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A black and white sketch of a landscape. A large, dark silhouette of a person is in the foreground, looking out over a field. In the background, there are rolling hills and a rainbow arching across the sky. The sky is filled with stars and a crescent moon. The overall style is a high-contrast, hand-drawn sketch.

*Leader's
Risk
Management
Guide for*
**Disaster Relief
Operations**

Introduction

This booklet highlights operations and conditions that are applicable to disaster relief efforts and provides leaders with appropriate controls and prevention measures. The information provided is based on past experience in disaster relief operations and also includes lessons learned in everyday operations. While some of the controls and prevention measures might seem obvious, past accident and injury experience indicates they were not so obvious to some. Leaders must be diligent in enforcing standards and apply the principles of Composite Risk Management to all operations.

During disaster relief efforts, DOD personnel and aircraft crews sometimes are given missions that involve life-and-death situations. Personnel have been known to willingly assume unusual risks in such circumstances, perhaps because they think the risks are justified in the interest of saving lives. Unfortunately, however, such thinking can lead personnel to take unnecessary and inappropriate risks that will affect not only themselves, but also those they are trying to save.

Disaster relief efforts are hazardous by their very nature, and resources often are stretched to the breaking point. There is never a good time for an accident, but this is especially true in disaster situations. Responding to an accident can halt relief efforts and drain the resources intended for disaster assistance.

This guide is divided into six chapters: Composite Risk Management, Human Factors, Ground Operations, Aviation Operations, Accident Reporting, and Legal Considerations. Every service member's contribution to current and future relief efforts is invaluable. Following the guidelines recommended in this booklet will help keep your personnel ready to act in disaster situations.

**Submit comments or recommended changes to
GroundTaskForce@crc.army.mil**

Accident Reporting

As part of the force protection effort, accidents meeting the following minimum criteria will be reported within 24 hours to the Joint Task Force (JTF) Safety Office:

- Injury to any military personnel that results in a lost workday case
- Estimated damage of \$2,000 or more to any military property or equipment
- Injury to any civilian resulting from military operations that requires either hospitalization of 24 hours or more or a lost workday(s)
- Estimated damage to civilian property of \$2,000 or more resulting from military operations

The JTF Safety Office will maintain 24-hour operations. Accidents may be reported by calling (404) 293-6291 and providing the following information:

- Name of the person reporting the accident
- Point of contact telephone number
- Unit involved in the accident
- Location of the accident
- Date and time of the accident
- Name and rank of personnel involved
- Extent of injuries
- Type of property or equipment damage
- Estimated cost of damage
- Estimated environmental cost
- Description of circumstances and events

The JTF Safety Office will:

- Coordinate requirements for Class A and B accident investigations according to DOD criteria (Class A=fatality, permanent total disability, or property or equipment damage estimated to exceed \$1 million; Class B=permanent partial disability, three or more personnel hospitalized in one event, or property or equipment damage estimated to exceed \$200,000)

- Forward required accident information to the appropriate service safety centers

All military personnel participating in a DSO should know their status, whether federal or state, so they will better understand any restrictions placed on them for providing assistance to civilian law enforcement.

Use of force

Your unit will have rules governing the use of force (which are the domestic counterpart to rules of engagement) during a DSO. Leaders must ensure all personnel know and understand these rules to prevent an unwarranted use of force, which will only aggravate an already stressful situation.

Additional guidance

Each deploying unit will have a designated legal advisor. Leaders should know how to contact their legal advisor for specific guidance.

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Chapter V

Legal Considerations

Disaster relief efforts by military personnel and units within the United States are classified as “domestic support operations” (DSOs). The military’s role in DSOs is well defined and is limited by law in scope and duration. Military resources temporarily support and augment—but do not replace—local, state, and federal civilian agencies that have primary authority and responsibility for domestic disaster assistance. The military’s DSO response is always in support of a civilian agency, frequently the Federal Emergency Management Agency (FEMA). A presidential declaration of an emergency or disaster area usually precedes a DSO. Based on the limited scope of the military’s role, there are some legal considerations of which every service member should be aware.

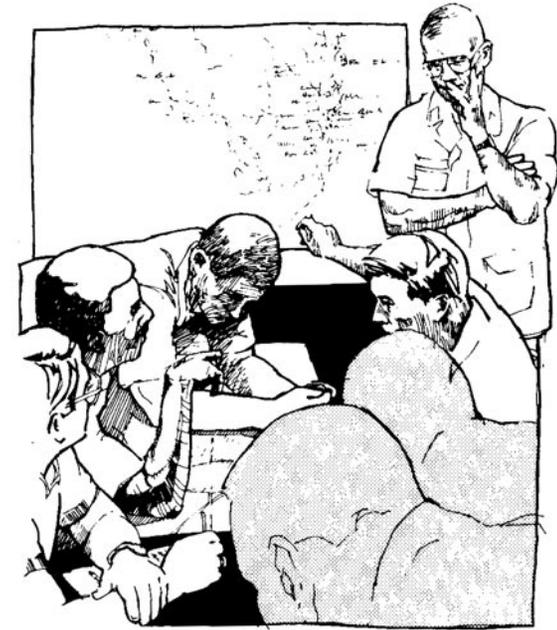
Immediate response

Military commanders may act *before* a presidential declaration when an immediate life-threatening situation develops. When a disaster or emergency is imminent and waiting for instructions from a higher military or civilian authority would preclude an effective response, military commanders may act. They may do what is required to save lives, alleviate human suffering, and mitigate major property damage *within the proximity of their installations*.

Immediate response is a short-term emergency supplement to government authorities. It does not supplant established Army plans for supporting civilian authorities, nor does it take precedence over a primary mission. Once a presidential declaration is made and the president determines federal assistance will be provided, the commander will adjust operations to conform to the tasks assigned by higher headquarters.

Support to law enforcement

In accordance with the U.S. Constitution, civilian government is responsible for preserving public order. However, the Constitution does allow the use of military force to protect federal and civilian property and functions. The Posse Comitatus Act restricts the use of the military in federal status and prevents it from executing laws and performing civilian law enforcement functions within the U.S. When National Guard personnel are serving under state status (“Title 32” status), the Posse Comitatus Act does not impose the same restrictions it would to National Guard personnel serving under federal status (“Title 10” status).



Chapter I

Composite Risk Management

Composite Risk Management (CRM) is the process of identifying, assessing, and controlling risk arising from operational factors and making decisions that balance risk costs with mission benefits. Loss statistics show that incidents occur when personnel are unaware of hazards and countermeasures (controls), or when established countermeasures and procedures are ignored. This section provides leaders guidance on integrating the CRM process into all operations.

Principles

Four principles guide the CRM process:

■ **Integrating CRM into mission planning, preparation, and execution.** CRM is a continual process that must be incorporated into both formal and informal planning activities.

■ **Making risk decisions at the appropriate level.** Make risk decisions at a level consistent with the commander's guidance. The leader responsible for the mission should make the risk decisions.

■ **Accepting no unnecessary risk.** Everyone, including individuals who have the authority to accept risk, has the responsibility to protect Soldiers, civilians, and equipment from unnecessary risk. An unnecessary risk is one that, if eliminated or mitigated, still allows mission accomplishment and maintains unit readiness.

■ **Accept risk if benefits outweigh the costs.** Leaders and individual Soldiers must take necessary risk to accomplish the mission. Leaders must understand that taking risk requires a decision-making process that balances mission benefits with costs.

Process

There are five steps in the risk management process (see Figure 2.1).

