect-borne Diseases

Many insects thrive in RUZBT. They are capable of spreading diseases to soldiers. Mosquitoes, for example, are common during the spring and summer months, especially in wet, marshy, or flooded areas. Several of these diseases are serious and some, such as malaria, can be fatal if not treated. Examples of other insects and types of disease they transmit include:

Mosquitoes - Malaria, Dengue (Break-bone) Fever, Chikungunya Fever, Rift Valley Fever, Yellow Fever

Sand Flies - Sand Fly Fever, Baghdad Sore (Cutaneous Leishmaniasis), Kala Azar (Visceral Leishmaniasis)

Ticks - Crimean-Congo Hemorrhagic Fever, African Tick Typhus, Relapsing Fever

Lice and Fleas - Typhus, Plague, Relapsing Fever, African Trypanosomiasis (sleeping sickness)

All biting flies and insects are considered carriers of disease. Steps should be taken to control their numbers and prevent biting. Almost all diseases from insects cause severe flu-like symptoms with fever, muscle aches, weakness and headaches. Other signs or symptoms may include rashes, swollen lymph nodes (glands), joint pain, shaking chills, sweats, nausea or vomiting. These symptoms must be treated seriously.

2. Countermeasures for Diseases from Insects

a. **Take anti-malarial medication as prescribed!** Malaria is a serious illness and can be fatal. Malaria, one of the most common diseases in this area, causes recurrent

fever, shaking chills and sweats alternating with fever-free periods. Malaria prevention measures are essential to maintain the health of soldiers in RUZBT.

b. Apply insect repellent, skin lotion, DEET extended duration (NSN 6840-01-284-3982) to exposed skin and to the first three inches covered by the uniform during the months of insect activity. This skin repellent is effective up to 12 hours. Apply it at least two times per day during periods when insects are prevalent.

c. Protect clothing with permethrin (also known as Permanone) insect repellent, during the months of insect activity. Spray permethrin aerosol (NSN 6840-01-278-1336) on the outside of the BDU until it looks wet. Allow the uniform to dry completely before putting it on. Reapply after every 6 washings or 6 weeks, whichever comes first. Treat bed netting with permethrin in the same fashion as the BDU. Treating the bed netting is crucial because sand flies are small enough to penetrate the untreated webbing.

d. Conduct periodic personal and "buddy" checks for ticks and other biting insects, especially when moving in brush or grass. Ticks should be removed from the skin by firmly grasping the head of the tick with tweezers and removing the tick with a gentle steady pull.

e. Wear blouse, trousers and shirts properly to prevent tick bites. Trouser legs should be tucked inside boots.

f. Remember, measures to control insects include good personal hygiene, proper disposal of garbage and human waste, and keeping food and water covered. Insect breeding areas such as pools of water in old tires, cans, buckets and ditches should be drained.

C. DISEASES FROM ANIMALS

1. Problems of Diseases from Animals

In RUZBT, animals have many diseases they can transmit directly or indirectly to soldiers. Dogs, cats, other domestic and wild animals may transmit **rabies** through bites and scratches. **Animal bites or scratches must be evaluated by medical personnel.** If a soldier is infected with rabies and does not receive anti-rabies shots immediately, the disease is always fatal.

Diseases such as **Brucellosis**, **"Q" fever**, and **Anthrax** are found in goats, sheep and cattle. Infection may result from consumption of local milk and other dairy products, from breathing dust-like particles from infected animals or their feces, and direct contact with animal tissues, urine or blood. These diseases cause headache, fever, chills, sweating, and body aches as well as other more specific symptoms.

2. Countermeasures for Diseases from Animals

- a. Avoid all unnecessary contact with domestic or wild animals. **Camp pets are forbidden.**
- b. Avoid contact with meat, hides, carcasses, blood, urine and wastes of animals.
- c. Do not work or live in sheds, or other areas where livestock have been housed or slaughtered.
- d. Practice proper sanitary disposal of food and other waste material.

3. Care of Diseases from Animals

Bites and scratches from animals should be cleaned with soap and uncontaminated water. Because of the possibility of rabies, immediate medical care should be obtained even for apparently insignificant bites and scratches.

D. DISEASES FROM PEOPLE

- 1. **Respiratory tract infections** such as colds, flu, strep throat, and sinusitis are common, especially in crowded living conditions. Although these infections are relatively

mild, they affect many soldiers at once and can have a serious impact on military readiness. Respiratory diseases are second only to diarrheal diseases as a cause of lost duty time. To control respiratory disease transmission, minimize crowding in living spaces. Maintain good ventilation and alternate sleeping positions (head to foot) to reduce the spread of respiratory diseases. These measures also help prevent the spread of more serious diseases such as tuberculosis.

2. **Meningitis** (an infection of the brain lining) is spread through direct contact with droplets from the nose and throat of infected people. It can be rapidly fatal. The meningococcal vaccine given to U.S. soldiers protects against the types of meningitis that most often cause epidemics in RUZBT. The same personal protective measures that prevent respiratory infections also prevent the spread of meningitis.

3. **Sexually transmitted diseases**, including gonorrhea, syphilis, genital warts, herpes, hepatitis B infection, and infection with the **AIDS virus (HIV)**, occur frequently in RUZBT. Abstinence is the best way to prevent sexually transmitted diseases. Prophylactics (condoms) are only partially effective in preventing disease. Since many of these diseases are potentially serious, a physician should be consulted if genital discomfort, sores (painful or painless), or unusual discharge develop.

Assume that prostitutes are infected with AIDS virus.
About 1 in 3 people are infected with HIV in RUZBT .

4. **Hepatitis**, a liver disease, can be caused by several types of viruses. Epidemic hepatitis (type A or type E) is spread from person to person through contaminated water or food. Serum hepatitis (type B or type C) is spread by sexual contact, blood transfusion, or contaminated needles and medical instruments. Both forms of hepatitis cause fever, intestinal symptoms and jaundice (yellow skin). When a person is infected with one of these viruses, many weeks may pass before any symptoms emerge.

Immune serum globulin (ISG) shots protect against the most common type of hepatitis (type A), but shots do not protect against the other forms of hepatitis (types B, C or E). Booster shots of ISG are needed every three months to maintain protection. Since hepatitis A and E are acquired from contaminated food and water, they can be prevented by the same measures used to prevent any of the other food and waterborne diseases (see Section A above).

Hepatitis B vaccine is protective and is required for Army medical personnel. Other measures to protect against Hepatitis B include: 1) wearing gloves and other protective cover when exposed to blood or body fluids, 2) avoiding sexual contact, 3) avoiding sharing razors, and 4) immediate washing of hands and other body parts that have come in contact with body fluids. Personnel involved in handling corpses should refer to Appendix "D" for precautions. **Hepatitis prevention is critical since viral hepatitis IS NOT treatable.**

E. DISEASES FROM CONTACT WITH SOIL & WATER

1. **Hookworms** enter the body from the soil by penetrating bare skin (such as bare feet). **Roundworms** and **whipworms** enter through the mouth when a soldier swallows small bits of soil containing worm eggs. All of these worms cause intestinal (gut) disease and other symptoms, such as coughing or red snake-like trails under the skin. To prevent these diseases, soldiers should be cautioned not to walk bare foot and not to lie down and expose skin to the soil. They should not eat local food and must carefully wash hands and eating utensils.

2. **Tetanus (Lockjaw)** is a global threat; therefore all soldiers should have a tetanus booster at least every 10 years. It enters the body through puncture wounds, all of which should be medically evaluated and thoroughly cleaned.

3. **Snail fever (schistosomiasis)** is caused by microscopic worms found in fresh water and can affect many organ systems. Worms enter the body by penetrating skin exposed to infested water. To avoid snail fever, soldiers should not bathe, swim or wade in streams, rivers, ponds, canals, stock tanks or any body of freshwater, unless it is known to be adequately treated chemically. When military operations require fording any body of freshwater, some protection is provided by blousing (tucking) trousers tightly into the boots and by covering as much skin as possible. The burrowing parasites may also be rubbed from the skin by immediately drying exposed areas with a towel or cloth.

