Part Nine

EVASION

Chapter 26

LEGAL AND MORAL OBLIGATIONS

26-1. Introduction:

a. Aerial combat in the future, as in the past, will expose aircrews to possible ejection, bailout, or forced landings into enemy controlled territory. The aircrews who encounter such traumatic circumstances must be prepared to survive and evade the enemy to return to friendly control. An active commitment to solving problems and to individual survival (the "will to survive") is essential. Aircrew members must be prepared to exert extreme effort, both mental and physical, to successfully evade capture. In an excerpt from a debrief, one survivor describes what it was like coming to terms with these problems. "I thought to myself...'Well, I'm in a hell of a spot, what am I going to do about it?' The situation was such that I didn't do anything about it for quite awhile. I just sat there in the rain where I had landed and stared at the ground. It became colder, and after what seemed like hours, I lifted my gaze and sat staring now into the forest, looking at it without even really seeing it. I started thinking about the chain of events that had preceded my landing in this God-forsaken forest so far from my lines. My thoughts were as jumbled and unreal as the fog into which I had dived. Soon, it started to snow and I realized that I was in danger of being discovered or of freezing to death where I sat, and so, with a huge effort of will I forced myself to think coherently. I stood, and so began my journey." (See figure 26-1.)

b. This person had no survival training but nevertheless managed to successfully evade for miles back to his own lines with little more than a strong will to survive and common sense. Potential evaders must understand that evading capture presents a difficult challenge. They will meet and have to overcome a succession of obstacles, both manmade and natural. Knowledge gained from the experience of others, their own training, and prior preparation and planning will help them to overcome those obstacles.

c. This part addresses covert survival; that is, evasion. Areas to be covered include:

(1) Evader's moral obligations and legal status.

(2) Principles and techniques of evasion, camouflage, and travel (assisted or unassisted).

(3) The special aspects of food and water procurement.

(4) Combat signaling and recovery.

26-2. Definitions:

a. Evader. An "evader" (JCS Pub 1) is "a person who through training, preparation, and application of natural intelligence avoids contact with, and capture by, hostiles, both military and civilian."

b. Evasion. Evasion means all the processes involved in living off the land and, at the same time, avoiding capture while returning to friendly control. As used here, it includes all the techniques of evasion employed by those on foot in enemy territory.

26-3. Military Drive:

a. A crewmember becomes an evader when isolated in hostile areas, unable to continue the assigned mission, and when prevented from rejoining friendly forces. Definitions are useful but will not contribute to success in evading capture unless potential evaders understand what factors give direction and guidance to their efforts.

b. If the opportunity exists, evaders must be motivated to take advantage of it. The motivation to make a total effort to adhere to every evasion principle 24 hours a day may be personal or military. This strong central drive will give the survivor the necessary push to make these efforts.

c. Even if evasion is unsuccessful and the evader is captured, every hour spent eluding the enemy ties up enemy forces and lessens the evader's intelligence value.

d. In addition to the above reasons for evading capture, survivors also have moral and legal obligations to fulfull.

(1) Moral obligation is implied throughout the Articles of the Code of Conduct, specifically Article II. Article II states: "I will never surrender of my own free will. If in command, I will never surrender my men while they still have the means to resist." This Article of the Code should guide an evader's behavior during evasion just as it does in any other combat situation.

(2) The UCMJ continues to apply to evader's conduct during evasion or captivity. Particularly applicable are Article 99, Misbehavior Before the Enemy, Article 104, Aiding the Enemy, and Article 92, Failure to Obey a Lawful Order. Thus, one can be tried for misconduct as a combatant or as a noncombatant. A combatant is defined in AFP 110-31 as "a person who engages in hostile acts in an armed conflict on behalf of a party to the conflict." The combatant must conform to the standards established under international law for combatants, be authorized by his or her country to so act, and be recognizable as a combatant by uniform, insignia, or

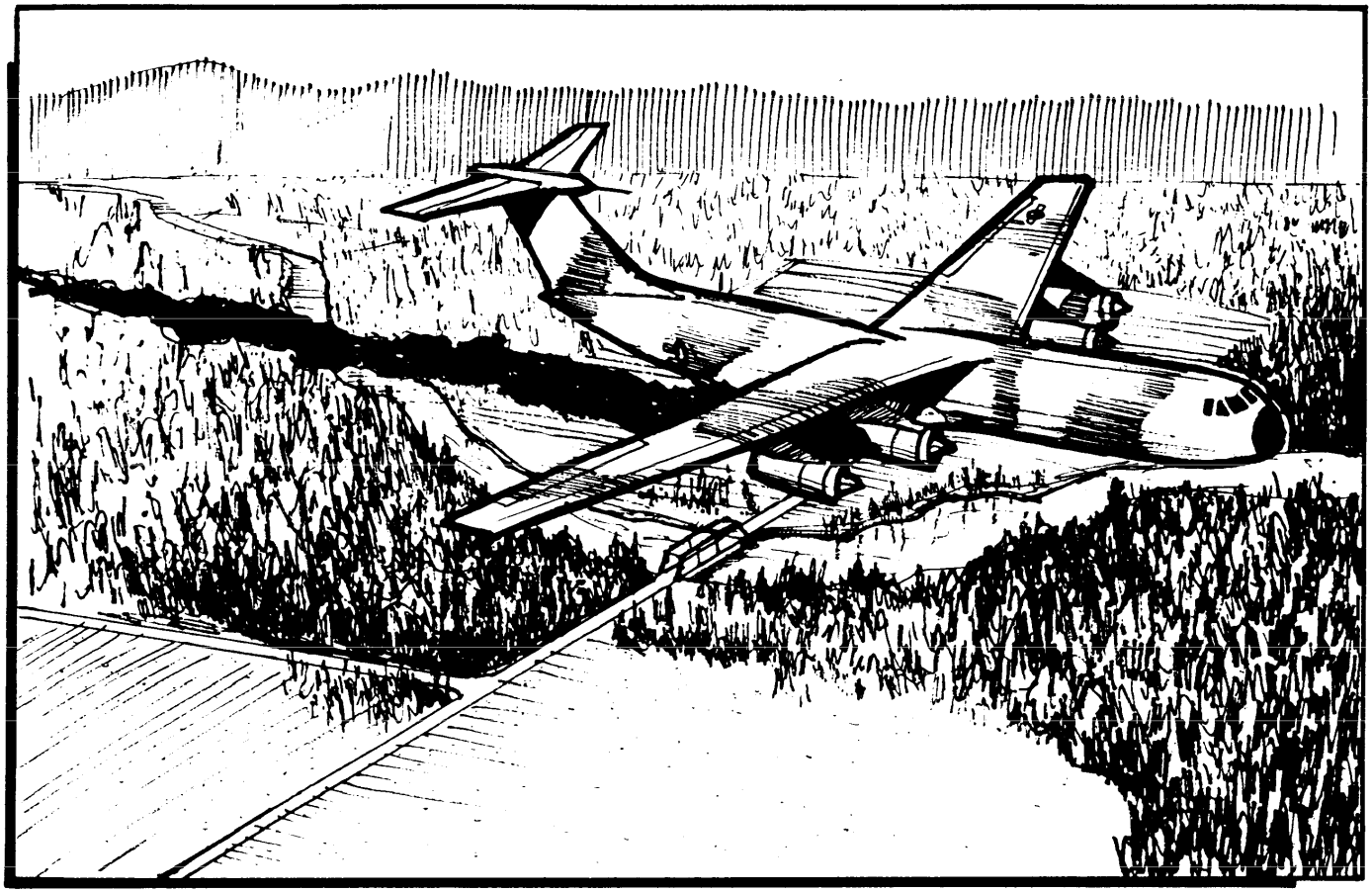

Figure 26-1. Evasion.

other sign. A noncombatant includes a wide variety of persons, including civilians, prisoners of war, sick and wounded persons, chaplains, medics, and other similar persons (AFP 110-31). Various countries around the world have developed written and unwritten laws of war. Four Geneva treaties were entered into by the United States and 60 other countries in 1949 and these treaties, as since amended, are in AFP 110-20.

(3) An "evader" is defined in international law as "any person who has become isolated in hostile or unfriendly territory and who eludes capture." An evader is a combatant and retains this status as a fighting person under arms according to international law until captured. Evaders are considered instruments of their government, under orders to evade capture, and never to surrender of their own free will. The evader is still militarily effective and may take such steps as necessary, within the rules of warfare, to accomplish the mission, which includes returning after striking an enemy target. While in combatant status, the evader may continue to strike legitimate military targets and enemy troops without being held liable to prosecution after capture for violation of the local criminal law. To do so while evading capture is the legal function of a combatant.

(4) Once captured, an evader becomes a noncombatant and will occupy the status of a prisoner of war (PW). A PW who kills or wounds enemy personnel of the Detaining Power in an attempt to escape or evade may be tried and punished for the offense. International law provides certain rights to a PW and requires issuance of an identity card showing name, rank, serial number, and date of birth. When questioned, a PW is bound only to provide this information. A PW who escapes remains a noncombatant until he or she rejoins the armed forces of his or her country or the armed forces of a friendly power. Once escape is completed, combatant status is regained and no punishment may be imposed by the Detaining Power in the event of subsequent recapture. A PW who attempts to escape and is recaptured before rejoining his or her armed forces is liable under the Geneva Convention only for disciplinary punishment in respect of this act, even if it is a repeated offense. However, special surveillance may be imposed.

(5) Disguise is a lawful means of evading enemy forces so long as a means of military identification is retained on the person. However, an evader while in disguise may not participate in or commit hostile acts

involving destruction of life or property. A person involved in such an offense will be classified as an "unlawful combatant," will not be entitled to PW status, and may be tried by the enemy and sentenced to imprisonment or execution under certain circumstances. A disguise also cannot be used by a military person for the purpose of gathering enemy military information or for waging war, and to do so will result in loss of PW status if captured.

(6) Evasion can be classified as either assisted or unassisted. Assistance can be defined as any help which is offered to an American aircrew member by any person. This help may include food, clothing, medicine, shelter, money, and even such a small item as a shoelace. Evaders should, in fact, consider they have been assisted even if, while evading through hostile territory, their presence has been ignored by indigenous personnel. The term unassisted evasion would then relate to the situation where the survivor, as an evader, must rely solely on his own knowledge and abilities to successfully emerge from an enemy-held or hostile area to areas under friendly control. The process of emerging may include aerial recovery, water recovery, or assisted evasion, but it is primarily an unassisted individual effort. Certain principles apply to all evasion situations; certain procedures should be followed; and certain techniques have widespread application. The beginning of an evasion experience is often the most critical phase. This is particularly true for a person who bails out over enemy territory during daylight hours and in sight of enemy personnel. The downed aircrew member can count on the enemy to make a determined effort to capture him if seen. Eluding the enemy is also a matter of effort and luck. Luck plays its part initially in establishing where a crewmember lands in relation to the location of any enemy personnel who may have seen the descent. For example, the downed crewmember who lands in a heavily populated area (city, military installation or combat area) may be taken prisoner immediately. Here the problem becomes one of early escape rather than one of evasion.

(7) An evasion situation should not be categorized in terms of length. History has proven that predicting the length of any specific evasion situation is practically impossible. All crewmembers should be prepared to evade until rescued, no matter how long the evasion experience might last. Emphasizing the advantages of "short-term" evasion over "long-term" may cause an overly optimistic, possibly even foolhardy, attitude toward evasion planning. Or, evaders may decide, if they are not rescured in a "short" period of time, it is no longer worth the effort; thereby, taking on a defeatist attitude.

Chapter 27

FACTORS OF SUCCESSFUL EVASION

27-1. Basic Principles. All potential evaders must have three things in their favor. These are the same three things needed by a potential escapee. The three factors which increase chances of successful evasion are preparation, opportunity, and motivation.

27-2. Preparation:

a. Preparation is one of the most important factors for successful evasion. The actions crewmembers take before the evasion episode can make the difference between being able to evade or being captured. In a hostile area the survivors should remember evasion is an integral part of their mission and plan accordingly. The enemy may make mistakes of every conceivable form and not suffer more than indignation, anger, and fatigue. The evader, on the other hand, must constantly guard against mistakes of any sort. Being seen is the greatest mistake an evader can make. The evader must prepare for this task (figure 27-1).

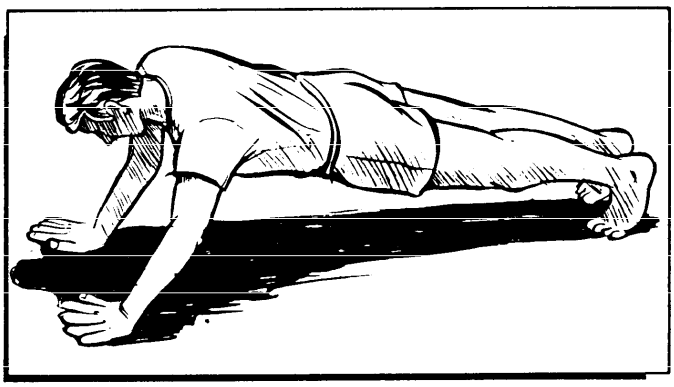

Figure 27-1. Preparation.

b. Three basic problems during evasion are:

(1) Evading the enemy.

(2) Surviving.

(3) Returning to friendly control.

c. Chances for a successful evasion are improved if evaders:

(1) Observe the elementary rules of movement, camouflage, and concealment.

(2) Have a definite plan of action.

(3) Be patient, especially while traveling. Hurrying increases fatigue and decreases alertness. Patience, preparation, and determination are key words in evasion.

(4) Conserve food.

(5) Conserve as much strength as possible for critical periods.

(6) Rest and sleep as much as possible.

(7) Maintain a highly developed "will to survive" and "can do" attitude. Evasion may require living off the land for extended periods of time and traveling on foot over difficult terrain, often during inclement weather.

(8) Study the physical features of the land. They should note the location of mountains, swamps, plains, deserts, or forests, type of vegetation, and availability of water.

(9) Consider the climate. Aircrew members should know the climatic characteristics and typical weather conditions of the area which may be flown over.

(10) Study ethnic briefs and survival, evasion, resistance, and escape (SERE) contingency guides before a mission and learn some of the customs and habits of the local people. Such knowledge will aid in planning missions and evasion plans of action. For example, it may give the evader the ability to avoid hostile people or groups or to identify and deal with "friendlies." This knowledge may also allow for blending into the local populace (figure 27-2).

(11) Know the equipment well! One must know the location of each item in the kit, its operation, and its value. An evader must preplan which equipment should be retained and which should be left behind.

d. Once in the evasion situation, planning for travel will be a consideration for evaders. They must have a definite objective and be confident in their approach and ability to achieve it. They will normally have several options with variations to choose from in selecting a plan of action or destination. The enemy force deployment, search procedures, terrain, population distribution, climate, distance, and environment (that is, NBC) will influence destination selection. Examples of options and destinations:

(1) Await SAR forces.

(2) Evade to a SAFE area.

(3) Evade to a neutral country. (NOTE: Border areas not disrupted by combat may have a security system intact.)

(4) If evaders are in the forward edge of the battle area (FEBA) and feel sure that friendly forces are moving in their direction, they should seek concealment and allow the FEBA to overrun their position. Evaders' attempts at penetrating the FEBA should be avoided. Evaders face stiff opposition from both sides.

e. The chances that one of these destinations may be close by will be determined by many things including the time and location of the bailout. Other determining factors are: the location and direction of movement of the FEBA, the presence or absence of willing assisters, and the knowledge of the evader's whereabouts possessed by rescue personnel. If the survivor does not land

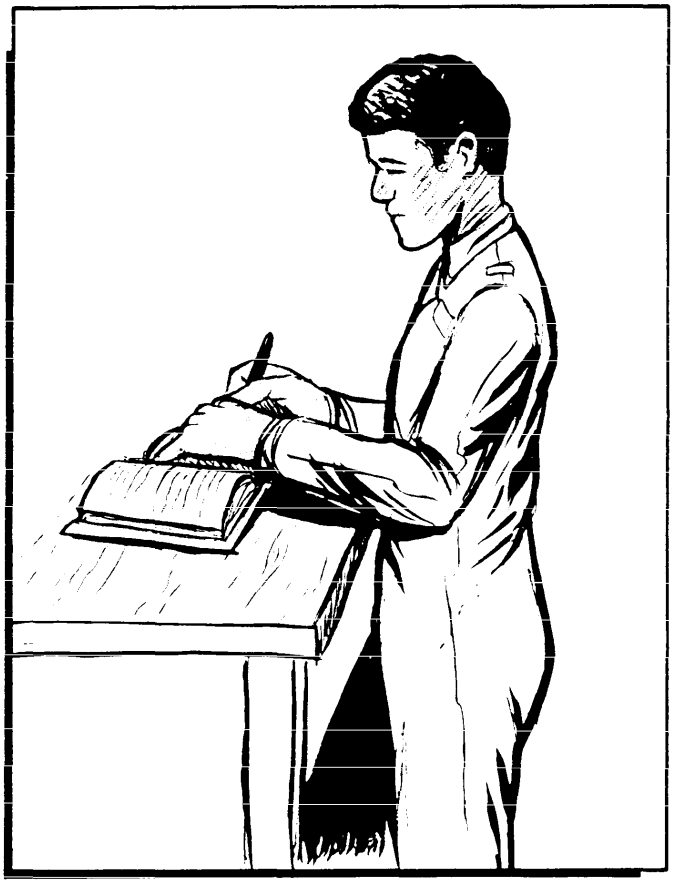

Figure 27-2. Study Ethnic Briefs.