1. **Identify the hazards.** Hazards are the potential sources of danger that could be encountered while performing a task or mission on or off duty. For example, a river crossing is anticipated while conducting a foot patrol. Factors that determine hazards are water depth and

usually is practical only at permanent landing sites. Portable lighting systems are available commercially and can be used at temporary facilities. Flares, vehicle lights, and other light sources are acceptable field expedients if trained personnel deploy them under very carefully controlled circumstances. Special care must be taken in the placement and orientation of lighting to avoid the temporary destruction of crews' night vision.

■ **Security.** Fences and hedges can effectively restrict inadvertent or unauthorized access to permanent heliports and helipads, but they must not present a hazard to flight operations. It is absolutely essential to have specially trained personnel responsible for security at temporary landing zones. Confusion and excitement can create dangerous situations for persons on the ground and the aircraft using the facility. For on-the-scene landing areas, a vehicle barrier or very secure rope can help keep the flow of relief activity away from the operational area.

■ **Triage areas.** The primary concern in establishing a temporary landing zone should be aeronautical safety and efficiency of operations. In disaster situations, high priority always is placed on saving lives and relieving the suffering of casualties. Emergency landing zones should be situated close to triage areas to facilitate and expedite patient transport. However, these landing areas should not interfere with triage or medical efforts, further endanger the victims, or add to patient discomfort (noise, rotor wash, and flying debris).

■ **Logistical support.** Long-term operations require support with fuel, maintenance, flight crew food, fluids, rest, etc. Planning must reflect these needs and provide a means of obtaining the necessary resources. These logistical support requirements are built into the incident command system.



Figure 2.1. The 5-Step Risk Management Process

and direction is essential at a landing zone. The recommended means is a wind sock. At facilities that are used only during disasters, choose a wind sock that can be installed quickly on a temporary basis. Placement is critical, particularly if the landing site is located near a building. Place the wind sock so it does not interfere with flight operations but still gives a true indication of wind speed and direction. In areas with swirling or varying winds, such as near buildings or in mountainous areas, two or more carefully placed wind socks might be required for an accurate indication.

Some of the more common helicopter accidents at landing sites involve inaccurate or unavailable information on wind direction and speed. Such accidents might involve a hard landing due to an unexpected tail wind or a collision with an improperly located wind indicator. Properly located wind socks provide an additional safety margin. A lighted wind sock should be used for night operations. Care should be taken to ensure this lighting is installed in a way that does not degrade night vision.

■ **Surface slope (in degrees).** The landing surface should be flat with no bumps or depressions and level (or as near level as possible). In no case should the slope exceed 10 degrees from the horizontal.

■ **Surface composition.** Landing surfaces should be capable of supporting 1.5 times the heaviest helicopter's maximum takeoff weight and be skid-resistant. All helicopter landing areas should be free of dust, loose dirt, other forms of loose debris and objects, and gravel smaller than 1.5 inches in diameter. Rotor wash can pick up and throw small gravel at significant speeds. Turf landing zones are suitable, but vegetation should be no higher than 12 to 18 inches. Wheeled helicopters are especially sensitive to soft landing surfaces. To control dust in dirt areas, wet down the landing area with a hose before landing operations begin.

■ **Obstructions and obstacles.** Tie-downs and other equipment within the FATO lights should be flush with the surface. Obstacles such as signs, poles, light fixtures, or fire extinguishers should be kept well clear of helicopter maneuvering areas. This is particularly relevant for objects that are difficult to see from the air such as power or telephone lines, guy wires, and poles that blend into the background. Obstructions should be briefed to pilots and, for night operations, should be lighted in a way that will not interfere with the aircrew's night vision. Ball markers can be effective in marking obstacles such as power lines and guy wires.

■ **Lighting.** Lighting systems are necessary to support night operations. However, the installation of permanent lighting systems

		HAZARD PROBABILITY				
		Frequent	Likely	Occasional	Seldom	Unlikely
		A	B	C	D	E
SEVERITY	Catastrophic	I	Extremely High			
	Critical	II	High	High		
	Moderate	III		Moderate		Low
	Negligible	IV				

Figure 2.2. Risk Assessment Matrix

current, hypothermia, fatigue, debris on and under water, a change in conditions caused by weather, and the swimming ability of the Soldiers involved in the operation. There are other less-obvious hazards that should become apparent during planning. Leaders should seek to identify all credible hazards before the operation.

2. **Assess the hazards** (see Figure 2.2). Identified hazards must be assessed to determine their cumulative effect on the mission or objective. Each of the hazards is analyzed to determine the probability of its causing a problem and the severity of the consequences should such a problem occur. Exercising judgment on how to eliminate or reduce hazards to lessen the overall risk is inherent in the risk assessment process. This step concludes with a risk assessment that describes the impact of the combined hazards. The result is a statement that quantifies the overall risk associated with the operation—extremely high, high, moderate, or low.

3. **Develop controls and make risk decisions.** Once hazards have been assessed, controls must be developed to mitigate the risk. Controls may include rehearsals, use of personal protective equipment, comprehensive pre-mission briefings and brief backs, review of standing operating procedures (SOPs) and regulations, or a myriad of other actions that can be taken to reduce the probability and severity of a hazard's associated risk.

Leaders and individuals must weigh the risk against the benefits of performing an operation. However, operational mentality often has been

“mission first,” without consideration of risk. Keep in mind that, in the long run, unnecessary risk can be just as great a hindrance to mission accomplishment and unit readiness as enemy action. Injured is injured, dead is dead, and broken equipment is out of the fight.

Risk decisions are made at a level of command that corresponds to the degree of risk. As such, guidance should be established determining who makes which risk decisions. For example, high-risk squad actions may be elevated to the company commander for acceptance or denial. A brigade commander may direct that company-level risk decisions be made by the company commander if the risk is low, the battalion commander if the risk is moderate, and the brigade commander if the risk is high. In the case of battalion-level decisions, the chain may go from battalion to brigade to division.

4. **Implement controls.** The controls established as a result of the first three steps are implemented in step four, including leader action to reduce or eliminate hazards. Controls may be as substantial as writing an SOP or as simple as conducting a short safety briefing. In the river crossing scenario described earlier, the leader would brief his subordinates on the specifics of his decision. He would then require each subordinate to brief back the requirements to ensure their understanding.

5. **Supervise.** In this sense, supervision goes beyond ensuring people do what is expected of them. Leaders’ supervisory tasks include following up during and after the operation to ensure all actions went according to plan; re-evaluating the plan or making adjustments as required to accommodate unforeseen issues; and incorporating lessons learned for future use.

expense of safety, communications, and operations. The landing area should be placed far enough away from activity centers so rotor wash will not blow dust or supplies around and noise will not interfere with communications.

■ **Approach and departure paths.** Like all aircraft, helicopters require clear airspace for safe operations during approach and departure. When selecting landing sites, it is critical to choose locations that provide at least the minimum airspace recommended by the FAA. Some of the most common helicopter accidents at landing sites are collisions with off-facility obstacles. Such accidents might involve collision with a tower, trees, or wires. These accidents can destroy aircraft and injure occupants. Selection of sites with additional airspace is encouraged because they provide an additional safety margin. Obstacles such as buildings, antennas, or wires must not penetrate either the approach/departure surfaces or the transitional surfaces. Aircraft operate best when taking off or landing into the wind. Thus, while one approach and departure path might be acceptable at some locations, two or more paths are recommended as a way to provide greater safety and operational flexibility during varying wind conditions. Approach and departure paths should not pass over command posts, treatment areas, or operationally congested ground areas where rotor wash and noise might interfere with communications and operations.