4. Mud fever (Leptospirosis) is contracted primarily by skin contact with water, mud or surfaces contaminated with infected urine of a variety of wild and domestic animals. The disease can cause sudden headache, chills, severe muscle aches, and bloodshot eyes. This disease can be prevented by avoiding contaminated water. If water must be entered, boots and clothing provide some element of protection.

F. DISEASES & IRRITATION OF THE SKIN

1. Problems with Skin Diseases & Irritations

Exposed skin is particularly vulnerable to drying conditions which may cause cracking or scaling. Conversely, sweating and chafing, combined with humid conditions can result in irritation, breakdown and erosion of the skin, especially in the feet, groin, abdominal folds, armpits, under breasts and where backpack or load bearing equipment (LBE) rubs. Skin conditions predispose soldiers to bacterial and fungal infections.

2. Countermeasures for Skin Diseases & Irritations

a. Practice good personal hygiene to protect the skin. Handwashing and bathing or showering should be done as often as practical. If bathing is not possible, areas where sweat accumulates should be cleaned with a wash cloth at least daily (sponge bath).

- b. Keep uniforms clean and dry.
- c. Keep feet clean and dry. Frequently change to dry socks.

3. Treatment and care of skin problems

- a. Use non-irritating moisturizing cream if skin becomes dry or cracked.
- b. Dry moist areas of skin if irritation develops and apply powders such as talc.
- c. Treat athletes foot, jock rash, and similar fungal rashes with appropriate anti-fungal powders and creams to alleviate the condition and to prevent secondary bacterial infections.
- d. Persistent rashes in moist areas such as the groin, under the breasts or on the feet require medical evaluation. Female soldiers who develop persistent vaginitis should seek medical attention. Soldiers who develop a persistent sore, especially with red streaks or swollen lymph nodes, should also seek medical attention.

G. VACCINES & OTHER PREVENTIVE MEASURES

1. Vaccines are available to prevent many infectious diseases. The U.S. military requires certain vaccinations (immunizations) routinely and others for specific deployments. Vaccines recommended by U.S. MEDCOM guidance prior to deployment at the time of this writing (August 1994) include:

- Immune Serum Globulin (ISG) - first dose predeployment and a booster dose every 3 months to prevent Hepatitis A
- Tetanus-Diphtheria - last dose within 10 years
- Oral Polio - primary 3 dose series, plus one adult booster
- Influenza (current year)
- Typhoid - 2 dose basic series plus booster in last three years
- Yellow Fever - last dose within 10 years
- Meningococcal - quadrivalent with last dose in past 3 years
- Measles - record of at least one shot or be born before 1957

These vaccines are approved by the U.S. Food and Drug Administration (FDA). Medical personnel are responsible for screening shot records and administering vaccinations. Soldiers are responsible for making sure shot records are up-to-date and that they receive the required immunizations.

2. Screen soldiers for Tuberculosis (TB) by skin testing before and after deployment.

3. **Prophylactic (Preventive) Medications.** The only preventive medications recommended for RUZBT are for Malaria - these are either **mefloquine** (once a week) for most soldiers or **doxycycline** (once a day) for those on flight status or having special reasons not to take mefloquine. In addition, after leaving the malarious area, all soldiers should take primaquine one tablet once a day for 14 days and mefloquine once a week for four weeks. Until more information is available, women should avoid becoming pregnant while taking these medications.

PLANT, INSECT & SNAKE HAZARDS

Many native plants and animals in RUZBT can cause harm to soldiers. The threat ranges from minor wounds and rashes to rapidly fatal poisoning. The threat is magnified for US military personnel who may be unfamiliar with native species and unaware of their potential danger.

A. PLANTS

1. Problems with Plants

Some plants in RUZBT have thorns which can puncture the skin and cause infections. Other plants can cause rashes by touching the skin, just like poison ivy. Contact with smoke from the burning of these plants can cause skin rashes and damage to the lungs. Many plants will cause poisoning if chewed or swallowed.

2. Countermeasures for Problems with Plants

- a. Avoid skin contact with harmful plants. Use clothing for protection.
- b. Clean clothing after contact with harmful plants. Clothing can be decontaminated by washing with soap and hot water.
- c. Seek medical evaluation if injury or poisoning from plants occur.

B. INSECTS, SPIDERS, CENTIPEDES & SCORPIONS

1. Problems with Insects, Spiders, Centipedes & Scorpions

There are many poisonous insects, centipedes, scorpions and spiders, including black widow spiders, in RUZBT. The effect of their poisons can range from severe pain and ulceration of skin and muscle to rapid death. These small and inconspicuous creatures are likely to be encountered around buildings and tents.

2. Countermeasures for Insects, Spiders, Centipedes & Scorpions

- a. Avoid contact with poisonous insects, spiders, centipedes and scorpions. This means extra vigilance in areas where these creatures live.
- b. Avoid sleeping on the ground.
- c. Shake out boots, uniforms and bedding before use to eliminate any creatures that may have crawled in.

3. Care for Insect, Spider, Centipede & Scorpion Problems

Seek medical attention if bitten or stung. First aid includes icing the wound (with uncontaminated ice) and immobilizing the body part involved. Tourniquets or cutting the wound to suck out the poison are not helpful and may cause harm.

C. SNAKES

1. Problems with Snakes

RUZBT has many very poisonous snakes including the boomslang, the twig snake, cobras, puff adders, mambas, and vipers. Without treatment, a snake bite can be rapidly fatal. Many snakes are well camouflaged and few give "warning signals."

ALL SNAKES SHOULD BE CONSIDERED POISONOUS.

2. Countermeasures for Problems with Snakes

- a. Do not handle or play with snakes.

- b. Avoid areas where snakes may be found.

3. First Aid for Snake Bites

Get medical attention immediately if bitten by a snake! First aid consists of immobilizing the bitten arm or leg and keeping the soldier at rest. Apply uncontaminated ice to the bite to slow the spread of venom and reduce pain. Tourniquets and attempts to suck venom out of the wound can cause more harm than good.

ENVIRONMENTAL HAZARDS

Soldiers will be subjected to a wide range of environmental hazards. Much of the RUZBT region is humid and damp. Heat stress, especially in the western and northern Zaire where humidity is high and daytime temperatures often reach 95°F, will be a problem for soldiers performing heavy work. However, in contrast to recent deployments, fewer soldiers will operate in areas where severe heat stress is a concern. On the other hand, soldiers may be exposed to mild to moderate cold stress and damp conditions. Despite the equatorial location of RUZBT, temperatures in eastern Zaire, central Uganda and western and central Rwanda range from nighttime minimums near 50 °F to daytime highs near 80°F. These cool temperatures result from the relatively high elevation that characterizes the RUZBT region. Many if not most of the RUZBT areas in which US soldiers will be

operating are at elevations in excess of 4,500 feet above sea level. Besides the cool temperatures, "thin" high altitude air will impact on soldier health and performance.

A. HIGHLAND REGIONS

In Highland and Mountain regions of RUZBT, soldiers will be affected by lower oxygen in the air at higher elevations ("thin" air) as well as by steep and rugged terrain. "Thin" air can cause altitude illness, spoil sleep, and degrade physical and mental work capacity. These effects become more severe as the altitude increases.

1. Problems with Highlands

Up to 25% of soldiers rapidly deployed from low altitude to highlands over 5,000 feet will develop Acute Mountain Sickness (often called "AMS"). AMS can begin within the first few hours or days at high altitude. AMS can feel like a "hangover" with headache, nausea, general weakness and fatigue. Some soldiers get sick enough to vomit. The illness will go away by itself in 1-3 days as the body adjusts to "thin" air. Hard physical work during the first few days in the mountains increases the risk of getting AMS. Being in good physical condition does not prevent it. AMS is not usually dangerous to a soldier's health. However, AMS can affect soldier performance.