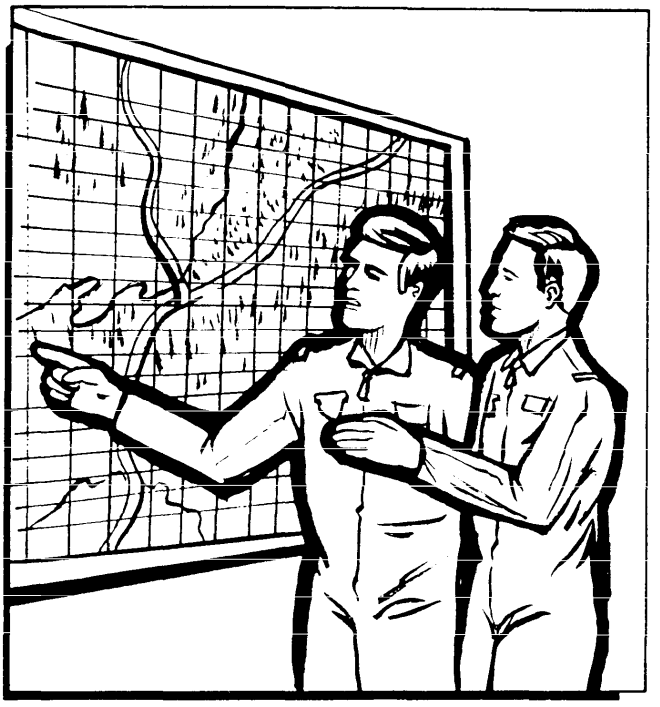

Figure 27-3. Planning for Travel.

close to one of the above areas or if the previously mentioned factors do not favor immediate air pickup, the survivor may have to travel some distance to reach one of the destinations (figure 27-3).

f. One consideration in choosing destination and direction of travel after bailout is whether one of these suitable areas for a pickup or contact with friendly forces exists and, if so, its location. Some preplanning should have been done before the mission. Information upon which to base a decision is derived from command area briefings, area studies, SERE contingency guides, and premission intelligence briefings.

g. Another consideration is physical condition. One's physical condition is the responsibility of the potential evader and has a great effect on the evader's ability to survive. Once on the ground, it is too late to get in shape. One more aspect is an aircrew member's personal habits. Upon first consideration, personal grooming habits might not be considered an important premission briefing item. However, using aftershave lotion, hair dressing, or cologne could add to the problems of an evader. The odor can carry for great distances and give away the evader's presence.

27-3. Opportunity. Potential evaders must take advantage of any and all opportunities to evade. This starts in the aircraft when an emergency is declared. Following current, approved emergency in-flight procedures for the theater of operations (when ejection, bailout, or ditching appears imminent), the aircraft commander will attempt to establish radio contact by first calling on the secure frequency of last contact; second, on an established common secure frequency; and third, on the international emergency frequency. When communication is established, the tactical call sign, type of aircraft, position, course, speed, altitude, nature of difficulties, and intentions will be transmitted. The identification friend or foe (IFF) should be set to the emergency position. When possible, ejection or bailout should be attempted over or near a SAFE area, lifeguard station, or submarine pickup point. This minimizes threat involvement for evaders and SAR forces alike. After ejection or bailout and during descent, the aircrew member must remain alert and steer the parachute away from potential threats (populated areas, gun emplacements, troop concentrations, etc.) or out to sea (feet wet). Once on the ground, the evader must be proficient in the use of the survival/evasion equipment to facilitate evasion (for example, use of the compass in conjunction with the survival radio to call in airstrikes on enemy forces threatening the evader). In addition to the opportunity to evade, motivation is essential to the evader's success.

Figure 27-4. Avoiding Detection.

27-4. Motivation. A strong, central drive will give the evader the necessary push to succeed. It may be personal, ranging in nature from a frame of reference gained through training to a desire to return to a family or loved ones. Motivation may be strictly military, involving one or all of the following reasons applicable to all military men:

a. To return and fight again.

b. To deny the enemy a source of military information.

c. To deny the enemy a source of propaganda.

d. To deny the enemy a source of forced labor.

e. To tie up enemy forces, transportation, and communications that otherwise might be committed to the war effort.

f. Return with intelligence information.

g. In addition, the Code of Conduct calls upon the military members not to surrender of their own free will.

h. Additionally, it is suggested that other personal reasons for being motivated to evade include: fear of death, pain, suffering, humiliation, degradation, disease, illness, torture, uncertainty, and fear of the unknown. From the evader's point of view, *evasion is far more desirable than captivity or death.*

27-5. Evasion Principles:

a. Besides the preparation, opportunity, and motivation factors important to evasion, there are other important principles. The evader should try to recall any previous briefings, standard operating procedures, or training. A course of action should then be chosen which has the greatest likelihood of resulting in the return to friendly forces.

b. Evader actions should be flexible. Flexibility is one of the most important keys to successful evasion. The evader, basically, must never be so firmly set in a course of action that a change is out of the question. The best thing an evader can do is to stay open to new ideas, suggestions, and changes of events. Having several backup plans of action can give the evader organized flexibility. If one plan of action is upset by enemy activity, the evader could rapidly switch to a backup plan without panic.

c. The evader is primarily interested in avoiding detection. Each evader should remember that people catch

people. If the evader avoids detection, success is almost assured. Evaders should:

(1) Observe and listen for sounds of enemy fire and vehicle activity during parachute descent and moving away from those enemy positions once on the ground. Flyers downed during daylight should assume they were seen during descent and expect a search to center on their likely point of landing.

(2) Be patient and determined while traveling.

(3) Use poor weather conditions as an aid in evading.

(4) Circumstances permitting, select times, routes, and methods of travel to avoid detection.

(5) Avoid lines of communication (waterways, roads, etc. (figure 27-4)).

d. The evaders' main objective is immediate recovery. In hostile areas or situations, survivors must sanitize all evidence of presence and direction of travel (figure 27-5.) Survivors may never be certain that rescue is imminent.

e. Although evaders would not normally move too far if rescue is imminent, in many situations they will have to leave the landing area quickly and travel as far as practical before selecting a hiding place. They should leave no sign which indicates the direction or presence of travel. All hiding places should be chosen with extreme care. The time evaders will remain in the first location is governed by enemy activity in the area, their physical condition, availability of water and food, rescue capabilities, and patience. It is in this place of initial concealment that the evaders should regain strength, examine the current situation, and plan for the evasion problems ahead (figure 27-6).

f. Once in a place of concealment, evaders should make use of all available navigation aids to orient themselves. After finding their location, evaders should also select an ultimate destination and any necessary alternate destinations. The best possible route of travel should then be decided upon. When the time comes to move, they should have a primary plan and alternate plans for travel that cover eventualities they may encounter.

(1) Evasion in a forward area has one great advantage which is not present further to the rear. Assistance may be close at hand. This assistance may come from serveral sources, each of which, under particular circumstances, may prove to be the most effective. These sources may be air cover by tactical fighter flights, helicopter recovery, and rescue by ground forces. Contact with friendly forces in forward areas requires extreme caution. Do not surprise them or move suddenly. They may mistake the evader as the enemy.

Figure 27-5. Sanitize Area.

Figure 27-6. Movement from the Area.

(2) The situation at the time of the emergency will determine the evaders' best course of action. High ground is normally the best position from which to await rescue; evaders may expect the best results from signaling devices, may observe the surrounding terrain, and may be kept under observation by friendly air cover. Whatever position is chosen, it must be clear of obstacles that would prevent a successful rescue.

(3) If not rescued immediately, the situation may compel evaders to move. Evaders must plan a course of action before leaving their position. When the evaders are certain their position is known to friendly elements, they might expect ground forces to attempt a rescue. They should remember their position may be detected as the enemy search parties approach. They must be prepared to evade to a new position.

(4) Evaders should remember that when traveling they are probably more vulnerable to capture. Once past the danger of an immediate search, evaders must avoid people. Inhabited areas should be bypassed rather than penetrated, even if it means miles of added travel. Many evaders have been captured because they followed the easiest and shortest route, or failed to employ simple techniques such as scouting, patrolling, camouflage, and concealment. As a rule, the safest route avoids major roads and populated areas, even if it takes more time and energy. Unaccompanied evasion requires self-reliance and independent action (figure 27-7).

Figure 27-7. Avoiding Populated Areas.

Chapter 28

CAMOUFLAGE

28-1. Introduction. Presence of evaders in an area controlled by the enemy may require the evaders to adopt and maintain camouflage to avoid observation. Camouflage consists of those measures evaders use to conceal their presence from the enemy. Camouflage is a French word meaning disguise, and it is used to describe action taken to mislead the enemy by misrepresenting the true identity of an installation, an activity, an item of equipment, or an evader. As a tool for evasion, it enables evaders to carry out life supporting activities and to travel unseen, undetected, and free to return to friendly control. Camouflage allows them to see without being seen. They should try to blend in with the surrounding environment. Effective individual concealment often depends primarily on the choice of background and its proper use. Background is that portion of the surroundings against which an evader will be seen from the ground and the air. It may consist of a barren rocky desert, a farm yard, or a city street. It is the controlling element in individual camouflage and governs every concealment measure. At all times, camouflage is the responsibility of the individual evader. In the event of group evasion, the group leader and each individual are responsible for the camouflage of the group. Evaders should remember that camouflage is a continuous, never-ending process if they want to protect themselves from enemy observation and capture (figure 28-1).

28-2. Types of Observation:

a. Of the five senses, sight is by far the most useful to the enemy, hearing is second, while smell is of only occasional importance. But these same senses can be of equal value to the evader and observer.

b. How useful these senses are depends primarily on range. For this reason, basic camouflage stresses visual concealment which is relatively long range. Most people are accustomed to looking from one position on the ground to another position on the ground.

Figure 28-1. Camouflaging.

c. Before evaders can conceal themselves from aerial observation, they should become familiar with what their activities look like from the air, both in an aerial photograph and from direct observation. The evaders must also have an understanding of the types of observation used by the enemy. There are two categories of observation—direct and indirect.

(1) Direct Observation:

(a) Direct observation refers to the process whereby the observer looks directly at the object itself without the use of telescopes, field glasses, or sniperscopes. Direct observation may be made from the ground or from the air. Direct aerial observation becomes more and more important because of the rapid changes in weapons and in tactical situations due to greater mobility of troops. Reconnaissance aircraft over enemy lines report locations of troops, vehicles, and installations (or shelter areas) as seen from the air-to-ground control stations. Reported targets can be immediately fired upon or troops can be sent in to investigate shelter areas or other suspicious areas (figure 28-2).

(b) The enemy may also use dogs, foot patrols, and mechanized units to patrol a given area. Such teams could physically search an area for signs of the passage of strangers, such as footprints, old campfires, discarded or lost equipment, and other "telltale" signs which would indicate that someone had been in the area.

(c) Observation by the local populace is also a possibility. Upon seeing an evader or "telltale" signs an

Figure 28-2. Direct Observation.

evader left behind, they may contact the local authorities, who initiate organized searches.

(2) Indirect Observation:

(a) Indirect observation refers to the study of a photograph or an image of the subject via photography, radar, or television. This form of observation is becoming increasingly more varied and widespread, and may be used from either manned or unmanned positions.

(b) Views from the ground are familiar, but views from the air are usually quite unfamiliar. In modern warfare, the enemy may put emphasis on aerial photographs for information. It is important to become familiar with the "bird's-eye view" of the terrain as well as the ground view in order to learn how to guard against both kinds of observation.

28-3. Comparison of Direct and Indirect Observation:

a. The main advantage of direct observation is that observers see movement of an evader without camouflage. An observation can be maintained over relatively long periods of time. The main disadvantage lies in human frailty. For example, the observer's attention may be diverted to another area, or the observer may be fatigued and unable to concentrate.

b. Indirect observation has many advantages. Indirect observation can be far-reaching, cover large areas, and be very accurate. It also produces a record of the area observed so that the recorded picture can be studied in detail, compared, and evaluated. The principal disadvantage is a photograph covers a very short period of time, making detection of movement difficult. This disadvantage can be partially overcome by taking pictures of the same area at different intervals and comparing them for changes (figure 28-3).

Figure 28-3. Indirect Observations.

28-4. Preventing Recognition:

a. Recognition is the determination (through appearance, behavior, or movement of the hostile or friendly nature) of objects or persons. One objective of camouflage concealment is to prevent recognition. Another objective is to deceive or induce false recognition. This implies that camouflage is not always designed to be a "cloak of invisibility." In some instances, camouflage is used to allow deception. The camouflaged object or person is then seen as a natural feature of the landscape.

b. Recognition through appearance is the result of conclusions drawn by the observer from the position, shape, shadow, texture, or color of the objects or persons. Recognition through behavior or movement includes deductions made from the actual movements themselves or from the record left by tracks of persons or vehicles or by other violations of camouflage discipline. Camouflage disciplines are those actions which contribute to an evader's ability to remain undetected. Proper use of camouflage discipline avoids any activity that changes an area or reveals objects to an enemy. Examples of common breaches of camouflage discipline include reflections from brightly shining objects (watches, glasses, rings, etc.) (figure 28-4), overcamouflaging, or using camouflage materials which are foreign to the area presently occupied by an evader. Evaders must also watch for signs that may reveal enemy camouflage efforts. Inadvertently walking into a camouflaged enemy position may result in capture.

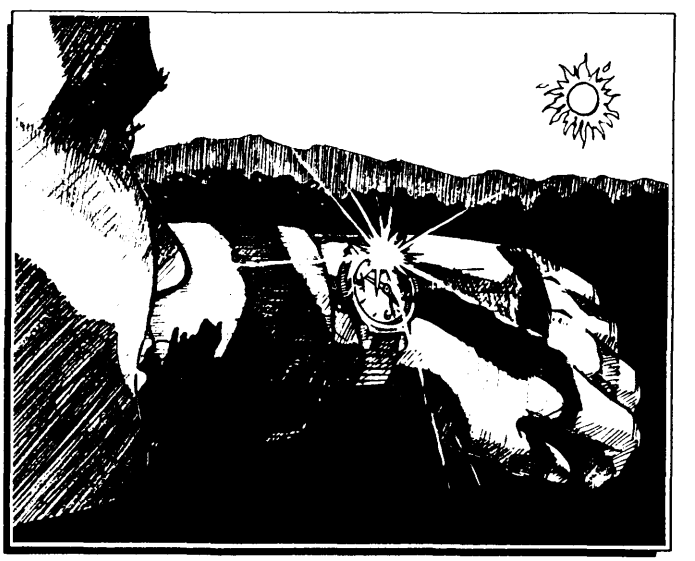

Figure 28-4. Reflections.

28-5. Factors of Recognition. Regardless of the type of observation, there are certain factors which help to identify an object. They are called the factors of recognition and are the elements which determine how quickly an object will be seen or how long it will remain unobserved. The eight factors of recognition are position, shape, shadow, texture, color, tone, movement, and shine. These factors must be considered in camouflage to ensure that one or more of these factors do not reveal the location of the evaders.

a. Position. Position is the relation of an object or person to its background. When choosing a position for concealment, a background should be chosen which will virtually absorb the evader (figure 28-5).

Figure 28-5. Position.

b. Shape. Shape is the outward or visible form of an object or person as distinguished from its surface characteristics and color. Shape refers to outline or form. Color or texture is not considered. At a distance, the forms or outlines of objects can be recognized before the observer can make out details in their appearance. For this reason, camouflage should disrupt the normal shape of an object or person (figure 28-6).

c. Shadow. A shadow may be more revealing than the object itself, especially when seen from the air. Objects such as factory chimneys, utility poles, vehicles, and tents (or people) have distinctive shadows. Conversely, shadows may sometimes assist in concealment. Objects in the shadow of another object are more likely to be overlooked. As with shape, it is more important to disrupt the shadow pattern than to totally conceal the object or person. The identifiable shadows can be broken up by the addition of natural vegetation at various points on the body. Wearing "shapeless" garments will also disrupt the outline. For example, a soft and shapeless field cap can be used instead of a helmet or flight cap (figures 28-7 and 28-8).

Figure 28-6. Shape.

d. Texture. Texture is a term used to describe the relative characteristics of a surface, whether that surface is a part of an object or an area of terrain. Texture affects the tone and apparent coloration of things because of its absorption and scattering of light. Highly textured surfaces tend to appear dark and remain constant in tone regardless of the direction of view and lighting, whereas relatively smooth surfaces change from dark to light with a change in direction of viewing or lighting. The application of texture to an object often has the added quality of disrupting its shape and the shape of its shadow, making it more difficult to detect and identify as something foreign to the surroundings in which it exists. As an example, a surface having the same color but with heavy "nap" or texture is tall grass. Each separate blade is capable of casting a shadow upon itself and its surroundings. The light reflecting properties have been cut to a minimum. It will look and photograph dark gray. Looking straight down, the aerial observer sees all of the shadows, whereas a person on the ground may not. The textured surface may look light at ground level, but to the aerial observer the same surface produces an effect of relative darkness. The material used to conceal a person or an object must approximate the texture of the terrain in order to blend in with the terrain. Personnel walking or vehicles moving across the terrain will change the texture by mashing down the growth. Therefore, this will show up clearly from the air as vehicle tracks or foot paths.

e. Color:

(1) Pronounced color differences at close range distinguish one object from another. The contrast between the color of the object and the color of its background

Figure 28-7. Shadow.

Figure 28-8. Shadow Breakup.

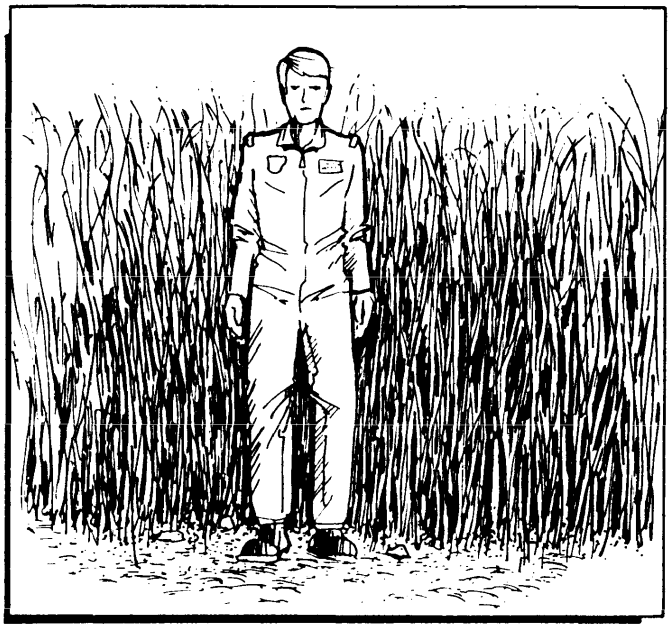

Figure 28-9. Contrast.

can be an aid to enemy observers. The greater the contrast in color, the more visible the object appears (figure 28-9).

