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## APPENDIX G

### SUSTAINED AND CONTINUOUS OPERATIONS

**This appendix discusses methods for sustaining the mortar section's performance during prolonged combat. In any conflict, combat operations are continuous and are at a high pace. Mortar platoons and sections must fight without stopping for long periods. Under these conditions performance suffers. The mortar leader uses several methods to conserve and prolong his soldier's combat effectiveness.**

#### G-1. TYPES OF OPERATIONS

Mortar platoons routinely conduct continuous operations and may be required to conduct sustained operations.

a. Continuous operations are possible by the mechanization of land combat forces and by technology that permits effective movement at night, in poor weather, and in other low-visibility conditions. Combat continues around the clock at the same level of high intensity for long periods. Armies now have the potential to fight without stopping. The reasons that battalions were forced to pause--darkness, resupply, regrouping--have been overcome by technological advances.

b. Sustained operations are used when the same soldiers and small units engage in continuous operations with no opportunity for the unit to stand down and little opportunity for the soldiers to catch more than a few minutes of sleep. Continuous operations do not always involve sustained operations if enough units or individuals within units are available to allow everyone to get adequate rest.

#### G-2. STRESS IN COMBAT

The confusion, stress, and lethality of the modern battlefield place a burden on the infantryman's endurance, courage, perseverance, and ability to perform in combat. Mortarmen conducting combat operations must perform complex collective and individual tasks without adequate sleep and under stress. Stress in combat is caused by the following:

a. **Fear.** All soldiers experience the fear of death or being wounded, or the fear of failing in the eyes of one's comrades.

b. **Limited Visibility and Low-Light Levels.** Smoke, darkness, fog, rain, snow, ice, and glare make it hard to see. The extended wear of night vision goggles, protective masks, or laser protective lenses causes stress.

c. **Disrupted Wake/Sleep Cycle.** A soldier's performance suffers during normal sleeping hours due to the disruption of the normal schedule.

d. **Decision Making.** Mental stress results from making vital decisions with little time and insufficient information. It is increased during times of great confusion and exposure to danger.

e. **Physical Fatigue.** Working the muscles faster than they can be supplied with oxygen and fuel can cause soldiers to function poorly without rest.

f. **Physical Discomfort.** Extreme cold, heat, wet, or thirst add greatly to the level of individual stress.

### **G-3. FATIGUE**

As sustained operations continue, all soldiers begin to show effects of general fatigue and lack of sleep. Unless this is counteracted, mortar performance declines rapidly.

a. Mortar sections can conduct sustained operations for 24 to 48 hours, extending 72 hours to them when required. Extensive training and standardization, plus cohesion and esprit de corps, allow limited sustained operations beyond 72 hours. All units experience serious degradation of combat effectiveness that quickly rises after 72 hours. A rule of thumb is to expect a 25 percent degradation in performance for every 24 hours without sleep. Under the extreme demands of combat, units historically have conducted sustained operations for a maximum of 120 hours. The result was a total deterioration of combat effectiveness. Operations in MOPP4 cause faster degradation of combat effectiveness.

b. Though essential for endurance, sheer determination cannot offset the cumulative effects of sustained sleep loss. A unit that is subjected to extensive sustained operations requires a long period of rest and recuperation to regain combat effectiveness.

c. Continuous operations cause a slower, but no less serious, degradation of combat effectiveness. Whether a task is degraded by loss of sleep depends on many interacting and sometimes counteracting factors. Complicated tasks are more stimulating to the brain and require more training to master. A simple task requires less training to do but can be boring. A soldier needs a high level of arousal to perform a task well after sleep loss. The following three factors are interactive:

(1) *Task complexity or ambiguity.* The FDC computer operators perform the most complex tasks and are usually the first to show the effects of sleep loss. Simpler, clearer tasks are less affected by sleep loss; complicated or ambiguous tasks will suffer from fatigue and loss of sleep. This applies to both physical and mental

tasks. Simple lifting, digging, or marching can be stable. The fine hand-and-eye coordination needed to lay a mortar can suffer, and reasoning and problem-solving can be difficult.