Another health problem experienced in highlands is poor sleep. Soldiers may experience "bad" dreams and periods of not breathing for many seconds while they are sleeping. Poor sleep makes soldiers tired and affects their concentration the next day.

There is also a very rare possibility that soldiers who ascend to high mountain peaks could develop a dangerous excess of fluid in their brain or lungs called "high altitude edema." High altitude edema in the brain or lung could be fatal. Symptoms of these conditions include severe headaches, disorientation, confusion, shortness of breath and cough. Soldiers who experience these symptoms should be medically evaluated.

Soldiers will experience a small decrease in ability to do hard physical work in the central plateau regions of Rwanda, and a more pronounced decrement in the highlands and mountains of western Rwanda, eastern Zaire and Southeastern Uganda. Endurance and work capacity will improve over one to three weeks as the body adapts to the "thin" air. Likewise, mental performance and the ability to concentrate also may be degraded in the highlands and mountains, but this too will improve with time.

Rugged terrain and steep slopes in the highlands and mountain of Ruzizi can cause falls and other accidents. The risk of falling is especially high because the "thin" air can cause soldiers to become careless. Soldiers can get cuts, bruises, sprains, broken bones and head injuries from falling. Soldiers may be at particularly high risk when attempting to rescue or evacuate a fellow soldier who has fallen.

2. Countermeasures for Problems in Highlands

- a. Prevent altitude illnesses by allowing the body time to adapt to the "thin" air of high altitude. This can be accomplished by climbing to higher elevations slowly. Soldiers should stop and rest for a day (and a night) at 5,000 ft before continuing to climb higher. Soldiers deploying by vehicle must also stop and rest at this altitude before going higher.
- b. Maintain adequate hydration by drinking plenty of liquids, but avoid alcoholic beverages.
- c. Limit physical activity during the first 24 to 48 hours in the highlands to reduce the risk of getting AMS.
- d. Soldiers working in the high mountainous regions (over 8,000 ft) may benefit from taking acetazolamide (Diamox®) before going into the mountains to prevent AMS. Mild side effects of the medication include tingling sensations in the fingers, toes and lips. This medication is probably unnecessary for soldiers working at the moderate altitudes of the central plateaus of Rwanda and Uganda.
- e. Plan for decreased physical and mental work ability. These impairments caused by "thin" air can only be prevented by breathing bottled oxygen, which is not practical in most military operations.

f. Be cautious and vigilant to the danger of falling when walking, running or climbing in the mountains. Recreational rock or mountain climbing should be discouraged because it increases the danger of injuries.

3. First Aid for Acute Mountain Sickness

- a. Soldiers with AMS should avoid physical exertion and stay well hydrated.
- b. AMS can be treated, as well as prevented, with the medication acetazolamide (Diamox®). Descent to lower altitude is the treatment of choice for AMS.
- c. The headache of AMS often can be helped by taking medications like ibuprofen (Advil® or Motrin®) or indomethacin (Indocin®). Aspirin and acetaminophen (Tylenol®) are often less effective, but can also be used.
- d. Poor sleep in the mountains can be helped with acetazolamide. Many sleeping pills that work well at lower altitudes can worsen AMS.

B. COLD WEATHER

In the mountains and highland plateaus, nighttime temperatures can become quite cold. Cold weather can lower body temperature, resulting in impaired performance and

cold injuries. When body heat loss exceeds the body's ability to produce and retain heat, body temperature decreases. When body temperature falls below 95°F (35°C), hypothermia, a life-threatening condition, follows. To slow body heat loss, the body has responses that decrease blood flow to the arms, legs and skin. Although these responses protect the internal organs, the decreased blood flow increases susceptibility of the hands, feet, ears, etc. to cold injuries.

1. Problems with Cold Weather

Cold stress. Wind and rain often accompany cold temperatures, especially in the highland and mountain regions. Despite being close to the equator, frost, snow and ice can be encountered in the high mountains of RUZBT. These conditions can worsen the effects of cold, especially if the clothing becomes wet. For any given air temperature, the potential for body-heat loss, skin cooling and decreased body temperature is increased by wind and wetness.

Soldiers use clothing and shelter to protect themselves from cold weather. When this protection is inadequate, the body protects its temperature by reducing skin blood flow and by shivering. When the soldier notices these responses, it is a signal that clothing and shelter are inadequate. Shivering and physical activity cause the body to produce more heat. The more vigorous the activity, the more heat is produced. However, intense

physical activity is fatiguing, and cannot be sustained indefinitely. Also, sweating during heavy exercise can wet the clothing making it less effective in protecting from cold. Inactivity for long periods increases the risk of cold injury.

Heavy physical work and sweating in the cold leads to dehydration, which increases susceptibility to cold injury. Poorly conditioned soldiers are more susceptible to cold injury. They tire more quickly and are unable to stay active to keep warm as long as fit soldiers. Lean soldiers are more susceptible to cold injury because they lack body fat, which is an excellent insulator. Illness, poor nutrition, and injury limit the soldiers' ability to protect against cold injury.

Alcohol consumption increases susceptibility to cold injury by blunting shivering and accelerating heat loss. Alcohol increases urine formation, which may lead to dehydration. Alcohol numbs the senses and impairs judgement, so the individual may not feel the signs of developing cold injury.

Cold Injuries. The cool to mildly cold temperatures likely to be encountered by soldiers deployed to RUZBT are not severe enough for freezing cold injuries (frostnip, frostbite) to be of serious concern. Even in the mountains above 6,000 feet, conditions only rarely reach the extremes necessary to freeze tissue. On the other hand, temperatures in the highlands and plateaus may, especially at night and/or during wet weather, fall low

enough to cause nonfreezing cold injuries such as chilblain and hypothermia. Trenchfoot may also become a problem for soldiers operating in cool, wet weather.

Chilblain is a nonfreezing cold injury that, while painful, causes little or no permanent impairment. The affected skin becomes tender, red, swollen, and hot to the touch and may itch, ache and become numb. Chilblain can develop in only a few hours in skin exposed to cold.

Trenchfoot and Immersion Foot ("paddyfoot") are serious injuries which develop when skin of the feet, is exposed to moisture for prolonged periods (12 hours or longer). Cold accelerates the injury. The combination of moisture and cold softens skin, causing sores and infection. Untreated, trenchfoot can eventually require amputation. Often, the first symptoms are itching, numbness or tingling pain. Later the feet may appear swollen, and the skin mildly red, blue or black. Commonly, trenchfoot shows a distinct "water-line" coinciding with the area of injury.

Hypothermia is a life-threatening condition in which body temperature falls below 95°F (35°C). Body temperature can fall even when air temperatures are above freezing if conditions are windy and clothing is wet. The first signs of developing hypothermia might include confusion, bizarre behavior and withdrawal from group interaction. Victims of hypothermia may be unconscious, with nearly undetectable breathing and pulse.

2. Countermeasures for Problems in Cold Weather

- a. Conduct essential training for cold weather operations before deployment.
- b. Maintain peak physical fitness. High levels of fitness are beneficial for participation in cold-weather operations.
- c. Reduce periods of inactivity in cold conditions.
- d. Maintain proper hydration and nutrition to reduce susceptibility to cold injuries. During cold-weather operations, consume half a quart (half a canteen) of water with each meal and before going to sleep at night. An additional half quart should be consumed every hour during the workday (more if the work is strenuous enough to cause the individual to sweat).
- e. Monitor hydration status by noting the color and volume of a soldier's urine. **Dark yellow urine indicates that fluid consumption should be increased.** Squad leaders should attempt to monitor urine color of squad members.
- f. Avoid alcohol, caffeine and tobacco because of their adverse effects in the cold.

g. Keep hands, feet and skin dry. Change socks whenever they become wet or sweaty. Extra socks can be air dried and then carried under BDUs to keep warm.

h. Keep clothing clean and dry. Dirty clothing packs down, loses insulation, and prevents evaporation of sweat. Wet clothing increases heat loss and reduces protection.

i. Wear clothes in layers. Layered clothing allows the soldier to adjust to changes in temperature or workload. Wearing layered clothing is especially important for soldiers whose duties require them to move in and out of heated spaces, or to periodically undertake vigorous physical activity.

j. Wear clothes that allow air flow (ventilation) and evaporation of sweat. Physically active people sweat even in cold weather. If sweat cannot evaporate, it will accumulate.

k. Soldiers should sleep in underwear with other clothing hung up to dry in tents.

l. Use lip balm to prevent chapped lips and skin (Cold Climate Lipstick, Antichap, NSN 6508-01-277-2903).