(2) Color differences or differences in hue, such as red and green-yellow, become increasingly difficult to distinguish as the viewing range is increased. This happens because of atmospheric effects. Colors in nature, except for certain floral and tropical animal life, are not brilliant. The impression of the vividness of nature's colors results from the large areas of like colors involved and contrast of these areas with each other. The principal contrast is in their dark and light qualities. However, the dark and light color contrast does not fade out quickly and is distinguishable at greater distances. Therefore, as a first general principle, the camouflage should match the darker and lighter qualities of the background and be increasingly concerned with the colors involved as the viewing range is decreased or the size of the object or installation becomes larger. A second general rule to follow is to avoid contrasts of hues. This is especially true in areas with heavy vegetation. Light-toned colors, such as leaf bottoms, should be avoided as they tend to attract attention.

f. Tone. Tone is the amount of contrast between variations of the same color. It is the effect achieved by the combination of light, shade, and color. In a black-and-white photograph, the shades of gray in which an object appears is known as tone (figure 28-10). By adding texturing material to a smooth or shiny surface, the surface can be made to produce a darker tone in a photograph, because the textured surface now absorbs more light rays. Objects become identifiable as such because of contrasts between them and their background. Camouflage blending is the process of eliminating or reducing these contrasts. The principal contrast is that of tone; that is, the dark and light relationship existing between an object and its background. The two principal means available for reducing tone contrast are the application of matching or neutral coloration and the use of texturing to form disruptive patterns. Poorly chosen, disruptive patterns tend to make the object more conspicuous instead of concealing it.

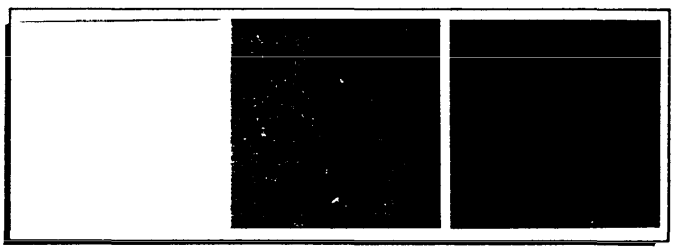

Figure 28-10. Three Half-Tone Blocks.

g. Movement. Of the eight factors of recognition, movement is the quickest and easiest to detect. The eye is very quick to notice any movement in an otherwise still scene. The aerial camera can record the fact that something has moved when two photographs of the same area are taken at different times. If an object has moved, the changed position is apparent when the two photographs are compared (figure 28-11).

h. Shine:

(1) Shine is a particularly revealing signal to an observer. In undisturbed, natural surroundings, there are comparatively few objects which cause a reflected shine. Skin, clean clothing, metallic insignia, rings, glasses, watches, buckles, identification bracelets, and similar items produce "shine." When light strikes smooth surfaces such as these, it may be reflected directly into the observer's eye or the camera lens with striking emphasis (figure 28-12).

(2) Such items must be neutralized by staining, covering, or removing to prevent their shine from revealing the location of evaders. This is especially true at night.

28-6. Principles and Methods of Camouflage:

a. No matter how applied, camouflage can be successful only by observing three fundamental principles. These basic principles of camouflage are choice of position, camouflage discipline, and camouflage construction.

b. When these factors have been considered, the evader is ready to begin application of various methods of deceiving the enemy. These methods are:

Figure 28-11. Movement.

(1) Hiding. The complete concealment of a person or object by physical screening.

(2) Disguising. Changing the physical characteristics of an object or person in such a manner as to fool the enemy.

(3) Blending. The arrangement of camouflage material on or about an object in such a manner as to make the object appear to be part of the background. To properly use these methods, three simple rules should be followed:

(a) First, the background should be changed as little as possible. When choosing a position to gain concealment, a background should be chosen that will visually absorb the elements of the position. Evaders should use a "natural" position if available. They should look for an existing position which can be used almost as is, such as a cave or thicket if there are many like it in the area. Isolated landmarks such as individual trees, haystacks, or houses should be avoided. They tend to attract attention and are likely to be searched first because they are so obvious. At times, by making use of background, complete concealment against visual and photographic detection may be gained with no construction. In terrain where natural cover is plentiful, this is a simple

Figure 28-12. Reflected Shine.

Figure 28-13. Background.

task. Even in areas where natural cover is scarce, concealment may be achieved through use of terrain irregularities. Regardless of the activity involved, evaders must always be mentally aware of their positions (figure 28-13).

(b) Secondly, the evader should use camouflage discipline. This means all of the factors of concealment are continuously applied.

-1. Daytime. Camouflage discipline is the avoidance of activity which changes the appearance of an area or reveals military objects to the enemy. A well-camouflaged position is only secure as long as it is well maintained. Concealment is worthless if obvious tracks point like directional arrows to the heart of the location or if signs of occupancy are permitted to appear in the vicinity. Tracks, debris, and terrain disturbances, are the most common signs of activity. Therefore, natural lines in the terrain should be used. If practical, exposed tracks should be camouflaged by brushing or beating them out. If leaving tracks is unavoidable, they should be placed where they will be least noticed and partially concealed (along logs, under bushes, in deep grass, in shadows, etc.). If tracks cannot be concealed, brushing them out will help them disintegrate quickly. Tying rags or brush to the feet will disguise boot prints and may help disguise them as refugee tracks (figure 28-14).

-2. Nighttime. Visual concealment at night is less necessary than in the daytime; however, noises at night are more noticeable. A simple act such as snoring may prove fatal. Calling to one another, talking, and even whispering should be kept to a minimum (figure

Figure 28-14. Camouflaging Tracks.

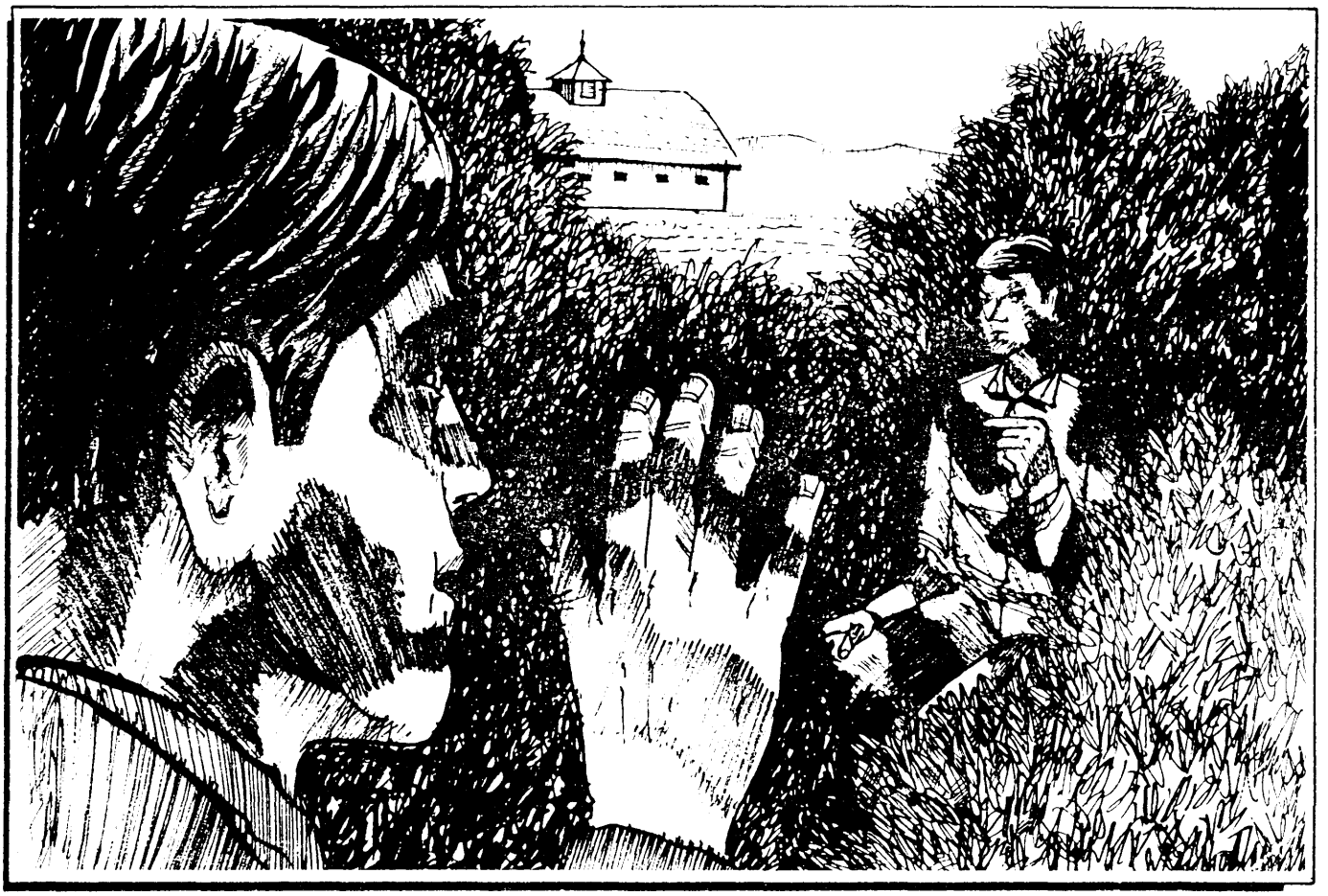

Figure 28-15. Sound.

28-15). But by far, the most important apsect of night discipline is light discipline. Lights at night not only disclose the evaders' position but also hinder the evaders' ability to detect the enemy. Even on the darkest nights, eyes grow accustomed to the lack of light in approximately 30 minutes. Everytime a match is lit or a flashlight is used, the eyes must go through the complete process of getting adjusted to the darkness again. Smoking and lights should be prohibited at night in areas in close proximity to the enemy because the light is impossible to conceal. Additionally, a cigarette light aggravates the situation by creating a reflection which completely illuminates the face. The smell of the evader's foreign tobacco would stand out even if the enemy is smoking.

-3. Evaders can lessen the effects of sound by simply taking precautions against sound production. They should avoid any sound-producing activity. Walking on hard surfaces should be avoided and full use should be made of soft ground for digging. Hand signals or signs should be used when possible during group travel. Individual equipment should be padded and fastened in such a manner as to prevent banging noises.

c. The evader should consider the following points regarding the use of camouflage:

(1) Take advantage of all natural concealment.

(2) Don't over-camouflage. Too much is as obvious as too little.

(3) When using natural camouflage, remember that it fades and wilts, so change it regularly.

(4) If taking advantage of shadows and shade, remember they shift with the Sun.

(5) Above all, avoid unnecessary movement.

(6) When moving, keep off the skyline; use the military crest (three-quarters' way up the hill).

(7) Do not expose anything that may shine.

(8) Break up outlines of manmade objects.

(9) When observing an area, do so from a prone position, while in cover.

(10) Match vegetation used as camouflage with that in the immediate locale, and when moving from position to position, change camouflage to blend with the new area's vegetation types.

28-7. Individual Camouflage:

a. At this point, with some of the general information about camouflage presented, it is time for a more detailed examination concerning individual camouflage.

b. Generally, individual camouflage is that personal concealment which evaders must use to deceive the enemy. Evaders must know how to use the terrain for effective concealment. Evaders must dress for the best concealment and carefully select their routes to provide for as much concealment as possible. All of the methods and techniques of camouflage addressed in this section have been successfully used by past evaders. If this information is learned and practiced by today's aircrew members (tomorrow's possible evaders), they will be more successful in evading and have a greater chance of returning to friendly forces.

c. Evaders should remember that in some areas they may have to engage in camouflage activities designed to deceive two types of enemy observation—ground and air. Many objects which are concealed from ground observation, may be seen from the air. This means the evader should camouflage for both types of observation.

d. Form is basic shape (body outline) and height. Three things which give an evader away in terms of form are to reveal outline of head and shoulders, to present straight lines of sides, and to allow the inverted "V" of the crotch and legs to be distinguishable. If staying in shadows, blending with background, adopting body positions other than standing erect, and other behavioral procedures are inadequate. They can be camouflaged by using "add-ons" such as branches or twigs to break up the lines. This addition of vegetation will also help an evader blend in with the background.

e. Effective concealment of evaders depends largely on the choice and proper use of background. Background varies widely in appearance, and evaders may find themselves in a jungle setting, in a barren or desert area, in a farmyard, or in a city street. Each location will require individual treatment because location governs every concealment measure taken by the individual. Clothing which blends with the predominant color of the background is desirable. There will be occasions when the uniform color must be altered to blend with a specific background. The color of the skin must receive individual attention and be toned to blend with the background.

f. There are certain general aspects of individual body and equipment camouflage techniques which apply almost anywhere. The evaders should take each of the following areas under consideration.

(1) Exposed Skin. The contrast in tone between the skin of face and hands and that of the surrounding foliage and other background must be reduced. The skin is to be made lighter or darker, as the case may be, to blend with the surrounding natural tones. The shine areas are the forehead, the cheekbones, nose, and chin.

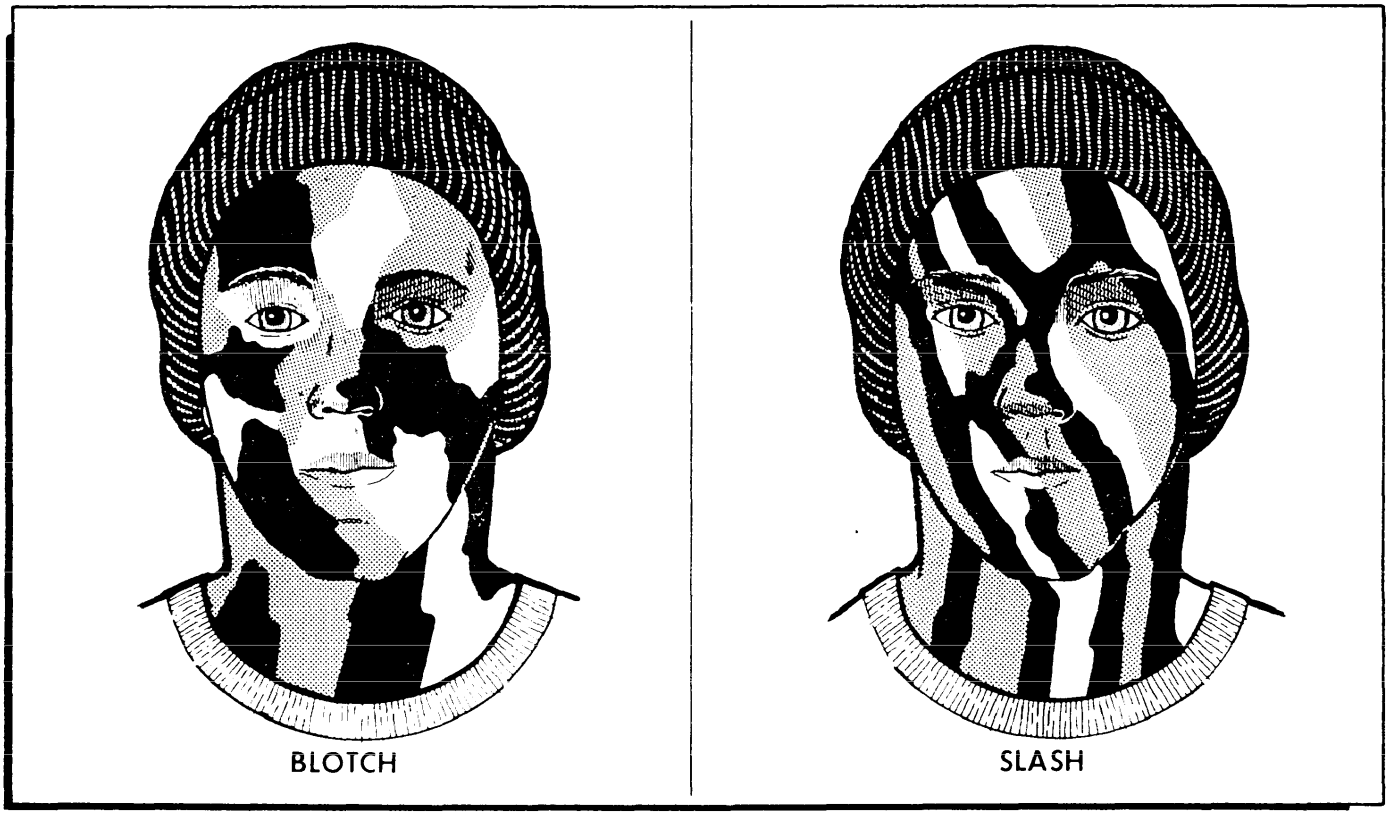

Figure 28-16. Camouflaged Faces.

These areas should have a dark color. The shadow areas such as around the eyes, under the nose and under the chin should have a light color. The hands, arms, and any other exposed areas of skin must also be toned down to blend with the surroundings. Burnt cork, charcoal, lampblack, mud, camouflage stick, berry stains, carbon paper, and green vegetation can all be used as toning materials.

(a) A mesh mosquito face net, properly toned down, is an effective method of breaking up the outlines of the face and ears.

(b) Two primary methods of facial camouflage have been found to be successful patterns. They are the "blotch" method for use in deciduous forests, and the "slash" method for use in coniferous forests (figure 28-16).

(c) Application of these two patterns are simply modified appropriately to whatever environment the evader is in. In the jungle, a broader slash method would be used to cover exposed skin; in the desert, a thinner slash; in barren snow, a wide blotch; and in grass areas, a thin type slash. To further break up the outline of the facial features, a flop hat or other loosely fitting hat may help. A beard that is not neatly trimmed may also aid the evader.

(d) When toning down the skin, evaders should not neglect to pattern all of the skin; for example, the back of the neck, the insides and backs of the ears, and the eyelids. Covering these areas may help somewhat, especially if there is a lack of other material to tone down the skin. Vegetation hung from the hat, collar buttoned and turned up, a scarf, or even earflaps may help. To cover the hands, evaders may use flight gloves, mittens, or loose cloth if unable to tone down wrists, backs of hands, and between fingers sufficiently. Evaders should watch for protruding white undergarments, T-shirt, long underwear sleeves, etc. They should also tone down these areas.

(e) Lack of hair or light colored hair requires some type of camouflage. This could include those applied to the skin or an appropriate hat, scarf, or mosquito netting.

(f) Odors in a natural environment stand out and may give evaders away. Americans are continually surrounded by artificial odors and are not usually aware of them. Human body odor would have to be very strong to be detected by ground troops (searchers) that have been in the field for long periods. The following odors should be of concern to the evader.