■ **Minimum recommended size—final approach and takeoff areas (FATOs).** The minimum recommended FATO size is determined by the largest aircraft expected to use the facility. Keep in mind the largest helicopter might be a military aircraft such as the UH-1 or UH-60. Choosing and designing landing sites that exceed the minimum requirements can increase the safety margin.

■ **Minimum recommended size—safety area.** The size of the safety area around the FATO is determined by the largest aircraft expected to use the facility, military or civilian. The safety area provides clearance between the FATO’s edge and buildings, trees, fences, telephone poles, wires, hillsides, or anything else that could be struck by main or tail rotors. Increasing the minimum tip clearance between helicopter rotors and objects that might be hit can increase the safety margin. This is a particular concern for objects that are hard to see (such as wires) or whose color allows them to blend into the background when visibility is poor. For nighttime operation at a temporary or unimproved landing site, a minimum tip clearance of 40 feet is recommended.

■ **Wind indicator.** A means of informing the pilot of wind velocity

■ Place extra emphasis on preventing fuel contamination, especially fuel obtained from non-governmental agencies.

After flight operations

■ Conduct all scheduled maintenance in accordance with the applicable maintenance manuals. Do not defer maintenance due to operations unless the commander or his lawful representative authorizes such.

■ Thoroughly inspect all aircraft after conducting operations in unimproved areas or after conducting rescue operations. Ensure appropriate steps are taken with biomedical and other hazardous materials that might have been transported in support of ground personnel. Keep the aircraft clean to protect the crew and maintenance personnel.

■ Update unit hazard maps after every flight and share the information with higher headquarters and civilian agencies. Conduct pilot reporting of flight hazards and the current state of aviation facilities, navigation aids, and other vital aviation-related subjects.

Aircraft site selection criteria

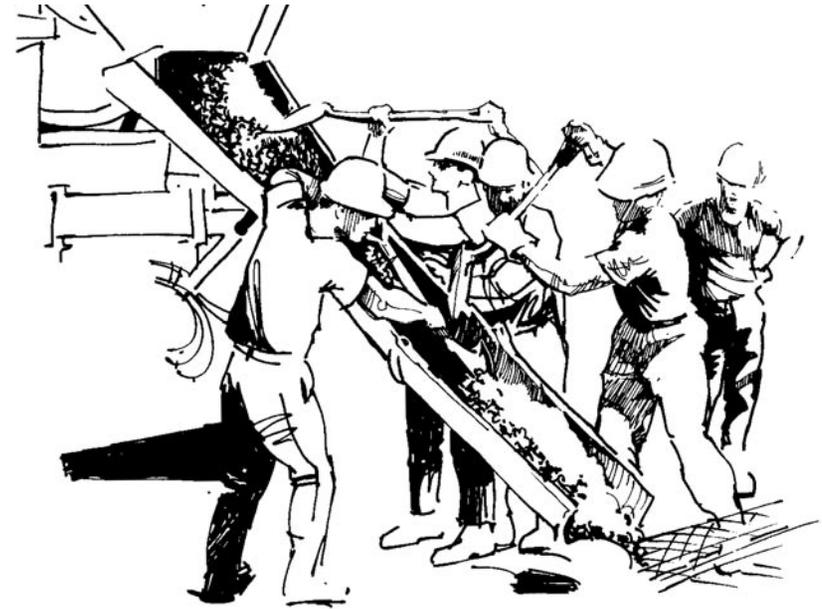
A pilot needs three things for safe operations at any helicopter landing site:

1. Adequate clear airspace for approach and departure with at least one, but preferably two, departure paths
2. Adequate clear space for expected ground maneuvers
3. Adequate current information about wind speed and direction (a wind sock is the ideal source for such information)

Embellishments on these basic requirements usually depend on the facility's purpose, resources available for development, and how often they will be used. In a disaster situation with numerous helicopters participating in relief efforts, it is highly desirable to have multiple approach and departure paths into the landing zone along with multiple parking areas. These measures provide an increased safety margin and operational flexibility and also reduce operational delay.

Specifically, commanders should consider the following factors when selecting aircraft sites:

■ **Location.** Remember the ultimate purpose of the facility when selecting the location of a temporary or permanent emergency-use landing zone. Landing zones near the disaster site and the emergency room entrance at receiving hospitals are most desirable but not at the



Chapter II

Human Factors

During disaster relief efforts, the interaction of personnel and the environment can produce hazardous conditions. There are ways leaders can eliminate or mitigate these conditions, as discussed in this chapter.

Supervision

Statistics show that 80 percent of all accidents are caused by human error. Supervision is the key to preventing these type accidents. Simply put, leaders can reduce human error by establishing sound standards and through consistent enforcement.

Failure to enforce a standard establishes a new, less stringent standard that might result in an accident. If, for example, you sit in the passenger seat and allow a driver to operate a vehicle too fast for conditions or do not require personnel to use safety restraints, you have failed to execute your leadership responsibilities. You might make it through *that* trip without incident; however, you have set the stage for a future accident. Consistent enforcement demonstrates “tough caring” and looking out for your personnel’s welfare.

Buddy system

Establish a buddy system and provide guidance on the issues buddies should help each other with. Examples include enforcement of water and food consumption and personal hygiene; watching for fatigue, sickness, and heat or cold injuries; and swimming. Leaders also need a buddy, because they frequently try to “tough out” injuries to stay in the action.

Communication

Maintain positive communication with your personnel. Equip them with communication equipment such as radios and cellular telephones. Ensure deploying personnel check in and report their status at regular intervals. Make sure all personnel know the locations, phone numbers, and how to contact medical, rescue, fire, and law enforcement personnel.

Hot weather

Water consumption and salt loss

The human body is cooled by sweat in extreme heat. Since sunburn inhibits sweating, every precaution must be taken to prevent sunburn. Common sense dictates maximum use of shade, sunscreen, and clothing that covers as much exposed skin as possible.

When the body loses water, it also loses salt. Salt should be replaced by normal consumption of food. Do not use salt tablets.

An individual might lose more than 1 quart of water per hour through sweating. Water loss must be replaced by frequent intake of small amounts of water. Water should be sipped, not gulped. Do not conserve water—personnel *must* drink even when they are not thirsty! Thirst is not an adequate indicator of dehydration. Personnel should hydrate throughout the day and into the evening. A good way to ensure adequate hydration is to have personnel keep their canteens or CamelBaks with them while supervisors monitor their fluid intake.

The chart on the next page is a guideline for water requirements. Keep in mind that following these requirements will not necessarily prevent dehydration. Be on the lookout for symptoms of dehydration such as dark urine. In addition, alcohol, coffee, and soft drinks are not substitutes for water. Alcohol and coffee exacerbate dehydration, and soft drinks are not absorbed into body tissue as rapidly as water. Soft drinks and sodas containing salt actually might increase water requirements.

Personnel who are overweight or dieting and past heat casualties are more susceptible to heat injuries. As such, their activities must be monitored closely. Leaders must:

- Enforce hydration and monitor water use

and also operate while hovering for long periods out-of-ground effect.

- Consider the possibility that some passengers might not understand oral or written English. If the mission is likely to involve transporting civilian passengers and especially evacuees, consider taking a Soldier on board who is fluent in both Spanish and English. At a minimum, consider providing the flight crew with a bilingual phrase guide for common commands and phrases.

During flight operations

- Be aware the disaster area might become congested with both military and civilian aircraft. Emphasize the importance of scanning for other aircraft and obstacles to all crewmembers. Do not assume civilian aircraft are familiar with military flight techniques or procedures to deconflict airspace.