3. First Aid for Cold Injuries

a. For **Chilblain** and **Trenchfoot**, prevent further cold exposure. Remove wet or constrictive clothing. Gently wash and dry the injured part and elevate it. Cover the injured area with layers of loose warm clothing and allow to rewarm. Pain and blisters may develop. **Do not pop blisters, do not apply lotions or creams, do not massage, do not** expose to extreme heat or allow victim to walk on injury. Seek medical attention.

b. For **Hypothermia**, prevent further cold exposure and remove wet clothing. **Initiate CPR if required.** Rewarm the victim by wrapping with blankets, sleeping bags and by body-to-body contact. Handle gently during treatment and evacuation because hypothermic victims can experience irregular heartbeat.

C. HOT WEATHER

Heat stress can occur anywhere within RUZBT depending on physical activity (work rate), hydration, heat acclimatization, clothing and climatic conditions. Normally, excess body heat is lost through several physiological mechanisms; however, when air temperature is above skin temperature, evaporation of sweat is the only mechanism for heat loss. High relative humidity, however, limits sweat evaporation and increases heat strain. Following sweat loss, water must be consumed to replace this loss. If the body fluid

lost through sweating is not replaced, dehydration will follow. Dehydration will lead to additional heat strain, reduced work performance and degraded mission capability.

1. Problems in Hot Weather

Heat Stress. Heat, high humidity and exposure to the sun make it difficult for the body to regulate its temperature. Hot weather increases water requirements, because body water is lost as sweat. Sweat rates can be high even when the skin looks and feels dry, since sweat will evaporate quickly in relatively dry and windy conditions. Dehydration reduces the benefits of heat acclimatization and physical fitness, increases the risk of heat illness, and reduces work capacity, appetite and alertness. The greater the dehydration, the more severe the effects will be.

Soldiers usually do not replace body water losses, even when drinking water is readily available. **Thirst is a poor indicator of dehydration.** Soldiers must constantly remind themselves, or be reminded, to drink in order to replace lost sweat. Ensuring regular consumption of water is the responsibility of the unit leader and NCOs. The high chlorine levels required to sanitize water in RUZBT may cause soldiers to drink less than they need until they get used to the taste. **Guidelines for water replacement are provided in Appendix B.**

Heat Injury/Illness. One heat casualty is usually followed by others. The occurrence of a heat casualty is a warning that the entire unit may be at immediate risk. This is the **Weak Link Rule: As soon as the first heat casualty occurs, assess the status of the whole unit.** There are several heat illnesses/injuries of varying degrees of severity including heat rash, sunburn, heat cramps, heat exhaustion and heat stroke.

Heat Rash is a skin rash most commonly found on clothed areas of the body. Heat rash can impair body heat loss and degrade performance for many days even after it disappears. Avoid heat rash by washing and keeping the skin clean and dry.

Sunburn is a skin burn due to over-exposure to the sun. Sunburn can impair body heat loss and degrade performance. Avoid sunburns by covering skin with clothing and sunscreen.

Heat Cramps are due to excessive salt and water losses which cause muscle cramps involving the abdomen, legs, and arms. Heat cramps most often occur in soldiers who are not acclimatized to the heat. Avoid heat cramps by maintaining proper nutrition and hydration.

Heat Exhaustion includes symptoms of fatigue, nausea, dizziness, fainting, vomiting, mild changes in mental function (e.g., disorientation, irritability) and elevated

temperature. Avoid heat exhaustion by employing appropriate work-rest cycles and maintaining full hydration (see Appendix B).

Heat Stroke includes all of the above signs and symptoms, but is more severe and can be fatal. The victim will be hot and disoriented or unconscious. Avoid heat stroke by employing work/rest cycles and maintaining full hydration.

2. Countermeasures for Problems in Hot Weather

The key to preventing heat illness and sustaining performance is knowledge of the environmental conditions. Leaders must have accurate weather information for the location. Heat illness prevention guidance is based on Wet Bulb Globe Temperature (WBGT) readings (TB MED 507, FM 21-11, and GTA 8-5-45, see References). Appendix E provides tips for measurement of WBGT. Measures to prevent heat illness fall into several categories: acclimatization/physical fitness, hydration/nutrition, work rest cycles/reduced heat exposure, and clothing/equipment/supplies.

Humidity levels over 75% contribute to an increased risk of heat injury.
WBGT guidelines do not accurately forecast heat illness rates under conditions of high humidity.

a. Acclimatization/Physical Fitness

1. Attain the best possible physical fitness and heat acclimatization prior to deployment. Maintain adequate levels of physical fitness after deployment with maintenance programs tailored to the environment. Physically fit troops acclimatize to heat more rapidly than less fit soldiers.
2. Significant heat acclimatization requires at least three to five days. Full heat acclimatization takes six to twelve days. Heat acclimatization requires two hours per day of carefully supervised exercise in the heat. Increase physical activity each day until full acclimatization is achieved.
3. Realize that acclimatization does NOT reduce, and may actually increase, water requirements. Heat acclimatization increases sweating which enhances evaporative cooling. Increased sweating requires additional water consumption.

**It is dangerous and inappropriate to
reduce water consumption.**

b. Hydration/Nutrition

1. Emphasize the importance of maintaining hydration. Almost any contingency of military operations will act to interfere with maintenance of hydration. The guidance for water consumption requirements given in Appendix B is approximate and was developed assuming that soldiers would be fully acclimatized, physically fit, fully hydrated and rested. If soldiers are not fully acclimatized and hydrated, the work-rest guidance (also in Appendix B) must be changed to allow more frequent rest.

2. Establish mandatory drinking schedules which replace water lost by sweating. Use the tables provided in Appendix B. Water requirements may exceed the body's ability to absorb fluid. Most soldiers can absorb up to 1.5 quarts per hour. Soldiers should not be expected to drink more than this amount per hour, and water requirements can be made up over longer periods of time.

3. Plan operations to provide water resupply points at a maximum interval of every three hours. One-hour intervals are more desirable. Carry as much water as possible when separated from approved sources of drinking water. Assure that soldiers always have at least one full canteen in reserve; know when and where water resupply will be available. Soldiers can live longer without food than without water.

4. Complete consumption of rations with use of salt packets is essential to provide an adequate salt intake. Soldiers may have a few days of increased salt requirements upon initial deployment because sweat is salty prior to acclimatization. **Additional salt supplementation is not appropriate** unless medically indicated and supervised by medical personnel.

5. Monitor hydration status by noting the color and volume of a soldier's urine. Soldiers should be taught that the lighter the urine color, the better hydrated a soldier is; and that **dark yellow urine and infrequent urination indicate that fluid consumption should be increased**. Squad leaders should attempt to monitor urine color of squad members.

6. Remove barriers to drinking. Make flavored, cool water accessible and provide enough time to drink and eat. *Soldiers drink most of their water with meals*, and improving water availability increases food consumption.

7. Carbohydrate and electrolyte beverages (sport-drinks) are not required, and if used should not be the only source of liquid. For healthy soldiers, these beverages generally provide no advantage over water, however, they can enhance fluid consumption because of their flavor.