-1. Soaps and Shampoos. In combat areas, personnel should always use unscented toilet articles. Shaving cream, after shave lotion, perfume, and other cosmetics are to be avoided. The potential evaders should also realize that insect repellent is scented. They should try to use headnets, but if forced to use a repellent, the camouflage stick which has repellent in it is the least scented. Tobacco should not be used. The stain and odor should be removed from the body and clothing. Gum or candy may have strong or sweet smells—evaders should take care to rinse out their mouths after use. These odors, especially tobacco, can be detected at great distances.

-2. Smoke odors from campfires may permeate clothing, but if the potential searchers use fires for cooking and heat, they probably can't detect it on evaders.

(2) Clothing and Personal Items. These items require attention both before assignment to a combat mission and again if forced to evade. Prior preparation for the survivor may include:

(a) Ensuring that flight clothing does not smell of laundry products and is in good repair and not worn to the point where it shines or is faded.

(b) Checking zippers for shine and function.

(c) Checking rank insignia and patches for light reflection and color. Remove name tag, branch of service tag, and rank (whether they are stripes or metal insignia, bright unit patches, etc.) from the uniforms and place them either in the pack or in a secure pocket. Underwear should also be subdued for camouflage in the event that the outer layer is torn. Boots should be black but not shiny. Shiny eyelets should be repainted. Squeaky boots should be fixed or replaced. Sanitize pocket or wallet contents. Remove items which might aid in enemy exploitation attempts of the individual PW or PWs as a group; for example, credit cards, photographs, money, and addresses. Evaders should carry only those necessary pieces of identification which will prove a person is a US military member.

(3) Additional Clothing. Additional clothing may be desirable and located in flight clothing, such as hat, socks, scarf, and gloves. In an evasion environment, clothing and equipment need quick camouflaging attention. Anything to be discarded should be hidden at the initial landing site.

(4) Sanitizing Clothing. Clothing should be sanitized by removing anything bright or shiny. Evaders should consider camouflaging their clothing (to include boots) just as they would their skin. This is detrimental to the insulative qualities of their clothes but not as much as bullets or prison barbed wire if they are seen.

(5) Camouflaging Clothing:

(a) One principle of camouflage is to disrupt or conceal uniform color, straight lines, and squares—things rarely found in natural features. If ground-to-air signals are designed to exploit these visual characteristics, then evaders should certainly want to eliminate them.

(b) Evaders should reduce the tone of all equipment by smearing it with camouflage stick, mud, etc., or with whatever is available in a mottled pattern. In some instances equipment will have to be lighter in tone, in others, darker.

(c) To maintain the functional capability of clothing and equipment, it must be kept clean. In some areas, however, these items may be the only natural camouflage material survivors have to work with (such as desert regions). But, in areas where they have access to vegetation and the various dyes which can be made from vegetation, the vegetation should be used. In contrast to substances which soil the material and actually break down the fibers, dyes derived from grasses or plant sap (banana trees, ash trees, etc.) will offer the evader the toning material necessary to break up the solid green of a uniform and leave the fabric grit-free and still able to "breathe." The same saps which produce stains for cloth can be used to discolor metal objects. Banana tree sap, when left on the metal blade of a knife, will produce a blue-black stain which is a permanent discoloration. Trappers still boil their traps in ash tree chips and water to produce the blue-black, rust-inhibiting coloration to the tools of their trade.

g. All principles and techniques for care and use of clothing and equipment cannot be forgotten or ignored in an evasion situation, although some modifications may be necessary. A number of variables will influence what changes or omissions will be necessary.

(1) All cutting tools must be kept sharp. Evaders should try to coincide these noisy, yet essential, tasks with natural noise in the area (a downpour of rain for instance) or in a protected, noise-dampening area.

(2) Clothing must be kept clean if it is to protect a survivor from a harsh environment. Dirt-clogged, perspiration-soaked fibers will not give the insulating qualities of clean cloth. Clothing can be washed during the downpour of rain or possibly under the cover of darkness in a stream. Convenient, secluded puddles of water may afford the opportunity a survivor needs to clean clothing and equipment properly.

(3) Cooking and eating utensils must be kept clean on the inside to prevent dysentery and diarrhea. Simultaneously, the outsides can be toned down with soil, mud, etc., to camouflage them.

(4) Where metal pieces come into contact with one another, there should be padding between them so they will not inadvertently "clank" together. Evaders should place all items needed for environmental protection in the top of the pack where they will be most readily available. The rest of the gear can be used as padding around metal objects. In this manner, with everything stored inside the bundle (pack), it is secure from loss, damage, and enemy observation, as well as being readily available when needed. Evaders should also remove jewelry, watches, exposed pens, and glasses if possible. If glasses are required, hat netting or mask may help reduce shine.

(5) An evader's pockets should be secured and all equipment, including dog tags, arranged so that no jingle or rattle sounds are made. This can be done with cloth, vegetation, padding, or tape.

(6) Evaders should minimize the sound of clothing brushing together when the body moves. Moving in a careful manner can decrease this sound. Evaders should remember that camouflaged clothing and equipment alone won't conceal, but it must be used intelligently in accordance with the other principles of camouflage and movement. As one example, even if evaders are perfectly camouflaged for the arctic, there could still be problems. Because snow country is not all white, shadows and dark objects appear darker than usual. A snowsuit cannot conceal the small patches of shadow caused by the human figure, but that is not necessary if the background contains numerous dark areas. If the background does not contain numerous dark areas, maximum use is to be made of snowdrifts and folds in the ground to aid in individual concealment (figure 28-17).

(7) The concept of blending in with the background is indeed an important one for the evader to understand. One major point in blending with the background is not to show a body silhouette.

(8) Losing the body silhouette is done by making use of the shadows in the background. Evaders should be constantly aware of two factors—silhouette and shadow. From a concealment point of view, backgrounds consist of terrain, vegetation, artificial objects, sunlight, shadows, and color. The terrain may be flat and smooth, or it may be wrinkled with gullies, mounds, or rock outcroppings. Vegetation may be dense jungle growth or no more than small patches of desert scrub growth. The size of artificial objects may range from a signpost to a whole city block. There may be many colors in a single background, and they may vary from the almost black of a deep woods to the sand pink of some desert valleys. Blending simply means the matching with as many of these backgrounds as possible and avoiding contrast. If it is necessary for evaders to be positioned in front of a contrasting or fixed background, they must be aware of their position and take cover in the shortest possible time. The next point to which they will move for concealment must be selected in advance and reached as quickly as possible.

(9) As in the daytime, silhouette and background at night are still the vital elements in concealment (figure 28-18). A silhouette is always black against a night sky, and care must be taken at night to keep off the skyline. On moonlit nights, the same precautions must be taken as in daylight. It should be remembered that the position of the enemy observer, and not the topographic crest, fixes the skyline. At night, sound is an amplified, revealing signal. Movement must be careful, quiet, and

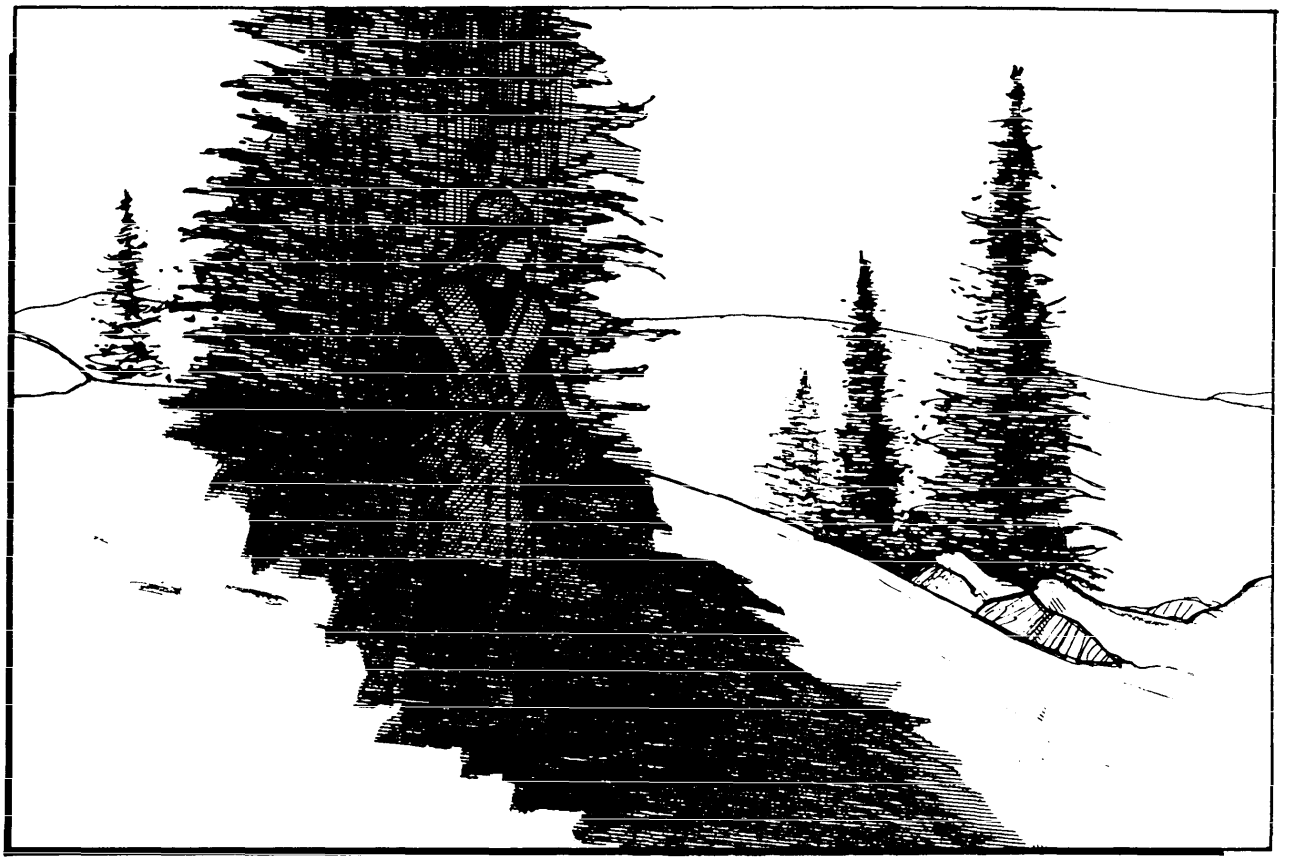

Figure 28-17. Arctic Travel.

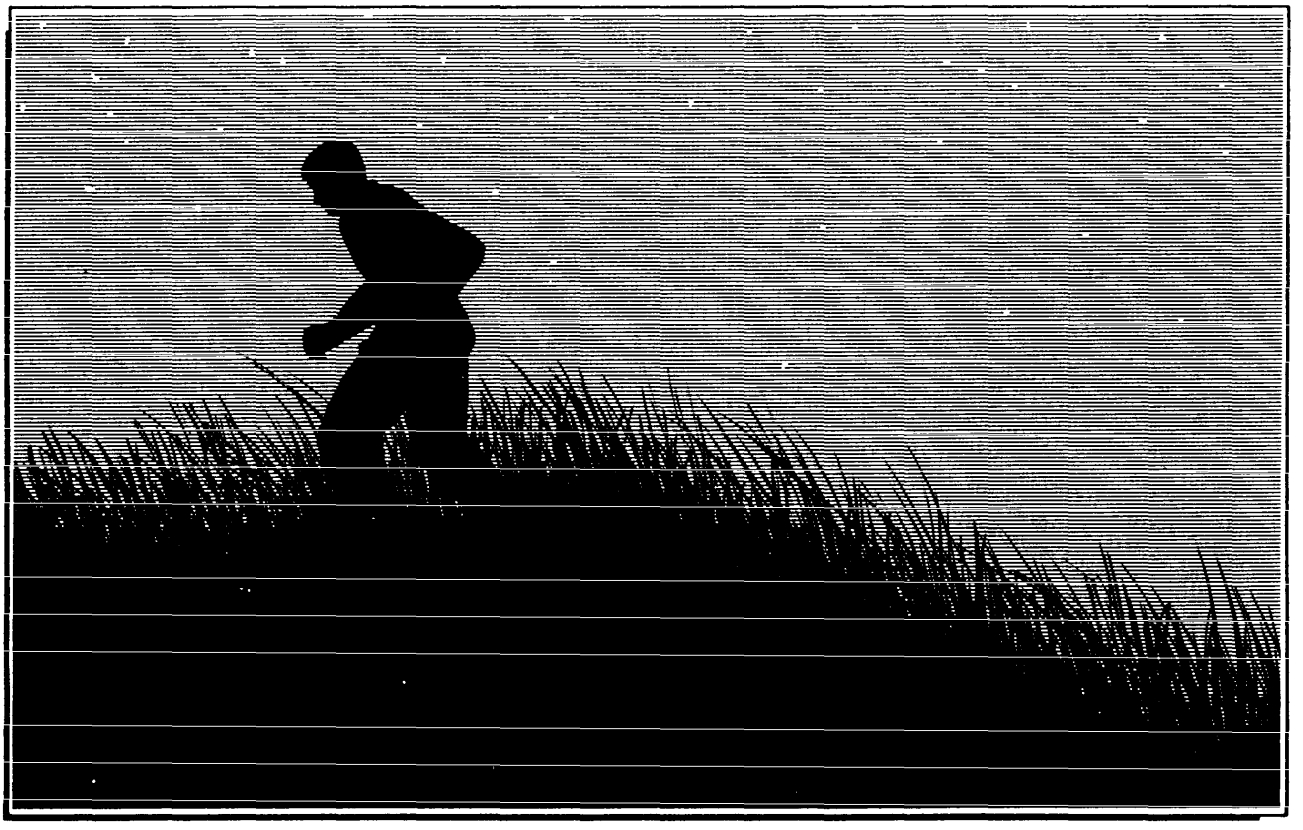

Figure 28-18. Silhouetting.

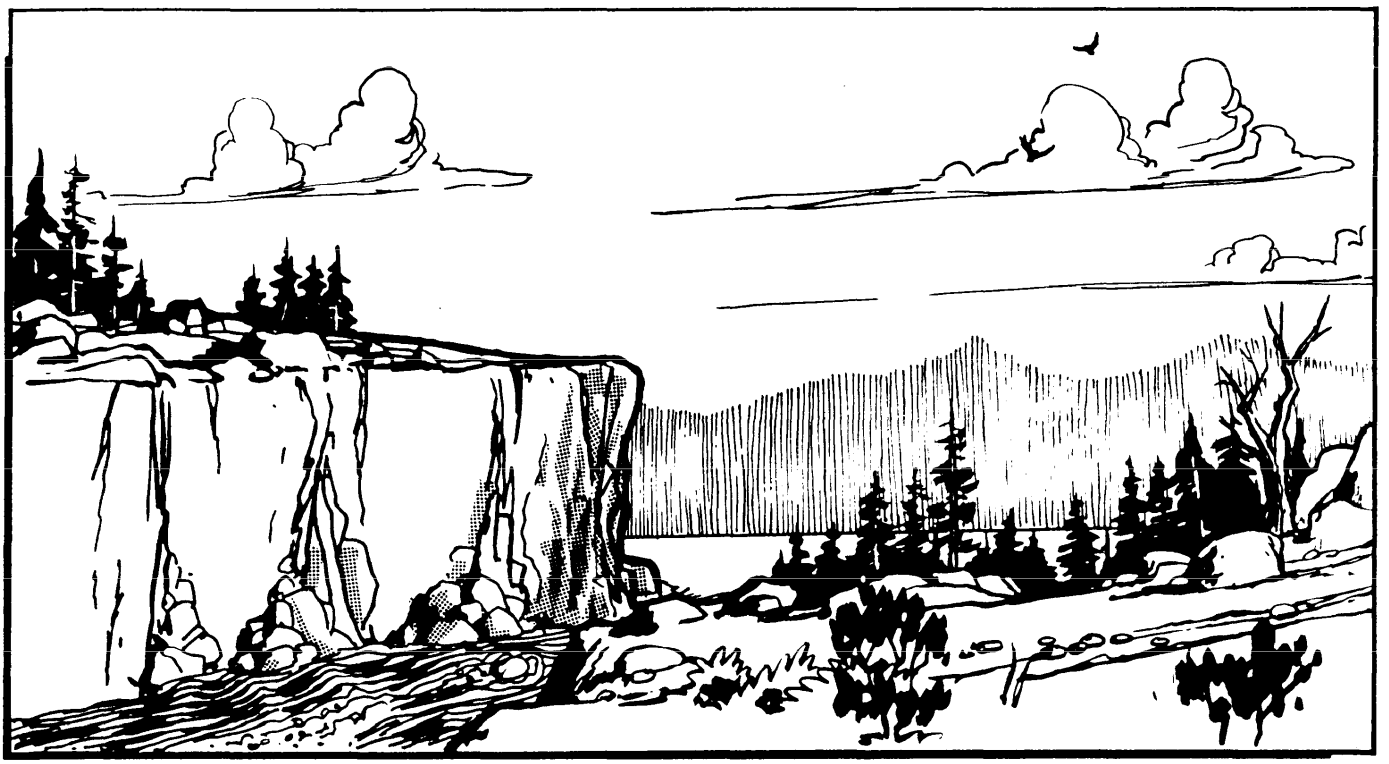

Figure 28-19. Natural Materials.

close to the ground. If the pop of a flare is heard before the illuminating burst, evaders must drop to the ground instantly and remain motionless. If they are surprised by the light, they must freeze in place with their faces down.

28-8. Concealment in Various Geographic Areas:

a. When not otherwise specified, temperate zone terrain is to be assumed in this section. Desert, snow, and ice areas are mostly barren and concealment may require considerable effort. Jungle and semitropical areas usually afford excellent concealment if the evader employs proper evasion techniques.

b. First, some general observations and rules regarding the addition of vegetation to the uniform and equipment. The cycles of the seasons bring marked changes in vegetation, coloring, and terrain pattern requiring corresponding changes in camouflage. Concealment which is provided in wooded areas during the summer is lost when leaves fall in the autumn. This will create a need for additional camouflage construction. Also, vegetation must be of the variety in the evaders' immediate location. It must be changed if it wilts or the evaders move into a different vegetation zone. Evidence of discarding the old and picking the new should be hidden. The vegetation should not be cut, this will give evidence of human presence.

c. Any type of material indigenous to the locality of the evaders may be classified as natural material. Natural materials consist of foliage, grasses, debris, and earth. These materials match local colors and textures and when properly used are an aid against both direct and indirect observation. The use of natural materials provides the best type of concealment. The chief disadvantage of natural foliage is that it cannot be prepared ahead of time, is not always available in usable types and quantities, wilts after gathering, and must be replaced periodically. Foliage of coniferous trees (evergreens) retains its camouflage qualities for considerable periods, but foliage that sheds leaves will wilt in a day or less, depending on the climate and type of vegetation (figure 28-19).