- Require all crewmembers to assist in obstacle clearance.
- Emphasize foreign object debris awareness when conducting operations in urban and post-natural disaster environments.
- Be prepared for nonstandard internal and external loads. Take all reasonable steps to adjust for these loads.
- Do not allow crews to develop a false sense of urgency simply because they are supporting disaster relief or engaged in rescue operations.

- Conduct landing zone/pick-up zone surveys to ensure suitability for aviation operations. For special considerations with regard to aircraft landing site selection, see the “Aircraft site selection criteria” section at the end of this chapter.

- Do not trust any rooftop for landing, even if previously tested. Water damage might change load-handling capability. If you have to land on a rooftop, maintain a power setting that reduces the weight but keeps the aircraft in positive contact with the landing point.

- Consider alternative briefing techniques for passengers such as pre-printed passenger briefing cards. Emphasize entry and exit of the aircraft during crew chief briefings. Be aware that you might be dealing with passengers who have never been around military or rotary-wing aircraft of any type. Do not assume these passengers understand military lingo or the basic precautions to protect themselves around Army aircraft.

- If ground rescue agencies are on site, establish communications with the ground element to facilitate air-ground integration. This can be accomplished by radio or hand signals that should be common between agencies.

and mission risk. Tailor risk assessment matrices (worksheets) for the aircraft type and mission to be performed.

- Ensure all mission changes are briefed by the appropriate briefing and approving authority. Stress the importance of not conducting unauthorized tasks and tasks not briefed beforehand to all flight crews.

- Establish specific crewmember duties during mission briefings.

- Identify aircrew coordination requirements to ensure standardized communications between crewmembers and other aircraft. Consider minimizing extraneous conversations, especially during takeoff, landing, and while engaged in low-level flight or unfamiliar tasks.

- Establish vertical helicopter instrument recovery procedures for all areas of operation and include in mission briefings. Ensure crews know instrument recovery airfields. Check the status of all airfields in the disaster area before departure to ensure operability of navigation aids, airfield lighting, and services.

- Tailor pre-accident plans for specific areas of operation.

- Create hazards maps for all areas of operation. Due to reconstruction and relief efforts, known hazards might change or new hazards might develop with little notice. Areas known to have been clear or unobstructed might no longer be safe for landing or low-level flight. Update the hazards maps often.

- Take special care when dealing with power transmission lines. Assume that all power lines, especially those downed by the disaster, are live.

- Identify all high intensity radio transmission areas.

- Ensure crewmembers adjust Aviation Life Support Equipment and personal protective equipment for overwater and rescue operations.

- Integrate civilian authorities into mission planning whenever possible. Before aircraft operations begin, on-site ground agencies should be given current hazard information.

- Work with local airport agencies and the FAA regional flight district office to establish an aerial procedures guide for traffic deconfliction, fixed- and rotary-wing routes, aided and unaided traffic, and air traffic control procedures.

- Be aware that many navigation aids might not be operable in disaster-affected areas and remember their status can change quickly and without notice.

- Plan for dealing with power management issues before the flight. Disaster recovery support operations might increase the need for rotary-wing aircrews to conduct downwind, formation, and steep approaches

Fluid Replacement Guidelines for Warm-weather Training Conditions (Applies to Average Acclimated Soldier Wearing BDU, Hot Weather)

		Easy Work		Moderate Work		Hard Work	
Heat Category	WBGT Index °F	Work/Rest*	Water Per Hour	Work/Rest*	Water Per Hour	Work/Rest*	Water Per Hour
1	78-81.9	No Limit	½ qt	No Limit	¾ qt	40/20 min	¾ qt
2 (Green)	82-84.9	No Limit	½ qt	50/10 min	¾ qt	30/30 min	1 qt
3 (Yellow)	85-87.9	No Limit	¾ qt	40/20 min	¾ qt	30/30 min	1 qt
4 (Red)	88-89.9	No Limit	¾ qt	30/30 min	¾ qt	20/40 min	1 qt
5 (Black)	>90	50/10 min	1 qt	20/40 min	1 qt	10/50 min	1 qt
		Easy Work		Moderate Work		Hard Work	
		<ul style="list-style-type: none"> • Walking on hard surface at 2.5 mph, <30 pound (lb) load • Weapon maintenance • Manual of arms • Marksmanship training • Drill and ceremony 		<ul style="list-style-type: none"> • Walking in loose sand at 2.5 mph, no load • Walking on hard surface at 3.5 mph, < 40 lb load • Calisthenics • Patrolling • Individual movement techniques (i.e., low crawl, high crawl) • Defensive position construction 		<ul style="list-style-type: none"> • Walking on hard surface at 3.5 mph, > 40 lb load • Walking on loose sand at 2.5 mph with load • Field assaults 	

Notes:

1. The work/rest times and fluid replacement volumes will sustain performance and hydration for at least 4 hours of work in the specified heat category. Individual water needs will vary + ¼ quart per hour.
2. NL equals no limit to work time per hour (up to 4 continuous hours).
3. Rest means minimal physical activity (sitting or standing) and should be accomplished in the shade if possible.
4. CAUTION: Hourly fluid intake should not exceed 1 ½ quarts.
5. Daily fluid intake should not exceed 12 quarts.
6. Wearing body armor adds 5°F to WBGT index in humid climates.
7. If wearing NBC clothing (mission-oriented protective posture [MOPP 4], add 10°F to easy work and 20°F WBGT index for moderate and hard work.

- Provide cool water whenever possible
- Enforce work and rest cycles
- Educate personnel on the signs of heat injury and ensure they watch for those symptoms
- Know each individual's physical condition and assign appropriate work
- Establish and ensure use of the buddy system

Heat injury: Signs, symptoms, and first aid

When prevention fails, it is critical that everyone be able to recognize and treat heat injuries. The following list contains information on the most common heat injuries.

■ **Heat cramps** are caused primarily by an excessive loss of salt from the body. Symptoms include muscle cramps in the abdomen, legs, or arms. Move the victim to a shady area, loosen their clothing, and dissolve ¼-teaspoon table salt in 1 quart of water. The victim must slowly drink at least 1 quart of this salt solution and seek medical treatment.

■ **Heat exhaustion** is caused by excessive salt depletion and dehydration. Symptoms include profuse sweating, headache, a tingling sensation in the extremities, weakness, loss of appetite, dizziness, nausea, cramps, chills, and rapid breathing. Move the victim to a shady area, loosen or remove their clothing, elevate their legs, pour water on them, have them drink water, and fan them as much as possible. Promptly seek medical treatment.

■ **Heatstroke** is a MEDICAL EMERGENCY and IMMEDIATE ACTION IS REQUIRED. Symptoms generally are patterned after heat exhaustion, but the victim's skin will be hot and dry, and they might suddenly lose consciousness and have seizures. Move any suspected heatstroke victim to a shady area; immerse them in water if possible, or douse them with water (ice water is preferable); fan them as much as possible; and elevate their feet. SEEK IMMEDIATE MEDICAL ATTENTION and ensure the cooling process is continued during transport to the medical facility.

Fatigue

Fatigue causes accidents. Personnel become militarily ineffective after 48 to 72 hours without sleep. The best control measure against fatigue is sleep. Water consumption, diet, physical conditioning, personal hygiene, and meaningful work all impact fatigue as well, so ensure the impact is positive.

Watch for the following symptoms of fatigue:

- Headache
- Poor personal hygiene



Chapter IV **Aviation Operations**

Aviation safety perspective

Safety is paramount. In everyday operations, pilots require a certain amount of clear airspace to conduct approach and departure safely. Pilots also require current information about wind speed and direction to operate safely at any landing site. Pilots do not need less-clear airspace, less-clear ground space, or less-current wind information simply because a disaster has occurred. While a disaster might appear to have turned the world upside down, the laws of physics still apply.