8. Drink water instead of splashing it on skin. Water splashed on the skin is wasted water; it might briefly improve comfort, but does little to sustain performance and avoid heat illness.

c. Work-Rest Cycles/Reduced Heat Exposure

1. Review procedures for the management of work/rest cycles and maintenance of adequate water consumption. Establish work/rest schedules using the Tables in Appendix B.

2. Prevent a dangerous increase in body temperature by minimizing heat production through reducing work pace and increasing rest periods. Body temperatures can rise very rapidly due to the combination of excessive heat, clothing and equipment worn and sustained activity.

3. Plan to perform heavy work (including PT) in early morning or cool evening hours whenever possible. In addition, provide shade whenever possible.

d. Clothing/Equipment/Supplies

1. Wear uniforms appropriately to protect against sun, wind and other hazards. Use hats, head cloths, and sunscreen as necessary. Remember, soldiers must be

cautious to counterbalance the hazards of sun, wind, insects and other factors with the desire to loosen and take-off clothing to improve ventilation and increase heat loss.

2. Keep clothing clean, since clean clothes protect better and help prevent skin rashes. Whenever possible, wash clothing and air-dry or sun-dry. Change socks at least twice a day.

e. First Aid for Heat Illness

1. Watch for signs of overheating which include: inability to work, red or flushed face, confusion or disorientation and fainting. It is always better to take care of a problem early. When in doubt, treat as a heat illness.

2. Immediately get heat-stricken soldiers into the shade, ventilate and remove any heavy clothing. If they are alert and not vomiting, have them slowly drink water. They will probably need at least 3 quarts. The water should be cool but not cold.

3. Seek medical evaluation for heat casualties even though mild signs and symptoms may be controlled by rest, shade, ventilation and water. Give the highest priority for medical evacuation to soldiers who are incoherent or unconscious; they may have heat stroke or some other serious illness.

4. Wet the skin or T-shirt (with uncontaminated water) and fan the casualty. If available, immersion in cool water is the best way of reducing body temperature. A field expedient immersion device can be built from tent canvas mounted in a frame off the ground. If an above-ground frame cannot be constructed, a shallow pit lined with canvas can be used.

5. Drink liquids that contain some added salt or electrolytes for heat cramps. If the victim can drink, slowly give no more than 1.5 quarts per hour using either salted water (one or two teaspoons or MRE packets of table salt per quart), or oral rehydration solution (described in Appendix C) or commercial glucose/electrolyte beverages (sport-drinks).

OCCUPATIONAL AND OPERATIONAL HAZARDS

Frustration and stress reactions are normal, expected behavior experienced by soldiers placed in unusual or catastrophic situations. Adverse reactions can be reduced by providing soldiers with accurate mission information and preparing them for cultural differences and for exposure to traumatic events.

**Well-trained, and well-led soldiers can succeed
under the harshest circumstances.**

A. OPERATIONAL STRESS

1. Problems of Operational Stress

Ambiguity concerning the mission and uncertainty about deployment length are the most common sources of stress among soldiers. In addition, frustration might occur because the situation in RUZBT and the refugee camps will not get better immediately.

Living conditions are characterized by poverty, misery, and tragedy. Observing the widespread sickness, suffering, starvation and death of the refugees will cause strong emotional reactions. Soldiers will need to channel their emotions into constructive behaviors. Soldiers may experience a critical traumatic event that produces a reaction so strong that it is repeatedly relived in memories, daydreams, nightmares, or flashbacks. These soldiers may have difficulty sleeping, be hyperalert, startle easily, or try to avoid places, sights, smells and people associated with the incident. They may not be able to express emotions easily and may feel detached from other soldiers in the unit.

Be aware of other potential sources of stress such as boredom and living or working in close quarters (aircraft, vehicles, tents, etc.). Deployment also interrupts daily routines, and places soldiers in unfamiliar surroundings, which may cause difficulty.

Operational stresses are compounded for some soldiers when they deploy because they leave behind their non-unit emotional support system. Families and civilian social groups (such as church groups, athletic clubs, etc.) are no longer immediately available for support during periods of stress. Lack of emotional support can lead to withdrawal, belligerence, or other operational stress behavior.

After returning home, soldiers are often expected to return to duty quickly as though "nothing has changed." Until they talk to nondeployed personnel, soldiers may not recognize how much they have changed. Other soldiers (who did not deploy) may not understand how the soldier feels upon returning. This can leave soldiers feeling isolated and alienated.

2. Countermeasures for Operational Stress

a. **Educate soldiers.** Provide accurate information to soldiers so they have appropriate expectations and will be psychologically prepared. Transmit information through the chain of command on a routine basis so that soldiers rely on official sources. Information about mission background, rules of engagement, length of deployment, culture of the host country and rival factions, and disease threat will give soldiers a concrete focus for plans and actions.

b. **Continue training.** Training for current and future missions should not stop in country. Well-learned and practiced skills are less disrupted by stress. Realistic training builds confidence, improves cohesion and prevents boredom.

c. **Live as a team.** Encourage soldiers to handle issues (lack of privacy, personality conflicts, alienation, etc.) early, openly and as a team. A simple self-check and buddy-check system can identify and reduce the incidence of stress and increase overall unit effectiveness.

d. **Maintain unit cohesion.** Cohesive, well-disciplined units have fewer severe stress reactions. Soldiers should routinely debrief each other after an operation, and discuss what they saw and how they felt. Soldiers who have strong emotional reactions to traumatic events should be kept with the unit and treated as soldiers, not as casualties.

e. **Manage contacts with the injured, dying, and dead.** Soldiers who are caring for sick/injured refugees should have opportunities to take regular breaks away from the action. Soldiers who handle corpses should insulate themselves from the task by not looking at faces and not learning names or other personal information about the dead. Soldiers should put mental and physical barriers between themselves and the deceased and finish jobs quickly. Soldiers who say they cannot handle such duty should be excused whenever possible. Personnel should work in pairs; experienced soldiers should be paired with inexperienced ones.

f. **Schedule recreation.** Maintain physical fitness and engage in recreational activities to reduce stress. Recreational activities which include units of multinational forces will also serve to introduce soldiers to each other and prevent friction.

g. **Deliver mail.** Ensure that the unit's system for distributing mail is quick, efficient and effective. In particular, distribute pay vouchers in a timely manner.

h. **Allow decompression time.** Soldiers need time to relax and adjust to normal routines upon redeployment to their home station. Units should encourage soldiers to take leave.

B. SEPARATION STRESS

1. Problems with Separation Stress

Deployment is a time of anxiety for many families. Families need to plan for potential disruptions during the deployment. Families who know significant events, such as the birth of a child or the death of a parent, are imminent, have special needs.

Unresolved domestic problems distract the soldier. Single soldiers, newlyweds and single parents need to make different adjustments to deployment than those who have had time to develop stable relationships and adequate family support. Soldiers will be

concerned about the adequacy of the resources available to their families during their absence. Women soldiers may feel additional pressure to defend their decision to leave their families and serve in the Army. Recent mothers may experience extended post-partum depression. Soldiers often will not be able to explain emotions caused by family-related stress. They may be irritable, nervous, inattentive and have difficulty sleeping.

Soldiers returning from stressful duty often expect their families and friends to be just like they were when the soldier left. Families and friends change as they adjust to the absence of the soldier. They may become more self-reliant or they may begin to depend on another family member or friend.

2. Countermeasures for Separation Stress

a. **Make family members self-sufficient.** Ensure that families have the information and skills they need to manage their own and the soldier's personal affairs. Discuss routine responsibilities and the handling of minor emergencies. Build confidence by practicing these skills before deployment.

b. **Contact family support groups.** Introduce family members to available support groups (parents of soldiers, spouses of both genders and children of all ages should be included).

c. **Keep families and friends informed.** Establish effective official lines of communication with the home-base rear detachment. Encourage soldiers to write home. Unofficial communication, such as a unit newsletter written by deployed soldiers, can be effective in reducing rumors back home and families' fears about their loved ones' living and working conditions.

d. **Plan reunions.** Have soldiers discuss how they will talk with family members about what they have been through, how family members may have changed while they have been apart and the likelihood that families will not understand what they have experienced. Units that establish relationships with relief workers or local nationals should plan ways to reestablish communication with those individuals after the return home.

e. **Maintain networks.** Family support groups should not dissolve when soldiers come home. They can be useful in helping families deal with reunion stress.