(1) The principal advantage in using live vegetation is its ability to reflect infrared waves and to blend in with surrounding terrain. When vegetation is used as garnishing or screening, it must be replaced with fresh materials before it has wilted sufficiently to change the color or the texture. If vegetation is not maintained, it is ineffective. Thorn bushes, cacti, and other varieties of desert growth retain growing characteristics for long periods after being gathered.

(2) The arrangement of foliage is important. The upper sides of leaves are dark and waxy; the undersides are lighter. In camouflage, therefore, foliage must be placed as it appears in its natural growing state, top sides of leaves up and tips of branches toward the outside of the leaves (figure 28-20).

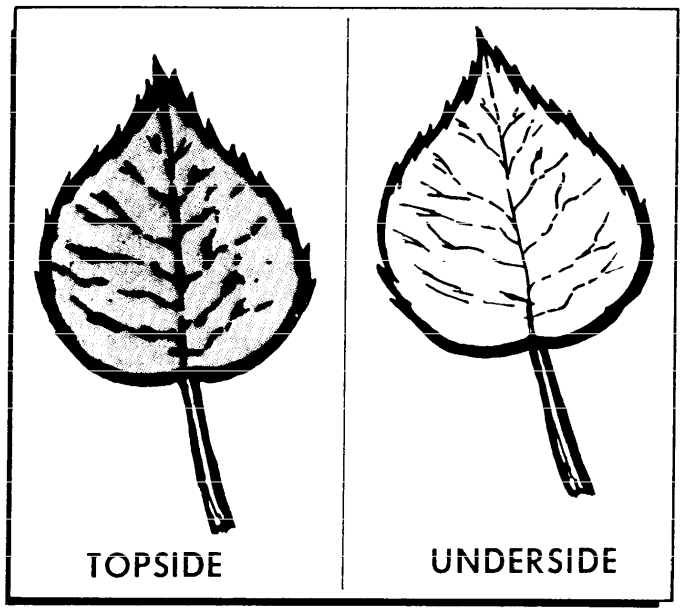

Figure 28-20. Dark and Light Leaves.

(3) Foliage gathered by survivors must be matched to existing foliage. For example, foliage from trees that shed leaves must not be used in an area where only evergreens are growing. Foliage with leaves that feel leathery and tough should be chosen. Branches grow in irregular bunches and, when used for camouflage, must be placed in the same way. When branches are placed to break up the regular, straight lines of an object, only enough branches to do this should be used. The evader must adopt principles that apply and know that the enemy also applies these principles.

(4) When vegetation is applied to the body or equipment of evaders, it must be secured to the clothing or equipment in such a way that:

(a) Any inadvertent movement of material will not attract attention.

(b) It appears to be part of the natural growth of the area; that is, when the evaders stop to hide, the light undersides of the vegetation are only visible from beneath. After evaders complete their camouflage, they should inspect it from the enemy's point of view. If it does not look natural, it should be rearranged or replaced.

(c) It does not fall off at the wrong moment and leave evaders exposed, or it should not show evidence of the evaders' passage through the area.

(5) Too much vegetation can give evaders away.

(6) If cloth material is used like vegetation to break up shape and outline and help blend in with the environment, there are some points evaders should be aware of. Cloth can be used successfully when wrapped around equipment or designed into loose, irregular shaped clothing or accessories (figure 28-21).

(a) Some of the materials evaders may use are:

-1. The colors (green, brown, white) of parachute materials plus the harness.

-2. Excess clothing the evader may have prepacked (scarf, bandana, etc.).

-3. Burlap, when found. It is used in battle areas in the form of sandbags.

(b) Most artificial material is versatile, but it can have drawbacks:

-1. Parachute material, for example, tends to shine and the unraveled edges may leave fine filaments of nylon on the ground as evidence of evaders in an area. Parachute material is very lightweight. A sudden breeze might cause it to move when movement is not desirable.

-2. A white suit of parachute material is excellent for winter evasion over snow and ice environments. The time required to fabricate this suit should be considered. (NOTE: Shadows cast on the snow cannot be

Figure 28-21. Breakup of Shape and Outline.

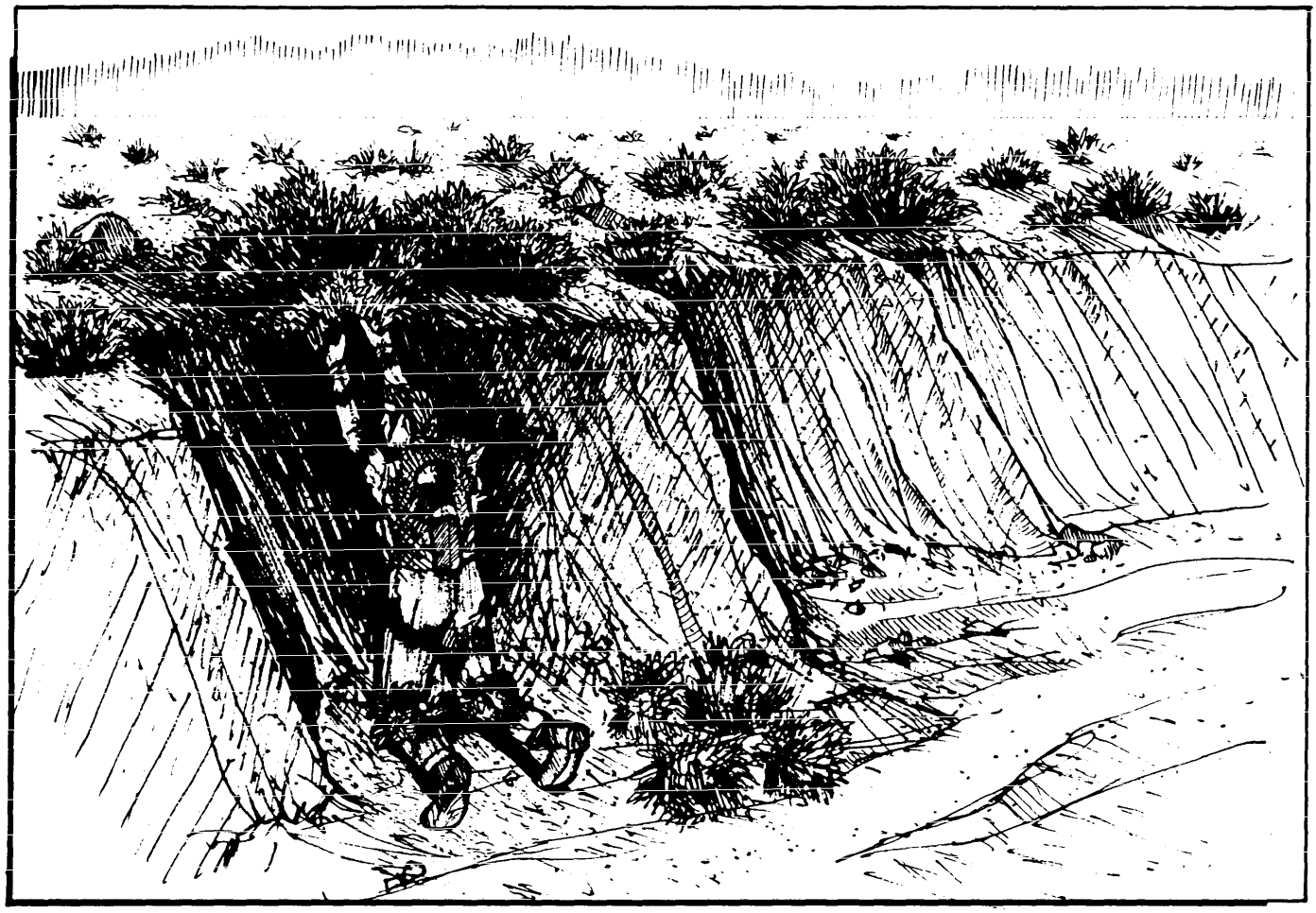

Figure 28-22. Concealment by Shadows.

Figure 28-23. Above Timberline.

camouflaged; they must be masked by terrain or other shadows.)

28-9. Concealment Factor for Areas Other Than Temperate:

a. Desert. Lack of natural concealment, high visibility, and bright tone (smooth texture) all emphasize the need for careful selection of a position for a campsite. Deep shadows in the desert, strict observance of camouflage discipline, and the skillful use of deception and camouflage materials aid in concealing evaders in a desert area.

(1) Deserts are not always flat, single-toned areas. They are sometimes characterized by strong shadows with heavy broken terrain lines and sometimes by a mottled pattern. Each type of desert terrain presents its own problems. When evaders and their shelters are located in the desert, their shadows are inky black and in strong contrast to their surroundings and are extremely conspicuous. To minimize the effect of these shadows when possible, use concealment that is afforded by the shadows of deep gullies, scrub growth, and rocks (figure 28-22).

(2) Many objects which cannot be concealed from the air can be effectively viewed from the ground. Even though these objects are observed from the air, lack of reference points in the terrain will make them difficult to locate on a map.

b. Snow and Ice. From the air, snow-covered terrain is an irregular pattern of white, spotted with dark tones produced by objects projecting above the snow, their shadows, and irregularities in the snow-covered surface such as valleys, hummocks, ruts, and tracks. It is necessary, therefore, to make sure dark objects have dark backgrounds for concealment to control the making of tracks in the snow and to maintain the snow cover on camouflaged objects.

(1) Mountain Areas Above Timberline and Arctic Areas. Common characteristics include an almost complete snow cover with a minimum of opportunities for concealment. Only a few dark objects protrude above the snow except for rugged mountain peaks (figure 28-23).

(2) Mountain Areas Below the Timberline and Subarctic Areas. Common characteristics of these areas are forests, rivers, lakes, and artificial features such as trails and buildings. The appearance of the area is irregular in pattern and variable in tone and texture (figure 28-24).

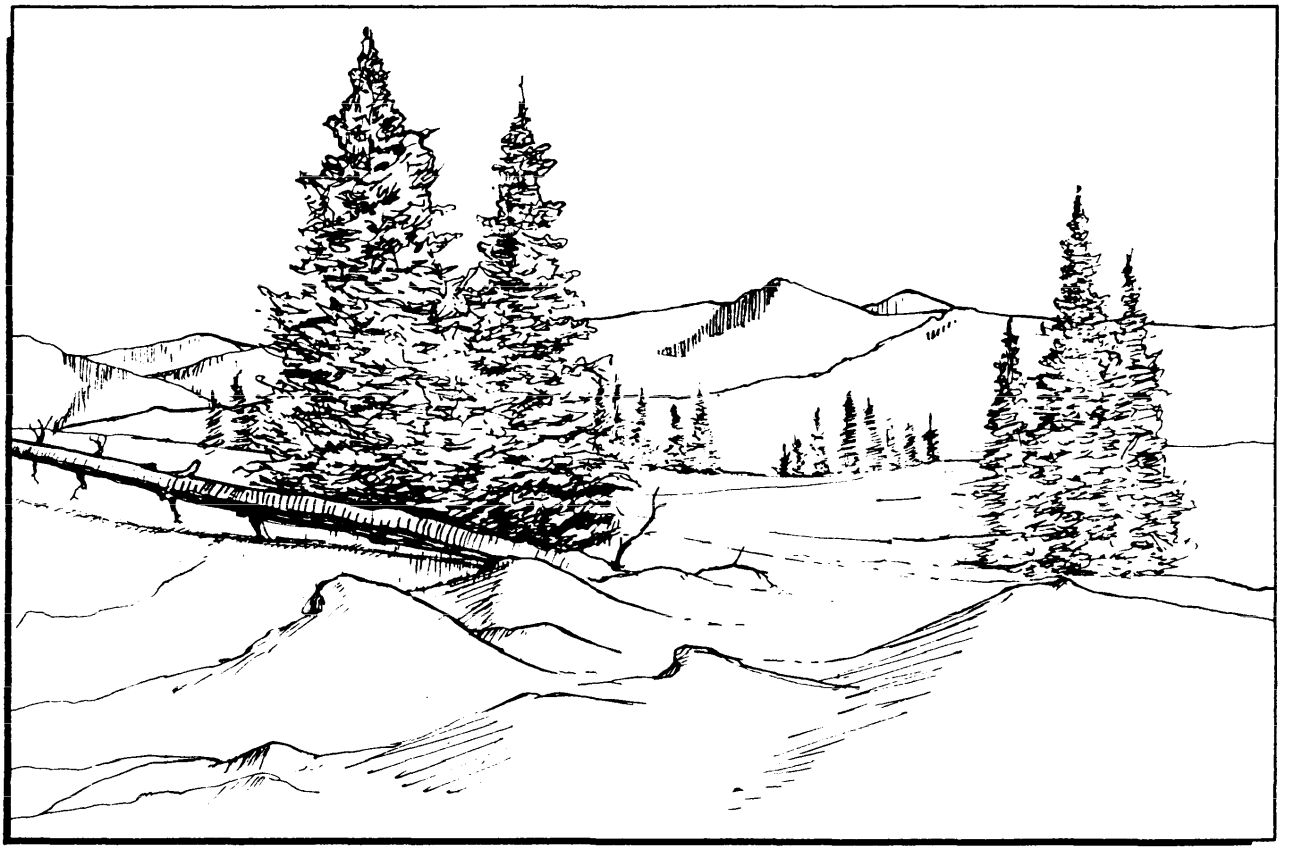

Figure 28-24. Below Timberline.

(3) Areas Between the Subarctic Zone and the Southern Boundary of the Temperate Zone. These have the same characteristics as mountain areas below the timberline and subarctic areas.

c. Blending With Background in Snow and Ice Terrains. No practical artificial material has yet been developed which will reproduce the texture of snow sufficiently well to be a protection against recognition by aerial observers. Concealment from direct ground observation is relatively successful with the use of white "snowsuits," white pants, and whitewash; these measures offer some protection against aerial detection. (White parachute cloth should also be considered.)

(1) People evading in snow-covered frozen areas should wear a complete white camouflage outfit. A white poncho-like cape can be made easily from parachute material (figure 28-25).

(2) A pair of white pants will normally be sufficient in a heavily wooded area. However, following or during a heavy snowfall when the trees are well covered with snow, the wearing of a complete white camouflage suit is necessary to blend in with the background. Other equipment, such as packs, should also be covered with white material.

d. Camouflage Checklist. The following checklist can be used to remember ideas concerning camouflage and to determine the completeness of individual camouflage application:

(1) Effective concealment is protection from hostile observation from the ground as well as from the air.

(2) Natural terrain lines are to be used for help in concealing the evader when possible.

(3) Every possible feature of the terrain should be used for concealment.

(4) A silhouette against the sky should be avoided.

(5) Every effort should be made to reduce tone contrast and eliminate shine.

(6) Evaders should be especially careful at night due to infrared and low light detection equipment which may be used by the enemy. Keeping close to the ground and using terrain masking for concealment provide the best protection.

28-10. Camouflage Techniques for Shelter Areas:

a. As used in this section, the word shelter refers to the concept of personal protection synonymous with the terms refuge, haven, or retreat. Readers should not visualize the word "shelter" when mentioned in this text to mean a dwelling traditionally occupied by survivors in nontactical situations; such as, tents, cabins, or other such places of habitation. While it is true that these structures can and do provide safety and relief, it must

Figure 28-25. Evading in Snow-Covered Areas.