(2) *State of arousal.* The extent to which the soldier's brain is aroused and active depends on both physical and mental stimulation. Noise, light, muscular movement, and speech keep the brain alert. Increased loss of sleep requires more stimulation to keep the brain awake. Too little or too much arousal can impair the soldier's performance. Combat operations are conducted at such a fast pace that a high state of arousal is maintained. However, even the most aroused soldiers are susceptible to *crashing*. This commonly occurs early during combat after as little as 24 hours of intense stress and sleeplessness. The body abruptly stops producing the high levels of adrenaline needed to sustain the initial activity. The result can be severe drowsiness, leading to near unconsciousness. Soldiers that are alert and aroused for 24 hours during the marshaling, loading, and insertion phase of an operation can be overcome by intense fatigue, which starts after dawn of the first day of combat. This effect can only be overcome by good leadership, motivation, and rest.

(3) *Level of training.* Extensive training delays the degradation of a task caused from lack of sleep. Training does not prevent lack of sleep from eventually affecting the performance of a task, but repetitive, stressful, realistic training can delay and moderate these effects. Good physical training prepares the soldier for sustained operations. It also allows him to recover quicker after a short rest than a soldier who is in poor physical condition. A good diet and healthful lifestyle prepares the soldier to cope with the physical stress of sustained operations.

d. Extensive Army studies on the effects of sustained operations on combat effectiveness show that the performance in all duty positions does not degrade the same. Performance in the FDC where there is a heavy load of mental tasks (determining, calculating, thinking, decision making) degrades faster than the performance in the mortar squad where tasks are mainly physical (firing, lifting, digging).

(1) Platoon and section leaders plan fires, integrate communications and plans, establish positions, and coordinate tactics. They show the effects of lack of sleep faster than the members of mortar squads.

(2) The FDC performs mentally demanding and complex tasks. Its ability to continue performing these tasks degrades severely over a period. For example, adjusting multiple missions can become difficult, and firing calculations are likely to be wrong as well as slow. Self-initiated tasks are especially likely to be forgotten.

(3) Long sustained combat degrades the fighting performance of all soldiers, teams, and units. The adverse factors affect everyone. If leaders at all levels perform without rest, they are likely to degrade faster than their troops.

(4) In addition to the degradation caused by fear, fatigue, and loss of sleep, there is a severe loss of effectiveness caused from operating in MOPP4. When soldiers are enclosed in full NBC protective gear, leadership judgment is degraded, communications are less effective, and information flow between units is reduced.

#### **G-4. TECHNIQUES TO SUSTAIN OPERATIONS**

To maintain effectiveness, soldiers must overcome adverse conditions. The rate of performance degradation must be slowed. Listed below are methods the mortar leader can use to slow degradation and to prepare to fight sustained operations.

- a. **Prepare Individual Soldiers.** Preventive measures are often more effective for keeping groups healthy and active. They include improving or maintaining good physical condition, balanced nutrition, good personal hygiene, and immunizations.
- b. **Provide Good Leadership.** Good leadership is the key to sustained unit performance. The leader must bring out the best efforts of his subordinates.
- c. **Set High Standards.** Success during sustained operations demands the highest standards of military expertise.
- d. **Develop Individual and Unit Confidence.** A confident, optimistic outlook resists stress and performance degradation.
- e. **Establish Good Communication Channels.** In combat, knowledge of the situation and the status of both enemy and friendly units sustains soldiers.
- f. **Cross Train.** Extensive cross training in the mortar platoon provides flexibility. Critical tasks, such as FDC and aiming circle operations, must be cross trained.
- g. **Develop Coping Skills.** All members must experience and learn to cope with adverse factors, especially stress and lack of sleep.
- h. **Develop Good Physical Fitness.** Whether moving heavy weapons, carrying large loads, or digging, physically fit soldiers can use their strength reserves to recover after only a brief rest.
- i. **Build Stamina.** Soldiers must develop aerobic fitness to work more and withstand the stress of sustained operations.
- j. **Practice Pacing While Extending Physical Limits.** All soldiers must be trained to pace themselves to work at their maximum range without degradation.
- k. **Foster a Spirit and Attitude of Winning.** In combat, winning depends on skill and dedication. Especially in sustained operations, a soldier who is dedicated demonstrates the extra strength needed to win.