Before flight operations

- Operate according to the crawl-walk-run philosophy, especially in unfamiliar environments.
- Conduct detailed planning and mission briefings regardless of pilot experience level.
- Conduct a Composite Risk Management assessment of accidental

around open hatches on ships. Some newer ships have no hatch combings.

Off-limits areas

- Ensure unauthorized personnel are not allowed in port areas.
- Establish and enforce no-smoking areas.

Slippery surfaces

- Remind personnel that slippery surfaces are common throughout the port area and to be continuously alert to avoid slipping.
- Remind personnel to clean up all spills as soon as possible.

Ground guides and drivers. See the “Vehicle operations” section of this chapter.

Airlift operations

Ground guides and drivers. See the “Vehicle operations” section of this chapter.

General

- Use DD Form 2133, Joint Airlift Inspection Record, to prepare for movement.
- Check hazardous materials for compatibility and certify any potentially hazardous materials.
- Ensure fuel and brake systems have no leaks.
- Have personnel check vehicle and fuel containers for proper levels.
- Ensure cargo and vehicle equipment is secured to prevent movement during flight.

- Impatience and irritability
- Loss of appetite
- Inability to focus on the task at hand
- Outright physical exhaustion
- Inability to make decisions

These symptoms manifest themselves in:

- Increased errors
- Difficulty in following instructions
- Lack of motivation
- Carelessness

All these factors might translate into unnecessary risk-taking or shortcuts to get the job done—an open invitation for an accident.

Facts about sleep deprivation

- You cannot train to overcome sleep loss.
- Tasks that are uninteresting and take a long time are extremely conducive to sleep.
- Performance of mental tasks requiring calculations, creativity, and ability to plan ahead declines by 25 percent for every 24-hour period of semi-continuous work without sleep.
- Leaders’ abilities are degraded by sleep loss, impacting quick and effective responses to changing conditions.
- Tasks that have been learned well and practiced repeatedly are more resistant to sleep loss effects. Select the best-trained personnel to perform critical tasks.
- The ability to learn new information is compromised by sleep loss.
- Leadership ability cannot overcome sleep loss.
- Sleep loss over time (greater than 2 days) has a cumulative effect.

Guidelines for sleep plans

- 6 to 8 hours of sleep per night will maintain mental task performance indefinitely.
- 3 to 4 hours of sleep per night will maintain mental task performance for 5 to 6 days.
- Less than 4 hours of sleep per night over a 3- to 6-day period will impair military effectiveness.
- The best sleep periods, given a limited choice, are 0300 to 0600 and 1600 to 1900.
- Provide for a *minimum* of 4 to 5 hours of quality, uninterrupted sleep. Remember, however, that after 6 to 7 days accumulated sleep loss will equal 48 hours without sleep.
- After 24 to 36 hours without sleep, decisions, calculations, etc.

should be cross-checked by a second person. Use a mix of rested and unrested personnel as a check and balance.

- Allow for naps as often as possible. Four 1-hour naps in a 24-hour period are as beneficial as 4 hours of sleep. However, accumulated sleep loss is more severe with fragmented sleep.

- Sleep plans should include provisions to recover from sleep loss.

- 12 hours of sleep and rest with at least 8 to 10 hours of sleep are required after 36 to 48 hours of acute sleep loss.
- 24 hours of sleep and rest with at least 15 hours of sleep are required after 36 to 48 hours of sleep loss under high workload conditions of 12 to 16 hours per day. This is particularly important for commanders and staff with high mental task workloads.

- 2 to 3 days of sleep and rest are required after 72 to 96 hours of sleep loss. The sleep and rest period means 8 to 10 hours of sleep per day and light duty.

- Supervisors must be diligent in checking personnel to ensure they get adequate rest.

Personal injuries

Eyes

Precautions should be taken to protect the eyes by wearing protective lenses, goggles, or face shields when the job calls for it. Activities most likely to produce eye injuries are chain saw work, carpentry, metal work, and motor pool or maintenance work.

Ears

Leaders must enforce the use of hearing protection when personnel are operating heavy equipment, generators, or chain saws; on board Army aircraft; and in any high-noise areas.

Head

Helmets or hard hats should be worn in construction areas in accordance with unit requirements.

Hands

Rings are a common source of personal injury. Personnel frequently catch rings on the tailgate of vehicles while dismounting, causing severe hand injuries or amputations.

Back

In most cases, back injuries occur when individuals overextend themselves. Leaders must remind personnel to get help when lifting heavy objects and to lift with their legs, not their backs.

Heat effects on tools and materials. Ensure gloves are worn when working with metal tools and materials exposed to heat from the sun.

Remind personnel to:

- Check wire rope riggings and bolt torque specifications to minimize varying heat stress or strain effects.

- Keep sawdust cleaned up in carpentry areas. Sawdust fires occur frequently in hot climates.

- Frequently inspect wooden items such as shovels, axes, and hammers for shrinkage. Check and tighten as needed.

- Emphasize the need for spill control. Remind personnel to remove contaminated soil from operational areas at once because of extreme fire and vapor hazards in hot, dry conditions.

Rail operations

General

- Assign only qualified drivers to load vehicles. Drivers must be licensed on the vehicles they are loading on the rail car.

- Require antennas to be removed or tied down and ensure internal equipment is secured.

Ground guides

- Have ground guides escort all vehicles on and off rail cars.

- Instruct ground guides to never walk backward and never be on the same rail car as a moving vehicle. (See the “Ground guide” section under “Vehicle operations” in this chapter.)

Load teams

- Provide gloves and correct tools for the job.

- Provide instruction in proper use of tools and inspect tools, blocking, lashing, spanners, and tow bars for serviceability before use.

- Prohibit sleeping on, in, or around rail cars.

Port operations

General

- Identify non-swimmers and require that they wear personal flotation devices near water.

- Ensure personnel are informed that ports are hardhat areas.

- Brief personnel to remain alert for movement in all directions.

- Ensure personnel are instructed to never walk or drive under a suspended load.

- Ensure personnel are briefed concerning the dangers of working

- Bend from the hips and knees, not just the waist.
- Carry heavy objects close to the body.
- Avoid sudden movements. Move slowly and deliberately.
- Do not carry unbalanced loads.

Slips, trips, and falls

- Remind personnel to maintain three points of contact while mounting or dismounting vehicles and negotiating structures.
- Ensure areas are clear of obstructions and hazards and remind personnel to use care when vision is obstructed by objects being carried.
- Caution personnel not to jump or step from cargo vehicles while carrying loads. Tell them to use a ramp or get help.
- Remind personnel to use extreme care when carrying loads in loose sand or over rough surfaces.

Construction operations

Equipment operation

- Remind operators that construction equipment might be very unstable off road in sandy terrain.
- Check outriggers for stability and ensure tires are inflated to the proper psi. This is especially critical when operating in loose sand or soil with a surface crust. Low tire pressure can lead to rollovers even when outriggers are used.
- Ensure safety belts are worn at all times when operating equipment.
- Ensure rollover protection systems are installed and erect sun umbrellas on slow-speed equipment such as rollers and compactors.
- Establish and rehearse operator/crew equipment rollover drills.
- Ensure ground guides are used. (See the “Ground guide” section under “Vehicle operations” in this chapter).