Figure 28-26. Shelter.

be understood that where an evasion situation is concerned, concealment, not personal comfort or convenience, will be the primary concern for the evader who seeks "shelter" or sanctuary (figure 28-26).

b. Besides resting or sleeping, there are a number of reasons why survivors may need to conceal themselves for varying amounts of time. They may need to take care of problems concerning personal hygiene, adjustment of clothing, maintenance or alteration of camouflage, triangulation for position determination, food and water procurement, etc. Concealment cannot be overstressed in respect to the areas survivors (evaders) may select for shelter. One important reason evaders must be able to select secure areas for refuge is to avoid and prevent detection by the enemy. This is especially important if the haven selected is to be used for resting or sleeping. Anyone who is resting or sleeping will not be totally alert, and added precautions may be necessary to maintain security. Another factor to consider, since evaders are also survivors, is to protect themselves from the elements as much as possible.

c. At no time will evaders be able to safely assume they are free from the threat of either ground or aerial observation. Therefore, not only is the shelter area and type determined by the needs of the moment (enemy

Figure 28-27. Natural Shelter.

presence, etc.), but consideration must also be given to the terrain and climatic conditions of the area. Evaders must constantly be aware of how long they may have to remain in the area and, most importantly, what type of enemy observation may be employed.

d. The shelters may be naturally present, or they may be those which are "assembled" and camouflaged by the evaders. Full use must be made of concealment and camouflage no matter what types of shelter areas are selected. The use of the natural concealment afforded by darkness, wooded areas, trees, bushes, and terrain features are recommended; however, any method used for disguise or hiding from view will increase the chances for success. There is much for evaders to consider concerning the many facets of evasion shelter site selection if they expect to establish and maintain the security of their area (figure 28-27).

e. Evaders should locate their shelter areas carefully. They should choose areas which are least likely to be searched. They must be in the least obvious locations. The chosen areas should look typical of the whole environment at a distance. They should not be near prominent landmarks. Areas that look bland get a cursory glance. The areas should also be those least likely to be searched; for example, rough terrain and thickly vegetated areas. The shelter sites should also be situated so that in the event of impending discovery, the evaders will be able to depart the area via at least one concealed escape route. The shelter areas should never be in areas which may trap them if the enemy discovers the places of concealment.

f. Evaders should choose natural concealment areas—a "natural shelter." Examples include small, concealed caves, hollow logs, holes or depressions, clumps of trees, or other thick vegetation (tall grass, bamboo, etc.). The site should have as much natural camouflage as possible. There should be cover on all sides; this includes natural formations or vegetation which can also protect evaders from aerial observations. The site should be as concealed as possible with a minimum of work. Sites chosen this way will make concealment easier and require less activity and movement. This is most important if the evaders are close to population centers or if the enemy is present.

g. The evaders should attempt to stay as high as possible and to select concealment sites near the military crest of a hill if cover is available. Noises from ridge to ridge tend to dissipate. Whispers or other sounds made in a valley tend to magnify as listeners get further up a hill. Shelter areas located on a slope are subject to higher daytime and lower nighttime winds, thereby minimizing the chance of detection through the sense of smell.

h. If possible, evaders should be in such a position in the shelter area that shadows will fall over the side of the area throughout the day. This can best be done in heavy brush and timber.

i. Evaders should try to locate alternate entrance and exit routes along small ridges or bumps, ditches, and rocks to keep the ground around the shelter area from becoming worn and forming "paths" to the site. They should avoid staying in one area so long that it has the appearance of being "lived in." Evaders should try to stay away from and out of sight of any open areas; examples are roads and meadows. Several miles distance from those may be desirable.

j. Waterways such as lakes, large rivers, and streams, especially at the junctions, are dangerous places. Power and fence lines or any prominent landmarks may indicate places where people may be. Evaders will want to stay clear of these areas. The enemy may patrol bridges frequently. Evaders should avoid any areas close to population centers. The evaders should be able to observe the enemy and their movements and the surrounding country from this hiding area if at all possible. If any assemblage of camouflage is necessary at the shelter site, evaders should keep in mind that they should always "construct" to blend. They should match the shelter area with natural cover and foliage, remembering that over-camouflage is as bad as no camouflage. Natural materials should be taken from areas of thick growth. Any place from which materials have been taken should be camouflaged. The following is an easy to remember acronym (BLISS) for evasion shelter principles:

B - Blend.
L - Low silhouette.
I - Irregular shape (outline).
S - Small.
S - Secluded location.

k. Other facilities evaders may use, such as latrines, caches, garbage pits, etc., must be located and camouflaged in the same manner as the shelter sites. Evaders should avoid forming a line of installations which lead from point to point to their location. They should dogleg through ground cover to use concealment to its best advantage. A dry, level sleeping spot is ideal, but the ideal spot to provide nonvisibility and comfort may be difficult to find. Evaders must have patience and perseverance to stay hidden until danger has passed or until they are prepared and rested enough to safely move on. They must be constantly on the watch for shelter areas which need little or no improvement for camouflage, protection from the elements, or security.

28-11. Firecraft Under Evasion Conditions:

a. Whether or not to build a fire under evasion conditions is indeed a difficult decision evaders must make at times. Basically, fire should only be used when it is absolutely necessary in a life or death situation. Potential evaders must understand that the use of fire can greatly increase the probability of discovery and subsequent capture.

Figure 28-28. Fire.

b. If a fire is required, location, time, selection of tinder, kindling, and fuel, and construction should be major considerations.

(1) Evaders should keep the fire as inconspicuous as possible. The location of an evasion fire is of primary importance. All of the small evasion-type fires must be built in an area where the enemy is least likely to see them. If possible, in hilly terrain with cover, the fire should be built on the side of a ridge (military crest). No matter where the fire is built, it should be as small and smokeless as possible (figure 28-28).

(2) Fires are easier to disguise and will blend in better during the times of dawn and dusk and during times of bad weather. At these times, there is a haze or vapor trap that hinges in and around hills and depressions and is prevalent on the horizon. Any smoke from the fire will be masked by this haze in the early morning and at sunset. This is the time when the local populace is most likely to have their cooking or heating fires lit. Another method of disguising the smoke from a fire is to build it under a tree. The smoke will tend to dissipate as it rises up through the branches, especially if there is thick growth or the boughs are low hanging. If this is not possible, it will be helpful to camouflage the fire with earthen walls, stone fences, bark, brush, or snow mounds to block the light rays and help disperse the smoke.

(3) The best wood to use on an evasion fire is dry, dead hardwood no larger than a pencil with all the bark removed. This wood will produce more heat and burn cleaner with less smoke. Wood that is wet, heavy with pitch, or green will produce large amounts of smoke. When the wood has been gathered, evaders should select small pieces or make small pieces out of the wood collected. Small pieces of wood will burn more rapidly and cleanly thus reducing the chance of smoldering and creating smoke. The wood selected should be stacked so the fire gets plenty of air as ventilation will make the fire burn faster with less smoke.

c. One type of evasion fire which has the capability of being inconspicuous is called the Dakota Hole Fire (figure 28-29). After selecting a site for the fire hole, a "fireplace" must be prepared. This is done by digging two holes in the ground, one for air or ventilation and the other to actually lay the fire in. These holes should be roughly 8 to 12 inches deep and about 12 inches apart with a wide tunnel dug to connect the bottoms of the holes. The depth of the holes depends on the intended use of the fire. Place dirt on a piece of cloth so it can be used to rapidly extinguish the fire and conceal the fire

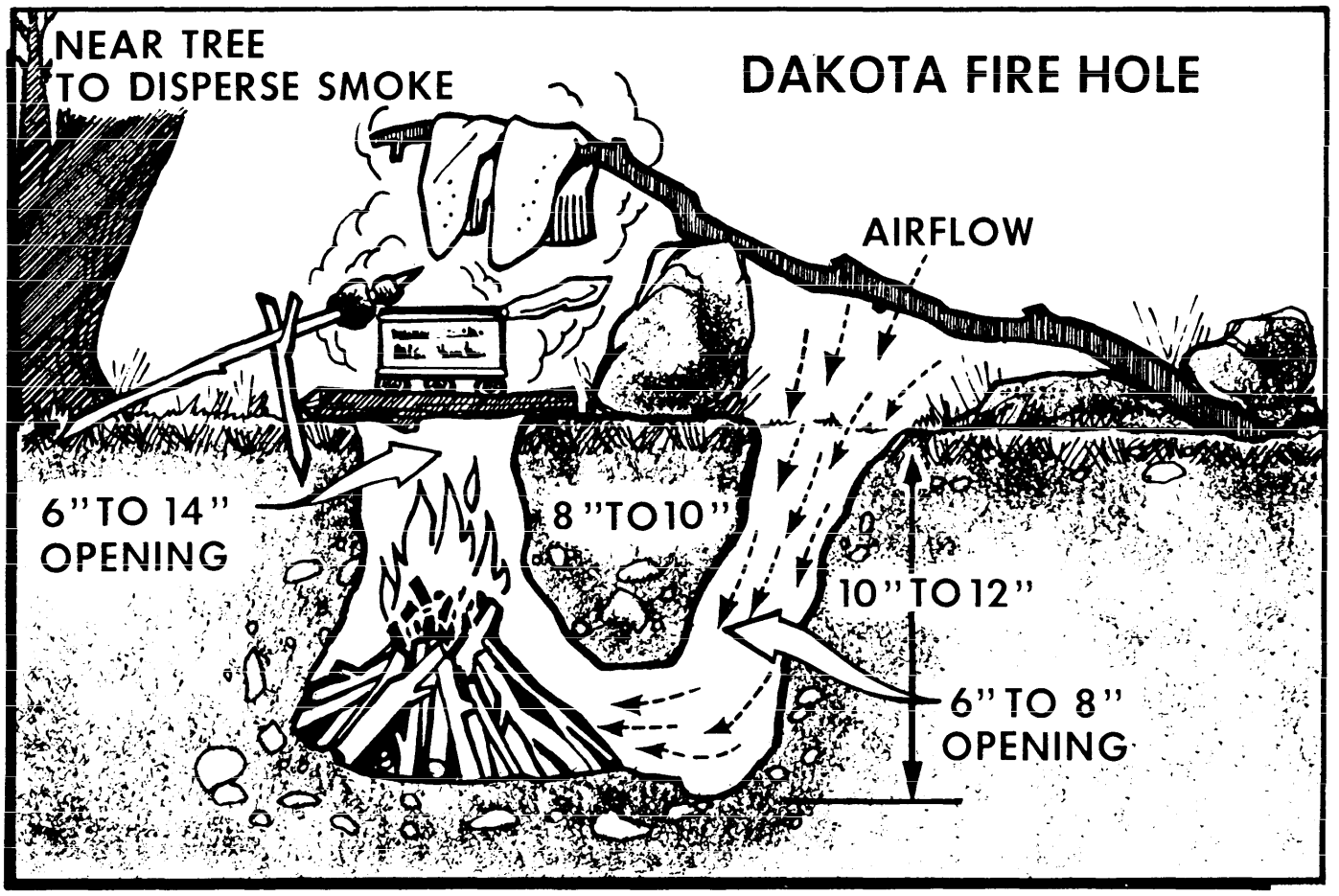

Figure 28-29. Dakota Hole.

site. Evasion fires should be small. Evaders who build these fires should strive to keep the flame under the surface of the ground. Initially the fire may appear to be smoking due to the moisture in the ground. At night the area may glow, but there should be no visible flame. A fire built in a hole this way will burn fast as all the heat is concentrated in a small area. This is a good type of fire for a single evader as opposed to many persons taking turns cooking over this one hole. Everything about the evasion situation will have to be examined before deciding which fire configuration would be most useful if a fire must be built.

d. Another good evasion fire is the trench fire. This fire is built by digging below the earth's surface 8 to 12 inches in an elongated pattern. The length depends on how many people need to use it. This is a fire more suited to meeting the needs of a small group. The fire should not crowd either end of the excavation, as it must be able to "draw" an adequate amount of air to help it burn hot and eliminate smoke (figure 28-30).

e. An evasion fire can also be built just below the ground cover (figure 28-31). Here the emphasis is on quick concealment of the area. It should be kept in mind, however, that some type of screen should be built

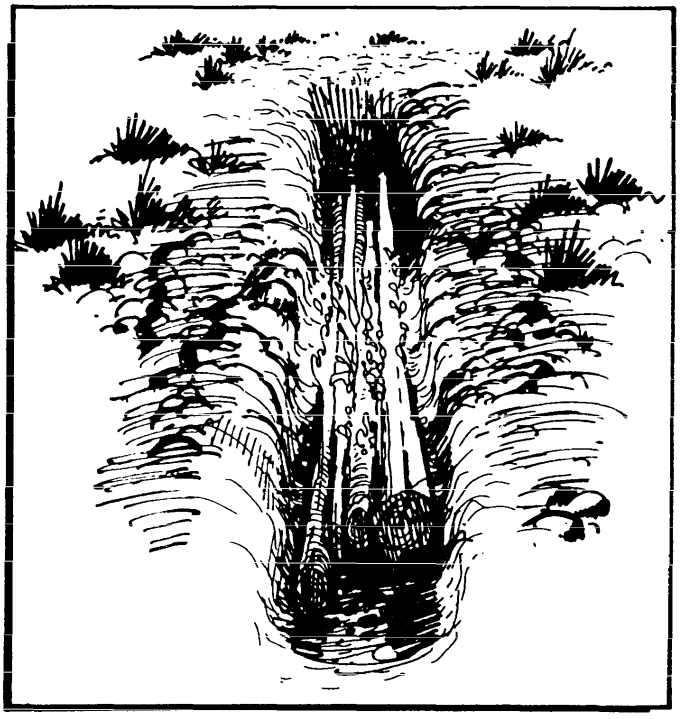

Figure 28-30. Trench Fire.

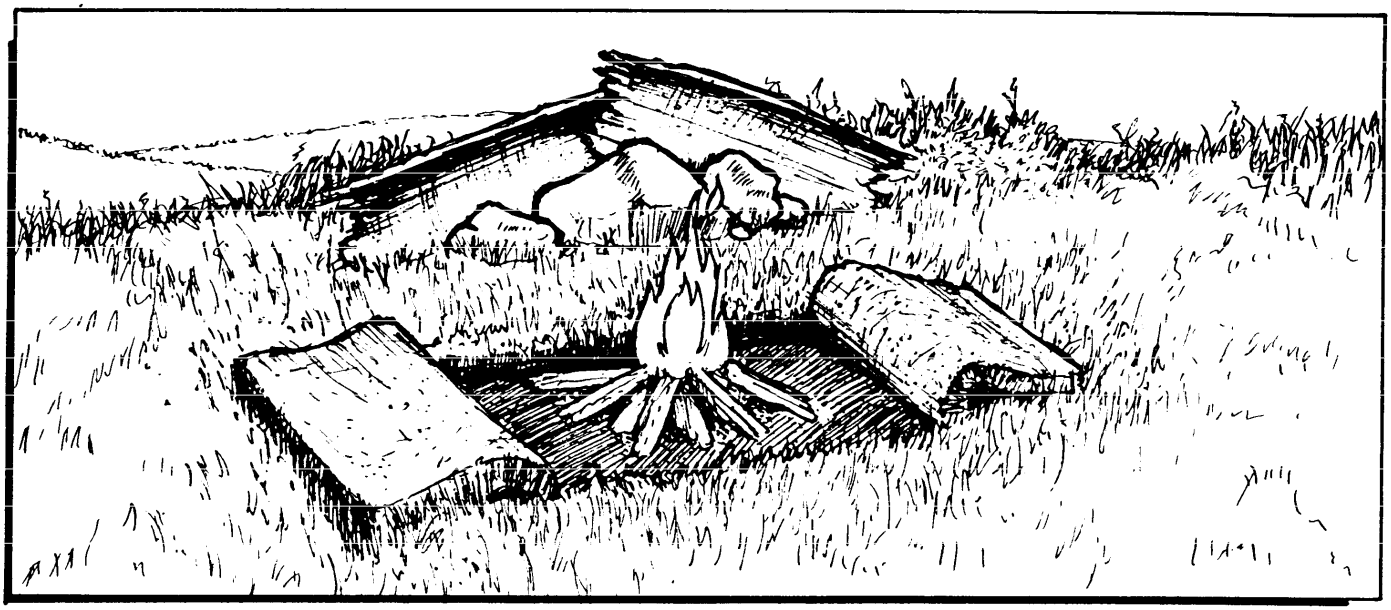

Figure 28-31. Fire Concealment.

to hide the flames. The small fire is built on the bare ground after a layer of sod or earth has been sliced and rolled back. After use, evaders simply scatter the fire remnants over the bare area and roll or fold the piece of ground back into place.

f. If evaders are in areas where holes can't be dug or sod can't be lifted, they will have to settle for some type of screen around the fire. They should also keep the fire small and finish using it quickly.

g. All traces of the fire should be removed. Unburned firewood should be buried. Holes should be totally filled in. Placing the soil on a holder, such as a map or piece of equipment, will aid in replacing it. This way there will be no leftover dirt patches on the ground after the holes were filled in. Once evaders feel all available measures have been taken to obliterate any leftover evidence, they should move out of the area if possible. Since evaders can never be positive the fire wasn't detected, they must assume it was spotted and take all necessary precautions.

28-12. Sustenance for Evasion:

a. As previously stated in this section, not only do evaders face the problem of remaining undetected by the enemy, they must also have the knowledge which will enable them to "live off the land" as they evade. They must be prepared to use a wide variety of both "wild" and domestic food sources, obtain water from different sources, and use many methods for preparing and preserving this food and water (figure 28-32).

b. No matter what the circumstances of the evasion situation are, evaders should never miss an opportunity to obtain food. Ordinarily food will be obtained from wild plant and animal sources. If possible, evaders should stay away from domestic plants (crops) and animals. Using wild animals and plant sources for food will reduce the probability of capture.

c. Animal foods are a prime source of sustenance for evaders, having more nutritional value for their weight than do plant foods. Evaders may obtain enough animal food in one place to last for several days while they travel.

d. There are several ways which evaders may procure animal foods (trapping or snaring, fishing, hunting, and poisoning). A few modifications should be considered regarding the use of traps and snares in a tactical situation even though the same basic principles apply in both tactical and nontactical environments.

(1) Because small game is more abundant than is large game in most areas, evaders should confine traps and snares to the pursuit of small game. There are other advantages to restricting trap and snare size. Evaders will find it is easier to conceal a small trap from the enemy. Small animals make less noise and create less disturbance of the area when caught.

(2) Conversely, there are also a few disadvantages pertaining to the use of snares or traps during evasion episodes. Two disadvantages are: Evaders must remain in one place while the snares are working, and there may be some disturbance of the area where materials have been removed.

e. Fishing is another effective means of procuring animal food. Fish are normally easy for evaders to catch, and they are easy to cool.

(1) There are several methods which evaders may use to catch fish. A simple hook and line is one of these methods; another is a "trotline." Evaders may construct a trotline by fixing numerous hooks to a pole and by

Figure 28-32. Sustenance for Evasion.

sliding it into the water from a place of concealment (figure 28-33).

(2) Nets and traps may also be used; however, they should be set below the water line to avoid detection. Spearing is another option. Here again, exposure in open waterways can be very dangerous to the evader.

(3) "Tickling" the fish (figures 28-34, 28-35, and 28-36) is also effective if evaders can remain concealed. This method requires no equipment to be successful. The main disadvantage to fishing is people live by water bodies and travel on them. This greatly increases the chances of being detected. (NOTE: Caution should be used when tickling fish in areas with carnivorous fish or reptiles.)

f. Weapons may be used by evaders to procure animals. The best weapons are those which can be operated silently, such as a blowgun, slingshot, bow and arrow, rock, club or spear. These should be used primarily against small game. One major advantage of using weapons is game can be taken while evaders travel. Because of noise, firearms should never be used in an evasion situation.

g. Plant foods are very abundant in many areas of the world. Evaders may be able to procure plant food types that require no cooking. One advantage of procuring plant foods during evasion is that by collecting natural fruits and nuts, evaders can remain deep in unpopulated areas. In some areas, it is possible to find old garden plots where vegetables may be obtained. When possible, select foods which can be eaten raw. (Refer to chapter 18 - Food.)

(1) The disadvantage of plant food procurement is that evaders may not be the only ones looking for food. The natives of the country could also be out looking for food. If natives know of a good area, they may visit that place many times. If evaders have been in the area, their presence could be discovered.

(2) Some other considerations and methods concerning plant food procurement are as follows. Evaders should:

(a) Never take all the plants or fruits from one area.

(b) Pick only a few berries off of any one bush.