C. FATIGUE

1. Problems Causing Fatigue

Jet lag. When soldiers are moved quickly from one part of the world to another, several days are required to adjust to new conditions. Upon arrival, body rhythms function as if they were still on home station time zones. Soldiers may have trouble sleeping when

they would normally be awake, especially if several time zones have been crossed. Soldiers with jet lag may be sleepy during the day, have degraded mental performance and have difficulty sleeping at night. Their biological clocks will gradually adjust in response to local sunrise and sunset, although the process of adjustment generally takes four to seven days if soldiers do not prepare in advance.

Sleep loss. Soldiers do more work and perform better when they are rested. Mental performance is affected by sleep loss earlier than physical performance. Sleepy soldiers do not always think clearly, plan effectively or follow procedures correctly. Performance on monotonous or repetitive tasks is degraded first. Symptoms of sleep loss include extreme sleepiness, lapses in attention, irritability, lack of initiative, susceptibility to accidents and decreased attention to self-care. All soldiers are affected by sleep loss, but leaders and command/control personnel who deal with many cognitive tasks and complex decision making are most vulnerable.

2. Countermeasures for Fatigue

a. **Minimize jet lag.** Be alert to sleep requirements before deployment. Soldiers deploying from CONUS should change work and sleep periods before deployment. If possible, duty hours and sleep time should gradually be shifted to the destination time zone. Preferably a day or two before deployment, soldiers should set their watches to the destination time zone. Cabin lighting and meal service on the aircraft should be

coordinated with the destination time zone; that is, a breakfast meal should be served to coincide with breakfast time in the destination time zone. As soon as they arrive in country, soldiers should begin working, eating and sleeping according to local time. They should participate in moderate exercise in daylight, avoid daytime naps and begin sleep at the "normal bed time" for the local time. This will help their body circadian rhythms adjust to the new time zone.

b. **Manage work-rest schedules.** For soldiers who will be assigned to work at night, several days to a week of operating at night and sleeping during the day are recommended to allow for circadian rhythm adjustments to new work schedules. The greatest disruption in night worker performance is usually attributable to poor quality daytime sleep, which tends to be intermittent and restless. Command attention should be given to ensure that night workers have adequate time for daytime sleep and to provide the best possible conditions for restful sleep.

c. **Minimize sleep loss.** Six to eight hours of sleep in each 24 hr day are optimal. Reasonable levels of productivity can be maintained for two to four days with four to five hours sleep per night. Taking naps of one to two hours should be encouraged when safely possible. Even 10-to 15-minute "power naps" are often helpful.

Sleep discipline SOPs should include provisions for recovery from sleep loss. Twelve hours of rest (including at least 8 hours of sleep) are needed after 36-48 hours of being

continuously awake. Two to three days of rest or light duty (including at least 8-10 hours sleep per day) are required to restore optimum performance after 72-96 hours of being continuously awake.

D. ACCIDENTS AND NON-BATTLE INJURIES

1. Problems with Accidents and Non-Battle Injuries

Accidents (particularly motor vehicle and aviation) and non-battle injuries have resulted in many disabilities and fatalities. This can reduce unit readiness, degrade effectiveness and disrupt operations. Non-battle injuries must be considered in the planning of all operations and actions should be taken to reduce the occurrence of accidents.

Factors contributing to serious injury include: abandonment of safety practices, poor visibility in inclement weather and rugged terrain, poor roads and poor traffic control, athletic injuries resulting from training and recreation, improper handling of weapons and ordnance (both U.S. and those left over from previous conflicts), and failure to wear proper eye protection against operational hazards. Fatigue caused by chronic sleep deprivation and high mission-related stress will compound many of these problems.

2. Countermeasures to Avoid Accidents and Non-Battle Injuries

- a. Plan missions and work with safety in mind.
- b. Establish system to identify hazards and breakdowns in safety procedures.
- c. Designate personnel to ensure that soldiers follow established safety standards and procedures.
- d. Emphasize vehicle safety (safety belts, speed limits).
- e. Avoid physical overtraining and minimize aggressiveness in sports.
- f. Enforce safety procedures for weapon and ordnance handling, and ordnance disposal policies.
- g. Make eye protection available and ensure proper use.

NUTRITION

Food and water are important in sustaining health, performance and morale. Ensure that soldiers follow sound nutritional practices in the field. More importantly, set the example for troops by practicing sound eating habits. Observe what your personnel are eating or failing to eat. Military rations are designed to provide balanced nutrition when consumed in their entirety. Do not assume that a meal issued is a meal fully consumed. Over consumption of non-issue food items often prevents soldiers from eating adequate military rations which ensure balanced nutrition.

Meals affect motivation and morale. Food intake is almost always higher at scheduled meals compared to unplanned meals. Hot meals will improve morale and increase food intake, try to schedule at least one hot meal per day. Establish regular meal time schedules, even when MREs are the only food.

Discourage soldiers from giving food to refugees.

The premature introduction of a high energy or high protein diet to a starving person can be fatal. Refeeding must begin gradually to protect the body from overload. Soldiers can help by donating leftover MRE's or other food items to a local food collection agency for appropriate distribution by the relief organizations.

APPENDIX A

Average Temperature, Humidity, and Rainfall for Selected RUZBT Locations

Numbers indicate, for a given month and location, the average daily high (H) temperature (°F), average low (L) temperature (°F), average percent relative humidity (RH), and average total monthly precipitation (P) in inches. Humidity listed below are midday values. At night and early AM, humidity typically rises to 80-95%.

Month	Goma Zaire (H/L/RH/P)	Kigali Rwanda (H/L/RH/P)	Entebbe Uganda (H/L/RH/P)	Kinshasa Zaire (H/L/RH/P)	Dar Es Salaam Tanzania (H/L/RH/P)
Jan	79/58/70/4.6	77/55/58/4.4	80/63/78/2.6	86/70/60/5.3	86/77/63/2.6
Feb	78/59/71/2.8	77/53/55/6.1	80/63/78/3.5	88/70/58/5.7	88/77/60/2.6
Mar	77/54/72/4.0	77/55/62/5.5	80/64/80/6.2	88/70/60/7.7	88/73/66/5.1
Apr	77/59/76/6.1	74/55/63/7.2	78/64/83/10.1	88/70/61/7.7	88/71/72/11.4
May	77/58/74/5.6	74/55/58/6.6	78/64/83/9.7	88/70/58/6.2	84/69/65/7.4
Jun	78/57/68/2.0	74/53/47/0.9	77/63/62/4.6	83/66/50/0.3	82/68/57/1.3
Jul	79/55/63/0.8	79/53/41/0.3	77/61/61/3.0	81/63/47/0.1	82/64/55/1.2
Aug	78/55/63/0.8	81/53/40/1.1	77/61/61/3.0	83/65/45/0.1	82/64/53/1.0
Sep	79/57/69/5.5	81/55/50/2.5	77/62/60/3.1	86/68/46/1.2	82/64/53/1.2
Oct	79/57/67/6.2	79/55/56/4.0	78/63/79/3.7	88/70/54/4.7	84/68/55/1.6
Nov	77/57/73/4.9	77/55/65/4.3	79/63/79/5.1	86/70/61/6.7	86/71/60/2.9
Dec	78/58/71/4.4	77/55/59/3.7	79/63/79/4.5	86/70/61/5.6	86/73/64/3.6
Elevation Feet above sea level	5,020	5,000	3,789	2,569	-

APPENDIX B

Use of Work-Rest and Water Consumption Tables

a. In contrast to the guidance provided in FM 21-10, the tables provided here contain guidance tailored for hot humid environments. The tables also contain guidance for a wider variety of work intensities (very light to heavy) and clothing ensembles than is normally provided.