Construction sites

- Appoint a site safety supervisor for large earthwork or building construction sites.
- Ensure hard hats, the ACH, or Kevlar are worn on construction sites.
- Control vehicle, pedestrian, and troop access to sites.
- When excavating, ensure excavation walls are reinforced to prevent cave-ins.
- Ensure all personnel on the site know what to do in case of flash floods.
- Ensure safety equipment such as goggles, gloves, welding masks, aprons, dust respirators, etc. is available and used.

Feet

Leaders must enforce wear of protective boots in areas that require toe protection such as maintenance, engineer, warehousing, and materiel-handling facilities. Also ensure personnel change their socks regularly to prevent trench foot and fungal infections.

Health and hygiene

Water

- Ensure water is treated—serious diseases can be transmitted by untreated water.
- Treat all water as if it is contaminated. Do not go in the water unless it is necessary or has been approved by the chain of command.
- Water in trailers should have the chlorine level maintained at 5 ppm. Use water in trailers primarily for showering and cooking, because the chlorine taste will discourage Soldiers from drinking it. Bottled water should be the primary source of drinking water.
- All personnel should be immunized appropriately.

Food

- Keep perishable foods below 45 °F or above 140 °F before serving.
- Dispose of perishable foods kept in insulated containers for more than 4 hours.
- If using Meals, Ready to Eat, ensure personnel stay well hydrated to avoid constipation.
- Bacterial diarrhea, viral diarrhea, chemicals, pesticides, and heavy metal poisoning are hazards associated with eating food from unapproved sources.
- Do not consume food procured from or prepared in the immediate hazard area by local personnel.

Laundry and bath

- Laundry operations require that equipment be operated at specific temperatures. To prevent fires, ensure temperatures listed in the appropriate operator’s manual are not exceeded.
- Ensure laundry units operating inside tents have adequate ventilation.
- Ensure high-voltage laundry units are grounded and that circuits are not bypassed.
- Ensure operators are using fuels prescribed in the appropriate operator’s manual to prevent overheating and fire hazards.
- Incorporate Quartermaster laundry services as soon as possible.

Latrines and waste disposal

- Designate a field sanitation team (FST) before deployment.
- Ensure FSTs deploy with appropriate equipment and references.
- Ensure portable latrines are available, cleaned regularly, and are located in low-lying areas.
- Ensure methods are available to establish adequate waste disposal procedures.
- Do not burn trash or waste without approval from appropriate military personnel.
- To minimize rodent and stray animal activity, designate locations and storage facilities for trash away from living and work areas.

Critters

Snake and insect bites

Bottom line—tell your personnel to leave snakes alone. There are poisonous snakes in many parts of the United States, but bites from nonpoisonous snakes also can be harmful if they are not cared for properly and become infected. Anyone bitten should immobilize the affected area and seek medical help immediately. When ice is available, apply it to the bite to slow the spread of venom. Tourniquets and attempts to suck venom out of the wound can cause more harm than good.

Bites from spiders, mosquitoes, and other insects can cause illness and lead to infected wounds. Ensure personnel shake out their clothing before getting dressed and check their boots before putting them on. Where possible, boots should be placed off the ground or inside a waterproof bag or other container. Ensure personnel wear the appropriate seasonal uniform with the sleeves down and apply repellent in accordance with the DOD Insect Repellent System. If possible, use insect repellents that contain DEET.

Animals and other reptiles

Wild animals such as bats, raccoons, and skunks, as well as feral dogs and cats, might be injured, hungry, or have rabies or other diseases. These animals and other domestic pets might be more aggressive or dangerous than usual. Ensure personnel do not taunt, play with, or handle any animals. In addition, alligators are very common in the swampy southeastern United States. Make sure all personnel stay away from alligators!

electrostatic charges.

- Remind personnel to wear fuel-resistant or rubber gloves and protective clothing to keep fuel off the skin. Human skin is highly susceptible to drying, cracking, and peeling if it comes in contact with fuel. Personnel should immediately change out of clothing that has been contaminated with fuel through spills or other means.

Communications

Antennas

- Remind personnel that, when erecting RC-292/OE254 antennas, they must stay *twice* the distance from power lines as the length of the antenna.
- Stress that personnel have been killed by falling antenna head sections.
- Require that personnel wear eye protection, head protection, and gloves when erecting antennas.
- Allow no substitutes for antenna mast sections—camouflage poles have been a fatal alternative.
- If, for any reason, an assembled antenna head must be left on the ground, ensure it is guarded to prevent others from walking into it. Tip protectors are a must.

Power lines

- Identify power lines in operational areas to *all* personnel.
- Tie down antennas when in areas with power lines. Antenna tips should be no lower than 7 feet to preclude eye injuries. Use tip protectors at all times.
- Warn personnel to never throw comms wire over power lines.

Electrical storms

- If possible, do not operate radios, telephones, or switchboards during storms.
- Disconnect electrical equipment from power sources and antennas if the situation permits.
- If equipment must be used, converse as little as possible and return calls *after* the storm.
- Ensure *all* electrical equipment is grounded.

Materiel handling

Lift and carry procedures. Enforce the use of correct techniques:

- Never carry a load heavier than can be managed with ease. When in doubt, get assistance.

Fuel handling

Grounding and bonding

- Ensure proper grounding and bonding procedures are used at all times.
- Remind personnel that hot conditions contribute to the generation of static electricity.
- Remind personnel to ground themselves by touching a large metal object before handling fuel hoses and nozzles.
- Ensure grounding and bonding equipment is inspected regularly.

Tank and pump units.

Remind personnel to:

- Lubricate equipment more often and use light oil instead of grease.
- Keep caps and covers on systems.
- Keep pump engines clean.
- Purge tanks, lines, and filter separators at the beginning and end of each day.
- Re-circulate all fuels to remove water.
- Keep pressure relief valves clean (compressed air).
- Watch for corrosion.

Fuel system supply point.

Remind personnel to:

- Not fill collapsible bags to full capacity to allow for expansion.
- Leave hose line valves slightly open to allow for fuel expansion in the tank.
- Keep pump engines clean and lubricate the pumps more often.
- Use dust caps and plugs.

Refueling operations.

Ensure proper bonding and grounding procedures are used and remind personnel to:

- Not fill vehicles to full capacity to allow for expansion.
- Keep tank truck hatches open during refueling to allow vapors to escape.
- Stay on the windward side to prevent being overcome by fuel vapors.
- Close hatches immediately after refueling.
- Use bottom load procedures when possible. If top loading is used, use extreme caution and start the refueling procedure at a slow rate until the level of fuel has covered the hose. Thereafter, increase the flow rate slowly.

Protective clothing and equipment

- Remind personnel not to wear nylon clothing. Nylon will build up

Respiratory issues

Personnel might be exposed to asbestos, carbon monoxide, nuisance dust, or other caustic fumes. Ensure personnel have the appropriate masks available when entering buildings. If required, ensure all personnel have been fitted for the appropriate gas, mist, fume, and dust protective masks.

To minimize the spread of upper respiratory infections, have personnel sleep in alternating head-to-toe arrangements. Also establish work/rest cycles to prevent personnel from sleeping en masse. When possible, avoid establishing sleeping quarters in areas contaminated with mold and mildew.

Some species of brush such as oleander are poisonous. Caution personnel not to inhale smoke when burning brush or other materials. Such smoke can cause respiratory problems including sickness and, in extreme cases, death.

Stress management

Everyone involved in rescue and recovery operations, including the rescue workers and victims, are dealing with increased stress and anxiety. There is a tragic loss of life and material possessions that will affect each person involved. Personnel must seek care from a stress management team or the Red Cross when they feel overwhelmed or unable to cope with the rescue operations.