(c) When digging plants, take only one plant, then move on some distance before digging up another.

Figure 28-33. Fishing.

(d) When digging plants from old garden plots, make sure the plot is old. In many countries the people plant their crops and do not return to the plot until harvest time.

(e) Camouflage all signs of presence.

(3) Most domestic foods must be procured by theft which is very dangerous. However, if proper methods are used and the opportunity presents itself, plants and animals may be stolen. The main reason thieves are captured is the boldness they display after several successful thefts. The basic rules of theft are:

(a) If at all possible, the theft should take place at night.

(b) Evaders should thoroughly observe the area of intended theft from a safe vantage point.

(c) Evaders should find the vantage points just before dusk and look the place over to make sure everything is the same as it was the last time a check was made.

(d) Evaders should check for dogs, which could be a big hazard. Barking draws attention; also, some dogs are vicious and can harm evaders. Besides dogs, other animals or fowl can alert the enemy to the evaders' position.

(e) Evaders should never return twice to the scene of a theft.

(f) Every theft should be planned, and after its accomplishment, evaders should leave no evidence of either their presence or the theft itself (figure 28-37).

(g) Only small amounts should be taken (figure 28-38).

(4) When evaders find it necessary to take cultivated plant foods, they should never take the complete plant. Taking plants from the inside of the field, not the edge, and leaving the top of plants in place may help conceal the theft.

h. The rules of theft also apply to taking domesticated animals. The evader should concentrate on animals that don't make much noise. If a choice has to be made as to which animal to steal, evaders should take the smallest one.

i. Water is very essential, but it can be difficult to acquire (figure 28-39).

(1) When procuring water, evaders should try to find small springs or streams well away from populated areas. The enemy knows evaders need water and may check all known water sources. No matter where water is procured, evaders should try to remain completely

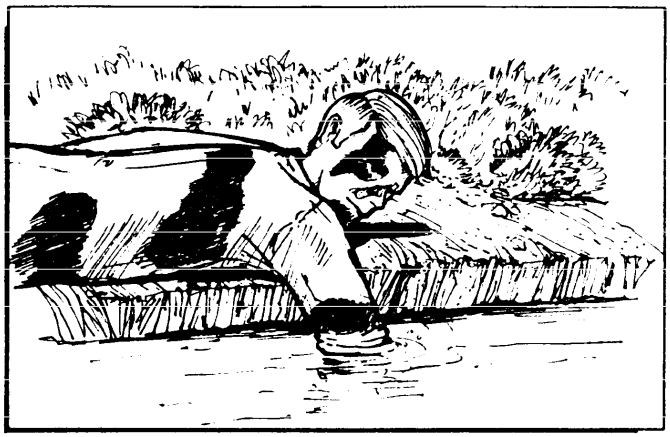

Figure 28-34. Fish Tickling - A.

Figure 28-35. Fish Tickling - B.

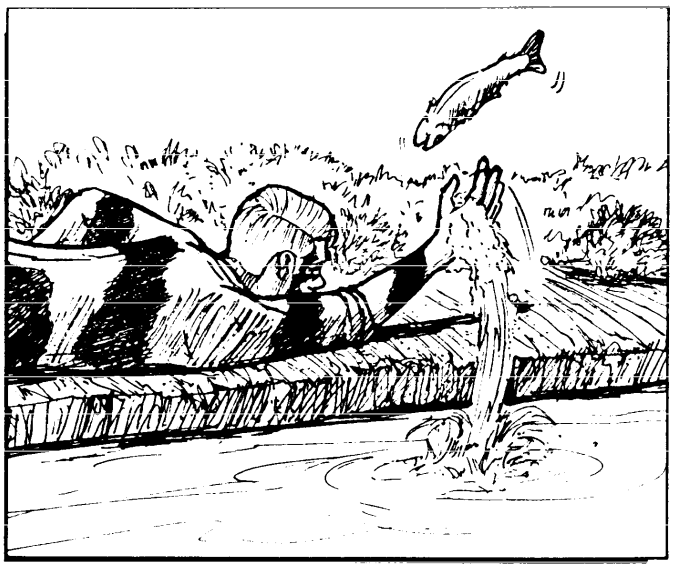

Figure 28-36. Fish Tickling - C.

concealed when doing so. The area around the water source should be observed to make sure it isn't patrolled or watched. While obtaining water and when leaving the area, evaders should conceal any evidence of their presence. Good sources of water include trapped rainwater in holes or depressions and plants which contain water.

(2) The preparation and purification of food and water by cooking is a precaution which should be weighed against the possibility of capture. It might be necessary to eat raw plant and animal foods at times. Some plant foods will require cutting off thorns, peeling off the outer layer, or scraping off fuzz before consumption. Raw animal foods may contain parasites and micro-organisms which may not effect evaders for days, weeks, or months, at which time, hopefully, they will be under competent medical care. If the environment in which the parasites live is altered by cooking, cooling, or drying, the organisms may be killed. Meat can be dried and cooled by cutting into thin strips and air-drying. Salting makes the meat more palatable. If the meat must be cooked, small pieces should be cooked over a small hot fire built in an unpopulated area. The best methods of preserving food during evasion are drying or freezing.

(3) In an evasion situation, boiling water for purification should not be used as a method except as a last resort. Iodine tablets are the best method of purification. If evaders do not have purification tablets, and the danger of the enemy detecting their fires is too great, evaders may have to forego purification. The only problem with this is if water is not purified, it may cause vomiting and (or) diarrhea. These ailments will slow down the evaders and make them susceptible to dehydration. Aeration and filtration may help to some degree and are better than nothing. If water cannot be purified, evaders should at least try to use water sources which are clean, cold, and clear. Rain, snow, or ice should be used if available.

28-13. Encampment Security Systems:

a. When evading for extended periods in enemy-held territories, it becomes essential for evaders to rest. To rest safely, especially if in a group, it is essential to devise and use some sort of early warning system to prevent detection and unexpected enemy infiltration. When establishing an evasion "shelter" area, there are certain things which should be done (day or night) for security purposes (figure 28-40).

b. Evaders should scout the area around their encampment for signs of people. They should pay particular attention to crushed grass, broken branches, footprints, cigarette butts, and other discarded trash. These signs may reveal identity, size, direction of travel, and time of passage of an enemy force. If large numbers of these signs are present, the evader should consider moving to a more secure area.

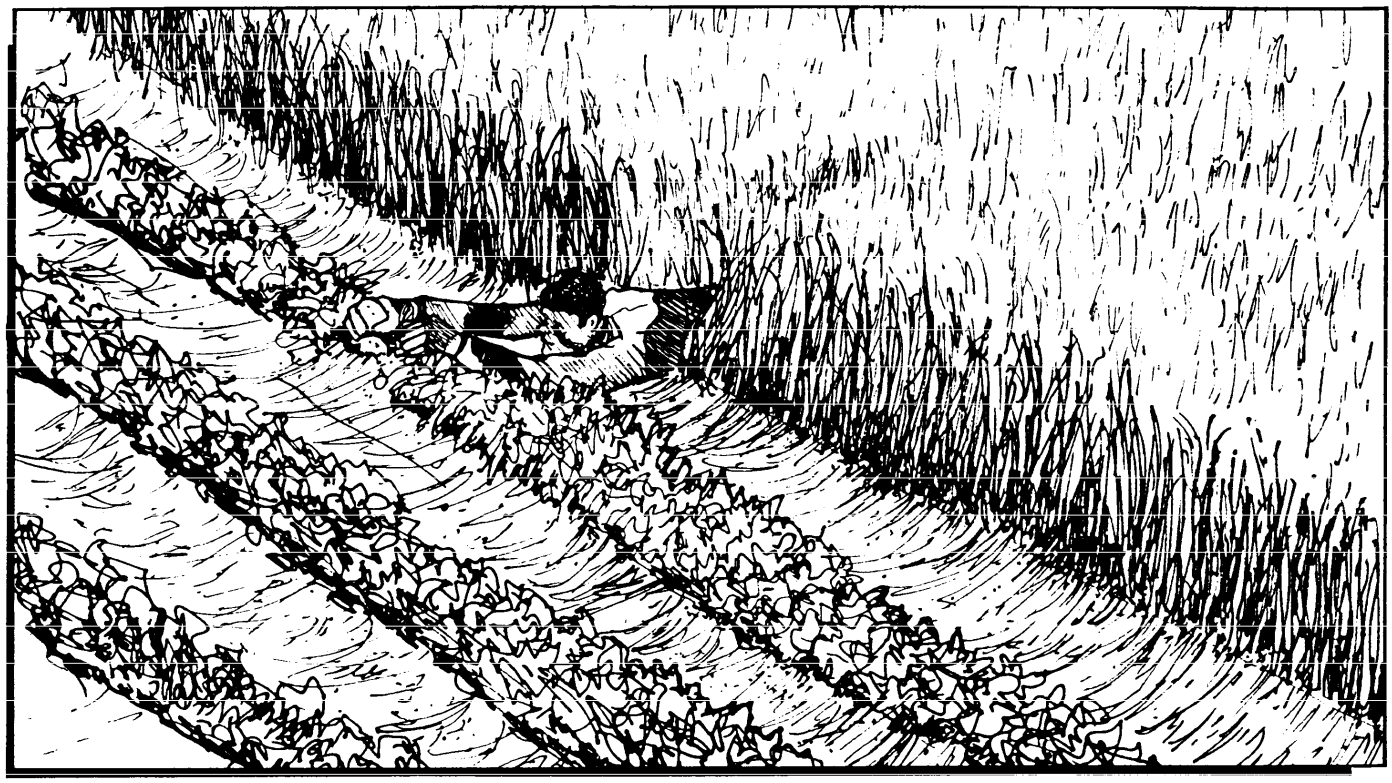

Figure 28-37. Stealing Vegetables.

Figure 28-38. Stealing Small Amounts of Food.

Figure 28-39. Procuring Water.

Figure 28-40. Rest Safely.

c. Once the camp area has been determined to be fairly secure, some type of alarm system must be devised. For a lone evader, this may consist of actually constructing wire or line with sound-producing devices attached. However, this system works for the enemy as well and may prove to alert enemy forces to the evader's presence. A lone evader should use the natural alarm system available. Disturbances in animal life around an evader may indicate enemy activity in the area. Group situations may allow for more security. Two or more evaders may use lookout(s) or "scout(s)" at observation posts strategically located around the encampment.

d. Readiness is another aspect of security. The evader should be aware that, at any time, the shelter area may be overrun, ambushed, or security compromised, making it necessary to vacate the area. If evaders are in a group and future group travel is desired, it is essential that everyone in the group knows and memorizes certain things; such as, compass headings or direction of travel, routes of travel, destination descriptions, and rally points (locations where evaders regroup after separation). Alternate points must be designated in case the original cannot be reached or if it is compromised by enemy activity.

(1) Once everyone in the evader's group has reached the final destination, alternate point, or rally point, a new emergency evacuation and rendezvous plan must be established.

(2) Evaders should always be aware of the next rally point, its location, and direction. These places, which provide concealment and cover, should be designated along the route in case an enemy raid or ambush scatters the group. There should be a rally point for every stage of the journey. Even when approaching the supposed "final destination" of the day, evaders should have an evacuation plan ready.

e. Maintaining silence is a very important aspect of security. It is essential to be able to communicate with individual group members and scouts so that everyone is aware of what is going on at all times during evasion. Hand signals are the best method of communication during evasion as they are silent and easily understood. Instructions and commands which must be conveyed throughout the entire group are: (See figure 28-41 for examples of hand signals.)

(1) Freeze.
(2) Listen.
(3) Take cover.
(4) Enemy in sight.
(5) Rally.
(6) All clear.
(7) Right.
(8) Left.

28-14. Evasion Movement:

a. During evasion travel, the evader is probably most susceptible to capture. Many evaders have been captured as a direct result of their failure to use proper evasion movement techniques. Evasion movement is the action of a person who, through training, preparation, and application of natural intelligence, avoids capture and contact with hostiles, both military and civilian. Not only is total avoidance of the enemy desirable for evaders, it is equally important for evaders not to have their presence in any enemy controlled area even suspected. A fleeting shadow, an inopportune movement or sound, and an improper route selection are among a number of things which can compromise security, reveal the presence of evaders, and lead to capture.

b. One evasion situation will not be identical to another. There are, however, general rules which apply to most circumstances. These rules, carefully observed,

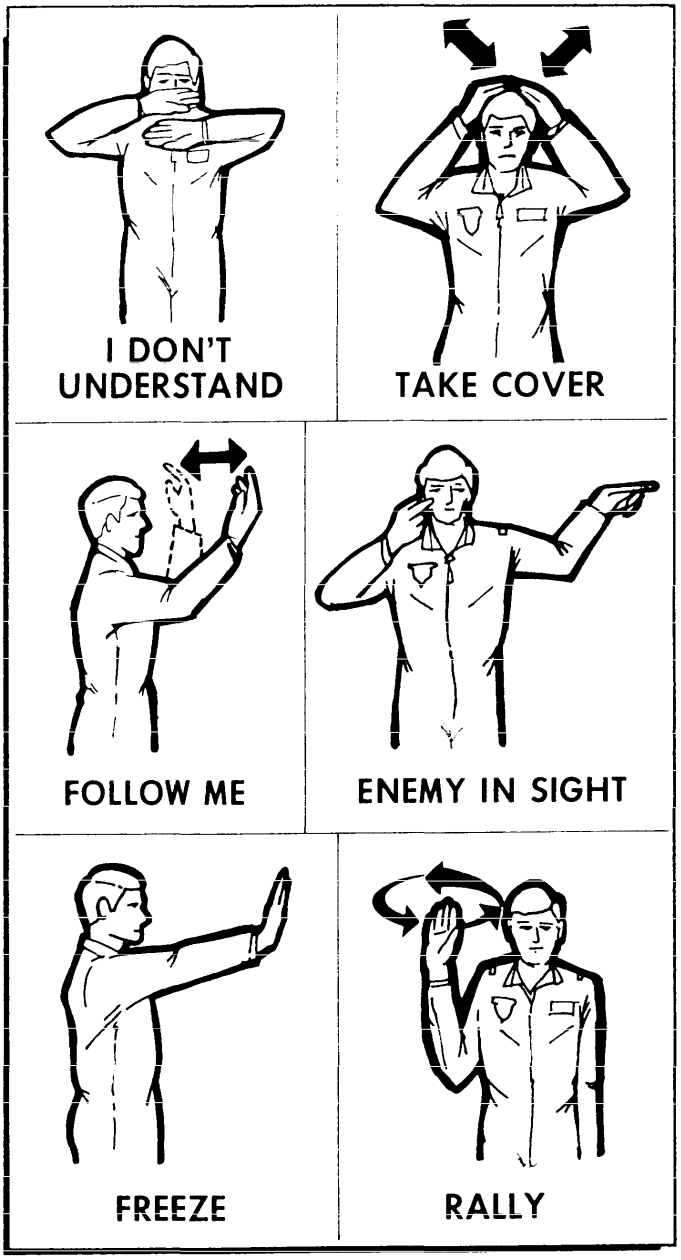

Figure 28-41. Hand Signals.

will enhance the evaders' chances of returning to friendly control.

(1) Evasion begins even before a crewmember leaves an aircraft over enemy territory. Two factors which are essential to successful evasion and return are opportuntiy and motivation. Pre-mission preparation and knowledge of areas of concern are very important to a crewmember. Pre-mission knowledge gained must be based on the most current information available through command area briefings, area studies, and intelligence briefings.

(2) Some areas of interest to the prospective evader are:

(a) Topography and Terrain. An aircrew member should know the physical features and characteristics, possible barriers, best areas for travel, availability of rescue, and the type of air or ground recovery possible. A future evader should also know the requirements for long-term unassisted survival in the area of operation.

(b) Climate. The typical weather conditions and variations should be known to aid in evasion efforts.

(c) People. A very critical consideration may be knowing the people in the area. From ethnic and cultural briefs read before the mission, crewmembers should familiarize themselves with the behavior, character, customs, and habits of the people. It may, at times during the evasion episode, be necessary to emulate the natives in these respects (figure 28-42).

(d) Equipment. Aircrew members who would hope to be successful evaders should be thoroughly familiar with all of their equipment and know where it is located. They should also preplan what equipment should be retained and what should be left behind under certain conditions of an evasion travel situation.

(3) Before addressing evasion movement techniques, it is appropriate to go over some of the factors which influence an evader's decision to travel.

Figure 28-42. Knowing the People.

(a) The first few minutes after entering enemy or unfriendly territory is usually the most critical period for the evader. The evader must avoid panic and not take any action without thinking. In these circumstances, the evader must try to recall any previous briefings, standard operating procedures, or training and choose a course of action which will most likely result in return to friendly territory.

(b) In those first few minutes, there is a great deal for the downed crewmember to think about. Quick consideration must be given to landmarks, bearings, and distance to friendly forces and from enemy forces, likely location for helicopter landing or pickup, and the initial direction to take for evasion. Knowledge of what to expect is important because when circumstances arise which have been considered in advance, they can be carried out more quickly and easily. Evaders should try to adapt this knowledge and any skills they have to their particular situation. Flexibility is most important, as there are no hard and fast rules governing what may happen in an evasion experience.

(c) In most evasion situations, evaders will be required to move if for no other reason than to leave the immediate landing area when pickup is not imminent. Because any movement has the inherent risk of exposure, some specific principles and practices must be observed. Periods of travel are the phases of evasion when evaders are most vulnerable. Many evaders have been captured because they followed the easier or shorter route and failed to employ simple techniques such as watching and listening frequently and seeking concealment sites.

28-15. Searching Terrain:

a. Evaders should visually survey the surrounding terrain from an area of concealment to determine if the route of travel is a safe one. Evaders should first make a quick overall search for obvious signs of any presence such as unnatural colors, outlines, or movement. This can be done by first looking straight down the center of the area they are observing, starting just in front of their position, and then raising their eyes quickly to the maximum distance they wish to observe. If the area is a wide one, evaders may wish to subdivide it as shown in figure 28-43. Now all areas may be covered as follows: First, by searching the ground next to them. A strip about 6 feet deep should be looked at first. They may search it by looking from right to left parallel to their front. Secondly, by searching from left to right over a second strip farther out, but overlapping the first strip. Searching the terrain in this manner should continue until the entire area has been studied. When a suspicious spot has been located, evaders should stop and search it thoroughly (figure 28-44).

b. The evader must question the movement:

(1) Is the enemy searching for the evader?