**1. Foster Cohesion, Esprit, Morale, and Commitment.** Mutual trust based on personal face-to-face interaction is called *cohesion*. *Esprit de corps* is identifying with the unit and with its history and ideals--the company, battalion, division, and US Army. Cohesion holds units together; esprit keeps them dedicated to the mission.

m. **Guarantee and Encourage the Free Exercise of the Soldier's Faith.** Regardless of their religious background, most soldiers are reassured and calmed if the leader encourages and assists the battalion chaplain in his visits to the unit.

#### **G-5. TECHNIQUES TO SUSTAIN COMBAT PERFORMANCE**

Several techniques can be used to sustain combat performance:

- a. Share physical and mental burdens among all members of the unit.
- b. Rotate boring tasks often.
- c. Share tasks by assigning two or more soldiers to perform them.
- d. Cross-check all FDC calculations, sight settings, and map coordinates among other members of the unit.
- e. Avoid using strong artificial stimulants. The use of amphetamines or other strong stimulants has risks that outweigh the benefits. Most are habit-forming and, if used regularly, require progressively higher doses to maintain arousal. In combination with the other physical and emotional stresses of combat, they are likely to interfere with good judgment by making users nervous and suspicious of others. Prolonged high doses can cause paranoia with hallucinations and delusions.
- f. Learn to recognize signs of serious performance degradation in others. The least affected soldiers must perform the most important combat tasks.
- g. Learn to recognize signs of serious degradation in yourself. Leadership requires thinking, judging, calculating, determining, recognizing, distinguishing, and decision making. These abilities degrade quickly in sustained operations.

#### **G-6. UNIT SLEEP PLAN**

The platoon leader must ensure his platoon can conduct both sustained and continuous operations. The only way a platoon can conduct continuous operations over long periods is to ensure all soldiers and leaders get enough rest.

- a. The platoon leader and sergeant must devise and enforce a work-rest-sleep plan for the platoon. The section sergeants must enforce this plan. The plan must include provisions for leaders as well as soldiers to sleep. The plan should allow soldiers at least 4 hours of sleep each 24 hours, preferably uninterrupted and ideally between 2400 and 0600.

Priority for sleep should go to FDC personnel, drivers, and others whose judgment and decision making are critical to mission accomplishment. Even with an average of 4 hours of sleep a night, soldier performance will gradually degrade.

b. The continuity of sleep is also important. Soldiers should sleep in a quiet, safe place away from radios and conversations in order for sleep to be of the most value. Sleeping in a corner of the FDC amid the noise of radios, generators, and talking is of little value. Soldiers do not sleep deep enough to gain much restorative value.

c. Twelve-hour shifts are the most effective. Rotating shifts are difficult for most soldiers to adjust to and should be avoided.

d. The quality of sleep is important. Four hours of sleep in a protected, comfortable position at a comfortable temperature are much more helpful than a longer but uncomfortable period.

e. The effects of sleep deprivation are accumulative. If three soldiers do their part of a task at 50 percent effectiveness, the chances that the whole task will be accomplished correctly are less than 50 percent. In fact, it is about 12 percent ( $.5 \times .5 \times .5 = .125$ ). Army studies on the effects of individual sleep deprivation on artillery FDC and gun crews show that seven hours of sleep for each man a day can maintain effectiveness indefinitely, five to six hours of sleep a day can maintain acceptable performance for 10 to 15 days, and four hours of sleep for each day maintain acceptable performance for only two to three days. Less than three hours of sleep a day is almost the same as not sleeping at all.

#### **G-7. DUTY MORTAR CONCEPT**

One method for allowing mortar crews to rest, which has proven useful in combat, is the designation of a duty mortar. One mortar crew is designated as being responsible for answering all initial calls for fire. This crew remains awake near its mortar during the entire tour of duty. The other crews can sleep without having anyone awake to respond immediately to fire missions. All mortars in the section must be laid on the priority target if one has been designated. A minimum amount of ammunition is prepared to fire the priority mission. Local security must still be established, and the FDC must have at least two people awake--a RATELO and an FDC computer. An easily initiated and effective signal for the whole mortar section to wake up and join in the fire mission must also be established. This may have to be a runner, since history has shown that exhausted mortar crews will not wake up, even when the mortar next to them begins to fire. After several days of sleep deprivation, the body will not respond to the sounds of outgoing fire.