Remember that these are average guidelines derived from a mathematical model which was developed from actual measurements in a large population of test subjects. Individual requirements and heat tolerance may vary widely. It is more important that leaders understand the trends (and underlying principles) presented in the tables than that they follow the guidance exactly. THE TABLES ARE NOT INTENDED TO BE A SUBSTITUTE FOR COMMON SENSE.

b. Be aware that the charts sometimes recommend hourly drinking of larger amounts of water than can possibly be absorbed during an hour. The maximum sweating rate (approx. 3 qts/hr), which is closely related to the maximum water requirement, is higher than the rate of water absorption from the gut (approx. 1.5 qts/hr). Whenever input of water fails to keep up with output of sweat the body will become progressively dehydrated. This can be tolerated for limited periods of time (at a penalty in health and performance), but eventually the deficit must be made up. LEADERS SHOULD PLAN FOR AN EXTENDED REST AND REHYDRATION PERIOD WHENEVER THE TABLES ADVISE DRINKING MORE THAN 1.5 QUARTS PER HOUR.

Table B-1: Work Intensities of Military Tasks

<u>PHYSICAL WORK INTENSITY</u>	<u>ACTIVITY</u>
VERY LIGHT	Standing In Foxhole
	Sitting In Truck
	Guard Duty
	Driving Truck
LIGHT	Cleaning Rifle
	Walking Hard Surface/ 2.2 mph, No Load
	Walking Hard Surface/ 2.2 mph 44 lb Load
	Walking Hard Surface/ 2.2 mph 66 lb load
	Lift 40 lbs & Carry 20 ft/ every 1 min
MODERATE	Walking Loose Sand/ 2.2 mph No Load
	Walking Hard Surface/ 3.5 mph No Load
	Calisthenics
	Walking Hard Surface/ 3.5 mph 44 lb Load
	Scouting Patrol
	Litter Carry - 2 Person/ 150 lb patient 300 ft every 4 mins
	Lifting 50 lbs to 4 ft every 20 secs
	Foxhole Digging
	Field Assaults
HEAVY	Lift 100 lbs & Carry 20 ft/ every 15 secs
	Walking Hard Surface/ 3.5 mph 66 lb Load
	Walking Hard Surface/ 4.5 mph No Load
	Litter Carry - 2 Person/ 150 lb patient 300 ft every 90 secs
	Emplacement Digging

* Note: all marching and walking activities are assumed to be on flat (0 grade) surfaces. Marching up inclines, particularly with heavy loads, requires metabolic rates higher than the upper limit for the Heavy work category above (often twice as much).

Table B-2
Number of Minutes of Work per Hour in Sustained Work/Rest Cycle

WBG	T _a	RH	BDU				BDU + Flak Vest				Aircrew Flight Suit			
			VL	L	M	H	VL	L	M	H	VL	L	M	H
75	75	75	NL	NL	NL	29	NL	NL	NL	28	NL	NL	NL	31
80	80	75	NL	NL	NL	25	NL	NL	39	24	NL	NL	NL	27
84	85	75	NL	NL	31	20	NL	NL	30	19	NL	NL	35	22
89	90	75	NL	NL	21	14	NL	NL	21	13	NL	NL	24	16
94	95	75	NL	21	8	4	NL	20	8	4	NL	NL	13	8
99	100	75	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF

KEY TO TABLE

WBG - Wet Bulb Globe Temperature (°F)
T_a - Ambient Temperature (dry bulb - °F)
VL - Very Light Work Intensity
L - Light Work Intensity
M - Moderate Work Intensity
H - Heavy Work Intensity
BDU - Battle Dress Uniform
NL - No Limit (continuous work possible)
NF - Work/rest cycle not feasible
(see Maximum Work Time - Table B-4)

INSTRUCTIONS & NOTES

This table provides, for four levels of work intensity (see table B-1), the number of minutes work per hour in work rest schedules tailored to the conditions specified. Spend the remainder of the hour resting in the shade. This table was prepared using the validated USARIEM Heat Strain Model. Assumptions for use of this table include: 1) Troops fully hydrated, rested and acclimatized; 2) Windspeed = 5 mph; 3) Clear skies (full solar load); 4) Heat casualties < 5%. This guidance should not substitute for common sense or experience. Individual tolerances may vary greatly. Appearance of heat casualties is evidence that the selected work-rest cycle is excessive for the conditions.

Table B-3
Water Requirements to Support Sustained Work/Rest Cycles [Qts/Hr]

WGBT	T _a	RH	BDU				BDU + Flak Vest				Aircrew Flight Suit			
			VL	L	M	H	VL	L	M	H	VL	L	M	H
75	75	75	0.3	0.6	1	0.8	0.4	0.6	1.1	0.8	0.3	0.5	1	0.8
80	80	75	0.5	0.7	1.2	0.9	0.5	0.8	0.9	0.9	0.4	0.7	1.1	0.9
84	85	75	0.6	0.9	1	1	0.6	0.9	1	0.9	0.6	0.9	1	0.9
89	90	75	0.8	1.1	1	1	0.8	1.2	1	1	0.8	1.1	1	1
94	95	75	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1	1.4	1.1	1
99	100	75	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF

KEY TO TABLE

WGBT - Wet Bulb Globe Temperature (°F)
T_a - Ambient Temperature (dry bulb - °F)
VL - Very Light Work Intensity
L - Light Work Intensity
M - Moderate Work Intensity
H - Heavy Work Intensity
BDU - Battle Dress Uniform
NL - No Limit (continuous work possible)
NF - Work/rest cycle not feasible
(see Maximum Work Time - Table B-4)

INSTRUCTIONS & NOTES

Amounts listed are required to support work/rest schedules in Table B-2; drinking should be divided over the course of each hour. Use Table B-5 to determine water required to support maximum continuous work times shown in Table B-4. This guidance was prepared using the validated USARIEM Heat Strain Model; assumptions used in generating this table include: 1) Troops fully hydrated, rested and acclimatized; 2) Windspeed = 5 mph; 3) Clear skies (full solar load); 4) Heat casualties < 5%. This guidance should not be used as a substitute for common sense or experience. Individual requirements may vary greatly. Appearance of heat casualties is evidence that the selected work-rest cycle is inappropriate for the conditions.

Table B-4
Maximum Continuous Work Times [minutes]

WBGT	T _a	RH	BDU				BDU + Flak Vest				Aircrew Flight Suit			
			VL	L	M	H	VL	L	M	H	VL	L	M	H
75	75	75	NL	NL	NL	77	NL	NL	NL	74	NL	NL	NL	87
80	80	75	NL	NL	NL	65	NL	NL	NL	63	NL	NL	NL	74
84	85	75	NL	NL	104	54	NL	NL	99	53	NL	NL	139	60
89	90	75	NL	NL	70	44	NL	NL	69	43	NL	NL	80	48
94	95	75	NL	130	51	35	NL	133	51	35	NL	NL	55	37
99	100	75	158	66	39	26	202	68	39	26	212	69	40	27

KEY TO TABLE

WBGT - Wet Bulb Globe Temperature (°F)
T_a - Ambient Temperature (dry bulb - °F)
VL - Very Light Work Intensity
L - Light Work Intensity
M - Moderate Work Intensity
H - Heavy Work Intensity
BDU - Battle Dress Uniform
NL - No Limit to Continuous Work

INSTRUCTIONS & NOTES

This table provides, for four levels of work intensity (see Table B-1), the maximum number of minutes work that can be sustained in a single work period without exceeding a greater than 5% risk of heat casualties. This table was prepared using the prediction capability of the validated USARIEM Heat Strain Model. Assumptions used in generating this table include: 1) Troops fully hydrated, rested and acclimatized; 2) Windspeed=5 mph; 3) Clear Skies; 4) Heat casualties < 5%. The guidance should not be used as a substitute for common sense or experience. Individual requirements may vary greatly. The appearance of heat casualties is evidence that the safe limits of work time have been exceeded.