Universal precautions

Everyone involved in rescue and cleanup operations must be aware of the risk from blood-borne pathogens. There currently is and will continue to be disease contamination at all rescue sites. Ensure personnel have current Hepatitis A and tetanus immunizations at a minimum. Precautions must be followed, and the equipment below must be provided:

- Latex or rubber gloves
- Over-garments for clothing protection
- Face masks for respiratory protection
- Goggles for eye protection from splashes or spills
- Bleach and chlorine for cleanup and decontamination of biohazards
- Biohazard bags

A collection site for contaminated items must be established. In addition, sites must be designated for showering and clothing changes before personnel leave for non-contaminated areas.

release and avoid pressure buildup.

- Ensure personnel check battery levels often. Battery electrolyte water evaporates faster in hot weather.

- Ensure personnel adjust battery electrolyte levels during the day. When batteries cool, levels will lower slightly and overflow will be avoided.

- Require the use of slave cables. Only as a last resort should jumper cables be used. Remind personnel to beware of sparks as jumper cables are attached around the battery's gaseous vapors.

- Ensure mechanics adjust voltage regulators to the lowest setting possible to avoid overcharging.

POL

- Remind personnel to use extreme care when changing hot lubricants, which can burn skin.

- Take care to prevent contamination of POL.

Brakes

Remind mechanics to use low air pressure to remove sand and dust from brake drum areas.

Radiators/coolant

- Remind personnel to use caution when removing radiator caps from hot vehicles and to check radiator fluids often to avoid overheating.

- Personnel should not use their hands to remove caps unless the cap is cool to the touch. Caps must be turned slowly to release pressure.

- Remind personnel to keep radiators and airflow areas clean and free of debris to avoid rupture.

- Require that radiator caps be tested often, because the caps control radiator pressure.

Grounding

- Instruct personnel to dig or drive grounding rods to a depth of 6 feet.

- Remind personnel to keep the soil around grounding rods moist to increase conductivity. Keep rods, straps, and connections free of paint or oils.

- Ensure portable electric power tools and power generation equipment is grounded properly.

Mess operations

Sanitation

- Hand washing is the single-most important measure in preventing food-borne illness and must be enforced at all times.
- Ensure all food waste is disposed of properly.
- Ensure food preparation areas are at least 100 meters from latrines and 50 meters from incinerators.
- Ensure food is protected from contamination.
- Monitor food handlers and other personnel to ensure sanitation standards are maintained.

Fire/explosion

- Ensure kitchen fuel storage areas are at least 15 meters from working areas and are marked as hazard areas.
- Ensure operable fire extinguishers are accessible (with designated operators) in mess tent areas and at stove-lighting and fuel storage areas.
- Ensure all personnel fueling or operating stoves, immersion heaters, and burners are trained properly.
- Make operators aware that increased heat will add pressure to fuel tanks and fuel cans and that particular attention should be given to M2 burners.
- Keep mess tent exits clear of obstructions.

Maintenance operations

Tire checks

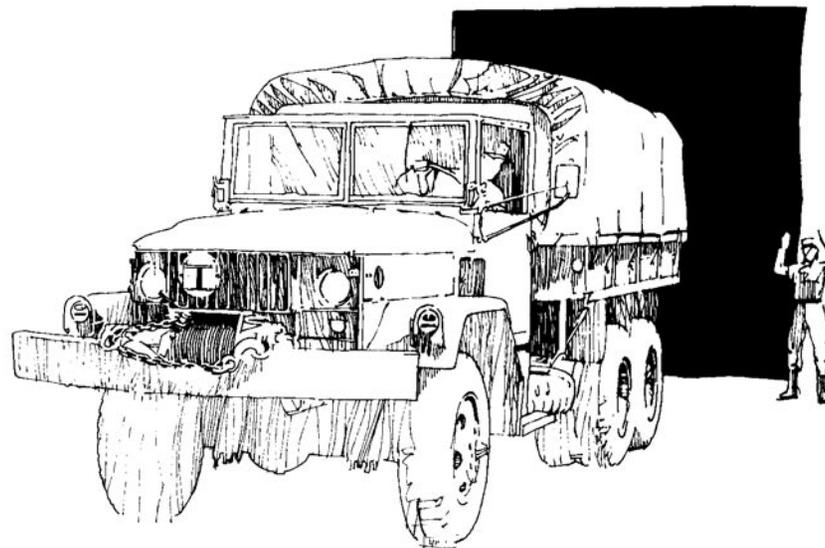
- Ensure tires are checked often for cuts and wear.
- Remind drivers to check for rocks between duals and to check tire pressure often.

Tire repair

- Ensure mechanics always use a tire cage.
- Remind mechanics to use proper tools, to keep hands out of tire cages while inflating tires, and to use extension hoses. Require the use of 10-foot inflation gages with a locking chuck for inflating and deflating split-rim tires.
- Remind mechanics to use the buddy system when lifting, removing, and installing large tires.

Batteries

- Require the use of face shields, goggles, and aprons when servicing batteries.
- Remind personnel to keep air vents on caps clean to allow gas



Chapter III

Ground Operations

This section addresses areas of concern in ground operations. Specific ground operations are highlighted with cautions and preventive actions leaders should take to reduce the hazards.

Use of appropriate personal protective equipment (PPE) is critical in all phases of ground operations. Hard hats, if available, must be used during missions that require them. If hard hats are not available, personnel should wear the Advanced Combat Helmet (ACH) or Kevlar. Leaders must be aware there are many missions that will require a wide variety of PPE. Examples of required PPE include biohazard protection, respirators, water hazard protection, personal flotation devices, work gloves, goggles or shields for chain saw operations, and knee pads.

General recovery and rescue operations

General. Personnel assisting in site recovery or rescue operations face a variety of hazards. Remind them to:

- Be aware of their surroundings and not enter damaged structures.
- Be alert for exposed electrical, gas, and other utility lines.

- Wear gloves and other protective clothing.
- Avoid moving or tampering with propane tanks.
- Watch where they step for nails, glass, and other sharp objects.
- Personnel should not attempt to recover human remains unless they are part of a recovery crew. Ensure personnel are briefed in advance on what to do if human remains are discovered.
- Ensure personnel have respirators with filters for asbestos. Many older buildings and schools contain asbestos.

Thunderstorms. Thunderstorms occur frequently in the southeastern United States. If thunderstorms occur, personnel in the open could be struck by lightning. Warn personnel to:

- Seek shelter during thunderstorms. Buildings and vehicles are good shelters.
- Avoid trees, towers, and other tall objects. Seek shelter in low areas.
- Get into the “lightning safety position” by squatting down near the ground with heels touching and hands over the ears.
- Ground fixed and tactical communications equipment.

Electrical hazards. Large electrical transformers might contain PCBs or cancer-causing chemicals. Electrical lines also might be energized and present a shock hazard. Ensure personnel:

- Do not attempt to move transformers during cleanup.
- Mark transformers and report their locations to the chain of command.
- Do not touch or operate near downed power lines. Electricity might be restored to downed power lines without notice. Beware of downed lines and anything touching them.
- As power is resupplied, emergency generators must come off line. Only qualified utility or engineer personnel should conduct the changeover.
- If the downed power line is difficult to see but is in a traffic area, clearly mark the area so no one inadvertently steps on the downed wire.

Hazardous materials. There are many sources of hazardous materials. Remind personnel to:

- Avoid areas near damaged propane tanks, oil containers, or other chemical drums.
- Mark and report suspected waste dump sites to the chain of command and avoid such areas.