Table B-5
Water Requirements for Maximum Continuous Work [Qts/Hr.]

WBGT	T _a	RH	BDU				BDU with Flak Vest				Aircrew Flight Suit			
			VL	L	M	H	VL	L	M	H	VL	L	M	H
75	75	75	0.3	0.6	1	1.5	0.4	0.6	1.1	1.5	0.3	0.5	1	1.3
80	80	75	0.5	0.7	1.2	1.7	0.5	0.8	1.3	1.7	0.4	0.7	1.1	1.5
84	85	75	0.6	0.9	1.4	1.9	0.6	0.9	1.5	1.9	0.6	0.9	1.3	1.8
89	90	75	0.8	1.1	1.7	2	0.8	1.2	1.7	2	0.8	1.1	1.6	2
94	95	75	1.1	1.5	2.1	2.1	1.1	1.5	2	2.1	1	1.4	2	2.1
99	100	75	1.5	2	2.1	2.1	1.5	2	2.1	2.1	1.5	1.9	2.1	2.1

KEY TO TABLE

WBGT - Wet Bulb Globe Temperature (°F)
T_a - Ambient Temperature (dry bulb - °F)
VL - Very Light Work Intensity
L - Light Work Intensity
M - Moderate Work Intensity
H - Heavy Work Intensity
BDU - Battle Dress Uniform

INSTRUCTIONS & NOTES

Amounts listed are required to support continuous work times in Table B-4; drinking should be divided over course of each hour. If water requirement is >1.2, sweat loss is greater than maximum water absorption during an hour, and troops will become increasingly dehydrated regardless of amount drunk; leaders should plan for an extended rest and rehydration period at work completion. The table was prepared using prediction capability of the validated USARIEM Heat Strain Model; assumptions used in generating estimates include: 1) Troops fully hydrated, rested & acclimatized; 2) Windspeed=5 mph; 3) clear skies; 4) casualties < 5%. This guidance is not a substitute for common sense or experience; appearance of heat casualties is evidence that safe work limits have been exceeded.

APPENDIX C
Fluid Replacement Recipes for Dehydration
Induced Either by Illness (Vomiting and/or Diarrhea) or by Sweat Loss

Garrison Recipe

One cup (8 ounces) of fruit juice (orange or apple) with one half teaspoon of sugar or honey and a pinch of salt, followed by one cup of water with a quarter teaspoon of baking soda added. Drink this combination until thirst is quenched.

Field Expedient Recipes

a) Rehydration fluid replacement: Add to a 1 quart canteen of water: 1 MRE table salt packet (4.0 grams of NaCl) and 1 MRE packet of beverage base powder (28 grams of sugar).

b) Potassium replacement: After prolonged vomiting and diarrhea have occurred, potassium (KCl) replacements may be beneficial. The MRE cocoa beverage powder is a good source of potassium. Add to a 1 quart canteen of water: 2 MRE cocoa beverage packets (60 grams of sugar, 1.7 grams of KCl equivalent).

Medic Recipe (Prepared by Medical Personnel)

Add to 1 liter (1 quart) of water 3.5 grams table salt (NaCl), 2.5 grams baking soda (NaHCO_3), 1.5 grams potassium salt (KCl), and 20.0 grams sugar (glucose) and drink as needed for rehydration.

Note: 5 grams equals 1 teaspoon.

APPENDIX D
Guidelines for Protecting Soldiers
During the Handling of Corpses

Personnel who handle or come in contact with human remains are at risk of acquiring infections. Bloodborne pathogens, infectious aerosols, or other potentially infectious materials may transmit the human immunodeficiency virus (HIV), hepatitis B and C virus (HBV, HCV), and tuberculosis, to name a few. Graves registration personnel should receive the hepatitis B vaccine (a 3-shot series which takes 6 months to complete) in addition to the other vaccines listed in this document. Evidence indicates that direct contact with bloodborne pathogens poses a significant hazard to personnel. Exposure to infectious aerosols (droplets in the air which may contain infectious material) also places personnel at risk, but to a lesser degree than bloodborne pathogens. Since a single exposure may cause infection, the best way to reduce the risk is to prevent or minimize exposures. The following guidelines should be adhered to as closely as possible, realizing that official policy will be set in theater by the appropriate authority based on the task at hand and the availability of various types of personal protective equipment (PPE). Provide the appropriate PPE and also ensure that soldiers use PPE as described below.

- 1. Body Protection**
 - a. Select protective body clothing based on the task and degree of exposure.
 - b. Wear impervious disposable gowns or rain gear or ponchos to protect clothing from large splashes or quantities of blood.
 - c. Keep an extra change of work clothing on hand at all times.
 - d. NBC suits are adequate barrier items, though they may cause considerable heat stress.

2. Hand Protection

- a. Wear polyvinyl chloride (PVC) or vinyl gloves when handling human remains.
- b. Wear structural fire-fighting gloves for situations where broken glass and sharp edges may be encountered, such as when extricating bodies from wreckages.
- c. Select gloves that fit tightly at the wrist to prevent hand contamination through the cuff during contact with large amounts of blood.
- d. Inspect reusable gloves prior to each use. Replace gloves if they are torn, cracked, peeling, punctured, or exhibit any signs of deterioration.

3. Eye and Face Protection

- a. Wear a surgical mask and safety glasses or a face shield when there is a potential for splashing of blood or body fluids, or for the generation of airborne particles from dried blood.
- b. Cover eye glasses with a face shield or eye goggles.
- c. M-40 masks will suffice if masks are needed (see #5 below) and will afford eye protection as well.

4. Foot Protection

- a. Wear rubber boots or appropriate shoe covers when there is a potential for footwear to be grossly contaminated.

5. Respiratory Protection

a. Respiratory protection is not normally required unless the local medical authority deems it essential to protect authorities from biohazardous materials.

6. Removing Personal Protective Equipment (PPE)

a. Remove PPE as soon as possible when it becomes saturated with blood or other potentially infectious materials and always prior to leaving the scene or work area.

b. Avoid skin contact with exterior surfaces when removing PPE.

APPENDIX E
Tips for Measurement of Wet Bulb Globe Temperatures (WBGT)

- a. WBGT measurements must be made at a point 4 ft. above ground level.
- b. If the WBGT Kit (NSN 6665-01-109-3246) is used, care must be taken to ensure that the natural wet bulb is clean, as well as wet. Sand and grit can affect the measurements made with this instrument; be sure to clean and wash it regularly.
- c. If the Wet Globe Temperature (WGT) Kit (i.e., "Botsball"; NSN 6665-01-103-8547) is used, a correction procedure is required (Ref. message SGPS-PSP, 23 May 1990):

$$WBGT = 0.8 \times WGT + 0.2 \times \text{Dry Bulb}$$

where Dry Bulb may be measured by removing the dial thermometer from the WGT Botsball and reading the air temperature after 3 minutes, (shading the sensor from direct sunlight).

REFERENCES

- FM 10-52, Water Supply in Theaters of Operations, 11 JUL 90
- FM 20-31, Electric Power Generator in the Field, 9 OCT 87
- FM 21-10, Field Hygiene and Sanitation, 22 NOV 88
- FM 21-11, First Aid for Soldiers
- GTA 8-5-45, Heat Injury Prevention and First Aid, AUG 85
- TB MED 507, Occupational and Environmental Health Prevention, Treatment and Control of Heat Injury, 25 JUL 80
- TRADOC PAM 525-11, Near Term Water Resources Management, 15 JUN 81
- USAEHA Tech Guide #195, Guidelines for Protecting Graves Registration Personnel from Potentially Infectious Material, MAR 93
- USARIEM Technical Note 91-3, Heat Illness: A Handbook for Medical Officers, JUN 91
- USARIEM Technical Note 93-1, Sustaining Soldier Health and Performance in Somalia: Guidance for Small Unit Leaders, DEC 92
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