Weapons handling

- Follow proper weapons handling procedures in accordance with appropriate TMs and graphic training aids.
- Instruct personnel on the rules of engagement with regards to weapons status.
- Ensure personnel clear their weapons at designated weapons clearing points.
- Control ammunition and safeguard it from the civilian population.
- Be aware of environmental factors that might affect weapons systems and take preventive or corrective actions as necessary.
- Do not tolerate horseplay.

Assembly area operations

Sleeping locations

- Establish a designated sleeping area. If the situation permits, mark the perimeter with engineer tape or chem lights.
- Post unit perimeter security personnel equipped with lights for signaling. Ensure they have been briefed thoroughly on their duties and responsibilities.
- Ensure vehicles are *not* parked where they can roll toward sleeping personnel or on an incline without chocks.
- Do not allow personnel to sleep in their vehicles with the engine running.

Dismount points. Establish dismount points beyond which vehicles may not move without ground guides.

Ground guides. Require all vehicles to use ground guides, especially during periods of darkness and reduced visibility. (See the “Vehicle operations” section of this chapter).

Tents

- Establish fire protection plans and evacuation procedures.
- Ensure operable fire extinguishers are accessible and that operators are assigned and knowledgeable.
- Require that electrical circuits be inspected routinely for possible overload conditions.
- Establish and enforce smoking areas.
- Ensure tents are anchored securely to withstand possible winds. To prevent trips and falls, ensure tent ropes and anchors can be seen clearly.

Materiel failures

- During halts, emphasize tire condition and security of loads.
- During operation, have drivers pay particular attention to air cleaner indicator and water and transmission gages.
- Ensure operators know proper cool-down procedures for their vehicles.
- Ensure vehicle basic issue items, pioneer tools, highway warning devices, and fire extinguishers are present on every vehicle.
- Ensure disabled vehicles are moved completely off the roadway.
- Conduct after-operations PMCS on each vehicle, focusing on potential damage to the undercarriage and tires from road debris.

Recovery vehicle operations

- Remind recovery personnel to use a braking vehicle when required by the technical manual (TM) and to always use correct hookup procedures.
- Ensure all vehicles are equipped for self-recovery as appropriate (tow ropes/cables, rope ladders, and pierced steel planking or other traction material to place under tires).
- Do not allow personnel between vehicles during recovery operations.
- Ensure personnel stay clear of tow ropes, cables, and rope ladders during operation.
- Caution personnel to keep hands and clothing at least 5 feet from winches when rewinding cable after recovery operations.
- Enforce safe towing speeds.
- Fabricate ground support devices for outrigger support in soft soil.

Forklift operations

General

- Require operators to wear safety belts.
- Enforce the use of ground guides in congested areas.
- Do not allow riders.
- Ensure personnel know and stay within forklift load limits.
- Check to ensure operators chock wheels before unloading.
- Do not allow personnel to park on a grade.

Rollover procedures

- Instruct operators to stay in their seat, grip the wheel, and brace their feet in the event of a rollover.
- Warn operators not to jump from the vehicle.

Chain saw operations

- Ensure operators receive training before operation, especially in procedures for cutting down trees to ensure trees fall in a safe direction.
- Ensure operators have the physical strength and dexterity to operate equipment.
- Enforce the wear of PPE including eye protection and gloves.
- Do not cut toward the body.
- Cut with the blade where it enters the drive body.
- To reduce kick-back, avoid cutting with the tip of the saw.
- Check for nails, wire, and other metal objects before cutting.

Vehicle operations

General. Vehicle operations in this environment will be extremely dangerous. Personnel must drive defensively and be alert to potential hazards.

- Enforce the use of restraint systems by crew and passengers.
 - Establish and enforce safe speed limits for various road and environmental conditions.
 - Pair experienced drivers with inexperienced ones to provide supervision and hands-on training.
 - Use experienced drivers in difficult terrain.
 - Remind drivers to slow down in limited visibility, on rough terrain, and during inclement weather. Driving too fast for conditions is a primary cause of accidents.
 - Establish procedures for vehicle stops and breakdowns to warn approaching vehicles.
 - Reinforce braking and downhill driving procedures with all operators.
 - Keep vehicle antennas secured to prevent contact with power lines and other objects.
 - Check to ensure operators have installed vehicle antenna tip covers to prevent injury and damage.
 - Ensure there are proper floatation devices in each vehicle operating in flooded areas.
 - Take into account the maximum fording depth for each vehicle type, and ensure proper fording equipment and accessories are installed before entering water areas (i.e., exhaust extensions).
- Preventive maintenance checks and services (PMCS)**
- Stress that PMCS is critical, especially under adverse or unusual conditions.

- Ensure operators perform special requirements covered in the “Operating Under Unusual Conditions” section of their respective operator’s manual.

Route reconnaissance

- When possible, conduct a physical reconnaissance of the route to avoid the worst terrain hazards. Mark unavoidable hazards on a strip map and include them in the convoy briefing.
- Reconnoiter the route for bridges or underpasses that might be too low for large vehicles.
- Caution drivers that roads, bridges, and overpasses might not be posted with weight or height restrictions.
- If possible, reconnoiter routes for hazards below the water line before operations begin.
- Check water height before driving through to ensure vehicles will not get swept away. A good rule of thumb is to not drive into running water deeper than the vehicle axle.

Ground guides

- Train drivers in the correct use of ground guides, and train *all* personnel in how to perform as ground guides.
- Stress the importance of ground guides in congested areas and during periods of limited visibility.
- Remind drivers to use two ground guides while backing or when their view is restricted.
- Equip ground guides with suitable lights during periods of limited visibility or darkness.
- Always use ground guides in assembly areas, displaced persons camps, etc.
- Remind drivers to keep ground guides in view at all times and to stop the vehicle if they lose sight of them.
- Instruct ground guides to never walk backward and to stay out of the path of backing vehicles.

Passenger or cargo transport

- Use fixed seating in truck cargo beds. In cargo beds without fixed seating, ensure passengers remain seated within the truck body and keep their heads, hands, and other body parts inside the vehicle cargo area.
- Ensure all personnel remain seated when being transported in the back of cargo vehicles.
- Enforce the use of troop straps when transporting personnel and ensure tailgates are secure.

- Supervise cargo loading to ensure loads are secured and weight is distributed correctly.
- Do not mix the transportation of personnel in cargo areas with a cargo load due to the potential for cargo shifting.

Rollovers

- Instruct drivers on conditions that can lead to rollovers including steep slopes, ditches, loose sand, etc.
- Remind drivers to slow down in limited visibility, on rough terrain, and during inclement weather.
- Ensure loads are secure to prevent injury from falling equipment or cargo.

Convoys

Convoy Briefings. Conduct convoy briefings before any movement. Most items in this section are applicable for use during convoy briefings.

General

- Establish and enforce safe convoy and catch-up speeds that do not exceed the posted limits and are appropriate for expected road and environmental conditions. Include speeds and limits in the pre-march briefing.
- Set speeds based on personnel, training, terrain, environment, and equipment.
- Establish safe following distance guidelines. Increase following distance in bad weather or darkness.
- Establish procedures to warn approaching vehicles of vehicle stops and breakdowns.
- Mark unavoidable hazards on a strip map and include them in the pre-march briefing.
- Check loads to ensure cargo is secured correctly. Stress even load distribution, especially when traveling over sandy terrain.
- Do not place vehicles transporting troops, ammunition, or petroleum, oil, and lubricants (POL) last in a serial or march unit.
- Ensure all prime movers and trailer brake systems are connected properly and are fully operational.
- Reinforce braking and downhill driving procedures with all operators.
- Ensure routes have proper vehicle clearance. (See the “Route reconnaissance” section of this chapter).