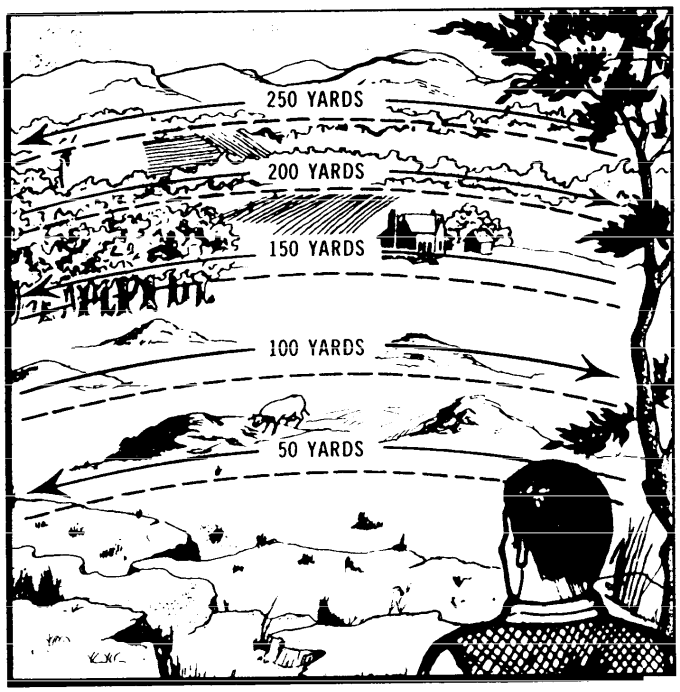

Figure 28-43. Viewing Terrain - A.

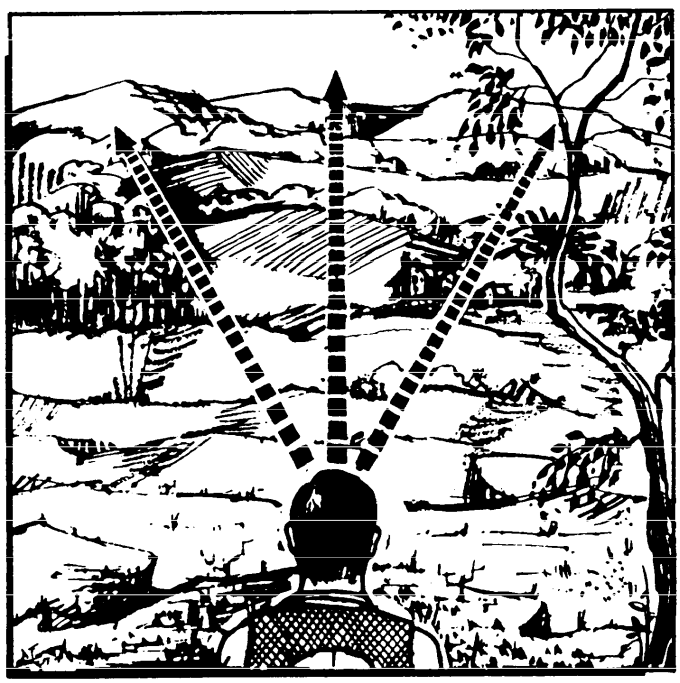

Figure 28-44. Viewing Terrain - B.

(2) What is the evader's present location?

(3) Are chances for rescue better in some other place?

(4) What type of concealment can be afforded in the present location?

(5) Where is the enemy located relative to the evader's position?

c. Having considered the necessity and risks of travel, evaders must:

(1) Orient themselves.

(2) Select a destination, alternates, and the best route.

(3) Have an alternate plan to cover all foreseeable events.

d. Cautious execution of plans cannot be overemphasized since capture of evaders has generally been due to one or more of the following reasons:

(1) Unfamiliarity with emergency equipment.

(2) Walking on roads or paths.

(3) Inefficient or insufficient camouflage.

(4) Lack of patience when pinned down.

(5) Noise or movement or reflection of equipment.

(6) Failure to have plans if surprised by the enemy.

(7) Failure to read signs of enemy presence.

(8) Failure to check and recheck course.

(9) Failure to stop, look, and listen frequently.

(10) Neglecting safety measures when crossing roads, fences, and streams.

(11) Leaving tracking signs behind.

(12) Underestimating time required to cover distance under varying conditions.

e. Evaders should understand progress on the ground is measured in stopover points reached. Speed and distance are of secondary importance. Evaders should not let failure to meet a precise schedule inhibit their use of a plan.

28-16. Movement Techniques Which Limit the Potential for Detection of an Evader (Single).

a. Evaders should constantly be on the lookout for signs of enemy presence. They should look for signs of passage of groups, such as crushed grass, broken branches, footprints, and cigarette butts or other discarded trash. These may reveal identity, size, direction of travel, and time of passage (figure 28-45).

(1) Workers in fields and normal activities in villages may indicate absence of the enemy.

(2) The absence of children in a village is an indication they may have been hidden to protect them from action which may be about to take place.

(3) The absence of young men in a village is an indication the village may be controlled by the enemy.

b. A knowledge of enemy signaling devices is very helpful. Those listed below are examples of some used by communist guerrillas in Southeast Asia.

(1) A farm cart moving at night shows one lantern to indicate no government troops are close behind.

(2) A worker in the fields stops to put on or take off a shirt. Either act can signal the approach of government troops. This is relayed by other informers.

(3) A villager fishing in a rice paddy holds a fishing pole out straight to signal all clear; up at an angle to signal the troops are approaching.

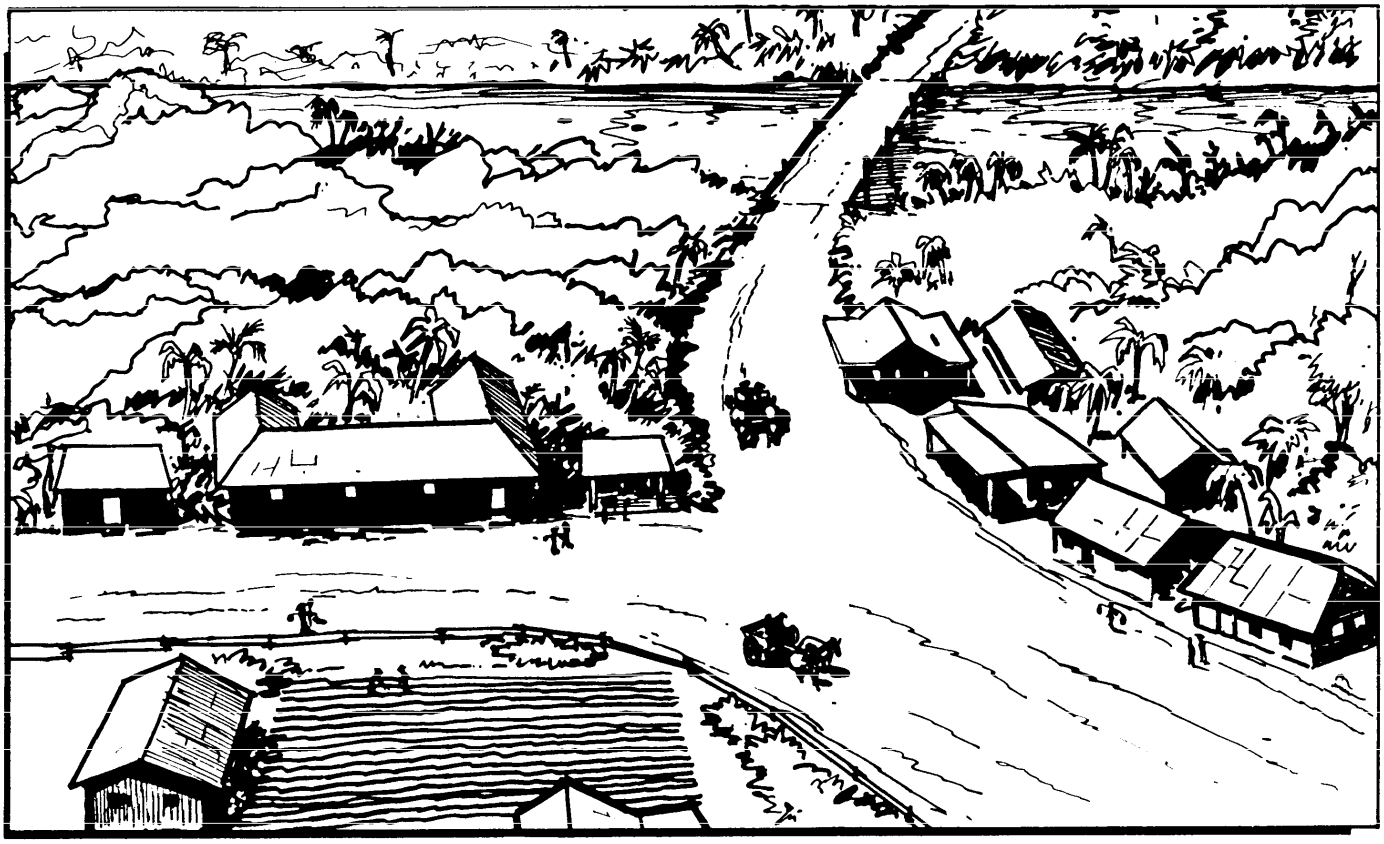

Figure 28-45. Signs of Passage.

c. The times evaders choose to travel are as critical as the routes they select. If possible, evaders should try to make use of the cover of darkness. Darkness provides concealment and in some cases there is also less enemy traffic. If, out of military necessity, the enemy is active during the hours of darkness, evaders may then find it wise to move in the early morning or late afternoon. Night movement is slower, more demanding, and more detailed than daylight movement; but it can be done. The alternative to night movement might be capture, imprisonment, and death. Evaders should then consider traveling under the cover of darkness first. However, if the enemy knows the evaders' position, or if the other factors dictate (terrain, vegetation, navigation consideration, etc.), other choices may have to be made. If travel is to be done during darkness, the terrain to be traversed should be observed during daylight if possible. While observing the area to be traveled, evaders should give attention to areas offering possible concealment as well as the location of obstacles they may encounter on their route. If the evader has a map, a detailed study of it should be made. However, it should be remembered that natural terrain features change with time of day and time of year. Certain features (ditches, roads, burned-off areas, etc.) may not be on the evaders' map if they are new. Such pretravel reconnoitering of an area will give evaders a head start on knowing how to adapt their travel movements and camouflage necessary from point to point (figure 28-46).

d. Evaders should try to memorize the routes they will take and the compass headings to their destinations. This information should not be written down on the map or on other pieces of material.

Figure 28-46. Pretravel Reconnoitering.

Figure 28-47. Military Crest.

e. If traveling through hilly country that provides cover, the military crest should be used as it may be the safest route. An evader's route should avoid game trails and human paths on the tops of ridges. The chance of encountering the enemy is greater on the tops of ridges. The risk of silhouetting during both day and night is also increased (figure 28-47).

(1) When it is necessary to cross the skyline at a high point in the terrain, an evader should crawl to it and approach the crest slowly using all natural concealment possible. How the skyline is to be crossed depends on whether it is likely the skyline at that point is under hostile observation. Evaders may never be certain any area is not under observation. When a choice of position is possible, the skyline is to be crossed at a point of irregular shapes such as rocks, debris, bushes, fence lines, etc.

(2) Another important point about moving along the military crest is that it is easier to evade the enemy on the side of the ridge than it is to lose sight of the enemy on the top of a ridge or in the valley below. Evasion along the side of a hill will afford a better chance for evaders to reach sites which are suitable for air recovery.

f. Evaders should move slowly, stopping and listening every few paces. Additionally, they should not make noise and should take advantage of all cover to avoid revealing themselves. If spotted, they should leave the area quickly by moving in a zigzag route to their goal if at all possible. If the enemy finds evidence of the evaders' passage, their route may help confuse the pursuer as to direction and goal. Background noise can be either a help or hindrance to those who are trying to move quietly—both the evaders and the enemy. Sudden bird and animal cries, or their absence, may alert evaders to the presence of the enemy, but those same signals can also warn the enemy of an approaching or fleeing evader. Sudden movement of birds or animals is also something to look out for.

g. The following are some techniques of limiting or concealing evidence of travel. Evaders should:

(1) Avoid disturbing any vegetation above knee level. Evaders should not grab at or break off branches, leaves, or tall grass.

(2) Glide gently through tall grass or brush. Avoid using thrashing movements. A walking stick may be used to part the vegetation in front, and then it can be

used behind to push the vegetation back to its original position. The best time to move is when the wind is blowing the grass.

(3) Realize that grabbing small trees or brush as handholds may scuff the bark at eye level. The movement of trees can be spotted very easily from a distance. In snow country it may mark a path of snowless vegetation that can be spotted when tracks cannot be.

(4) Select firm footing and place the feet lightly but squarely on the surface avoiding the following:

(a) Overturning duff, rocks, and sticks.

(b) Scuffing bark on logs and sticks.

(c) Making noise by breaking sticks.

(d) Slipping, which may make the noise of falling.

(e) Mangling of low grass and bushes that would normally spring back.

h. Evaders can mask their tracks in snow by:

(1) Using a zigzag route from one point of concealment to the next and, when possible, placing the unavoidable tracks in the shadows of trees, brush, and along downed logs and snowdrifts.

(2) Restricting movement before and during snowfall so tracks will fill in. This may be the only safe time to cross roads, frozen rivers, etc.

(3) Traveling during and after windy periods when wind blows clumps of snow from trees, creating a pock-marked surface which may hide footprints.

(4) Remembering that snowshoes leave bigger tracks, but they are shallower tracks which are more likely to fill in during heavy snowfall. Branches or bough snowshoes make less discernible prints.

i. Evaders' tracks in sand, dust, or loose soil should be avoided or else marked by:

(1) Using a zigzag route, making use of shadows, rocks, or vegetation to walk on to mask or prevent tracks.

(2) Wrapping cloth material loosely about the feet, this makes tracks less obvious.

j. By moving before or during wet or windy weather, evaders may find that their tracks are obliterated or worn down by the elements. Along roadways, evaders should be particularly cautious about leaving their tracks in the soft soil to the side of the road. They should step on sticks, rocks, or vegetation. They shouldn't leave tracks unless there are already tracks of natives on the road and their tracks can be made to look like the existing ones (small bare feet, tire sandals, or enemy footgear). Rolling across the road is a method of avoiding tracks. Walking in wheel ruts with the toes parallel to the road will help conceal tracks. If the road surface is dry, sand, dust, or soil tracks may be "brushed" out to make them look old or will help the wind erase them more quickly. This must be done lightly, however, so the tracks do not look as if they have been deliberately swept over. Mud will retain footprints unless the mud is shallow and there is a heavy rain. Evaders should try to go around these areas.

k. Many principles and techniques which work for the individual are also appropriate for use in groups of evaders. While it is not true that the only safe way to evade is individually, there is a certain danger in moving with a group.

(1) It is generally not advisable to travel in a group larger than three. If possible, the senior person should divide the group into pairs. Paired individuals must be compatible since any disagreement may prove fatal during the evasion process. Group travel can be advantageous because supplementary assistance is available in case of injury, in defense against hostile elements, in travel over rough terrain, and it provides moral support.

(2) In group travel, movement becomes critical. Movement attracts attention.

(3) The intervals and distances between individuals in the group should be made according to the terrain and the time of day. Intervals will probably be greater during the day. The natural but extremely dangerous tendency to "bunch up" is to be avoided when traveling in a group (figure 28-48).

(4) Under favorable conditions it is possible for the enemy to see 100 yards into open woods. If the undergrowth is light, the route must be farther into the woods, and the interval between evaders must be greater. Added consideration must be taken in deciding whether to travel at night or during the day. The leader will direct and guide the group to and from the best positions. All communications within the group should be made with silent signals only. Security in group evasion is of paramount importance. All members should stay alert. Security posts, lookouts, or guards should be designated for periods of rest or stopping.

(5) Various formations are available for use by the evading group during periods of travel. The group must be flexible and able to adapt to changes in the conditions of the situation. The type of formation may also change with the route. In choosing a formation, the following points should be considered:

(a) Group control and intercommunications.

(b) Security.

(c) Terrain.

(d) Speed in movement.

(e) Visibility.

(f) Weather.

(g) Enemy placement.

(h) The need for dispersion.

(i) Flexibility of change in speed and direction of travel.

(6) A "formation" is merely the formal arrangement of individuals within a group. This formal arrangement is designed to give the greatest dispersion consistent with adequate intercommunication, ease and speed of movement, and flexibility to change direction and speed of travel at a moment's notice; that is, close control. Any arrangement which provides the above advantages

Figure 28-48. Group Travel.

is satisfactory. The Army, which constantly moves groups of men of various sizes on various missions, has found the squad file, squad column, and squad line to be satisfactory.

(a) In a squad file, the personnel are arranged in a single file, or one directly behind the other, at different distances. The distance will vary depending on need for security, terrain, visibility, group control, etc. It is primarily used when moving over terrain which is so restrictive that the squad cannot adopt any other formation. It is also used when visibility is poor and squad control becomes difficult. When people are in a squad file, it is easy to control the group and provide maximum observation of the flanks. This is a fast way to travel, especially in the snow.

-1. However, there are disadvantages to this type of movement. A major one is that this formation is visually eye-catching. All the noise of the group is also concentrated in one place. This type of formation is easily defined and infiltrated. Depending on how many people are in the group, the area they walk through can become very packed down and easily detected by the enemy.

-2. If the group in the squad file is small, some members may have to double up on jobs; however, the "point" or lookout (scout) in the lead should only perform that job (figure 28-49).

(b) In the squad column, personnel are arranged in two files. The personnel are more closely controlled and yet maneuverable in any direction. There is greater dispersion with reasonable control for all-round security. It is used when terrain and visibility are less restrictive because it provides the best means of moving armed personnel into dispersed all-round security. It is easy to change into either the file or the line.

-1. There are many advantages to this type of formation, a major one being a greater dispersal of personnel. Visually, this way of moving is less eye-catching, and the sounds the group makes are less concentrated. With this formation, the rate of travel is reasonable, yet there is no well trampled corridor for enemy trackers to follow.

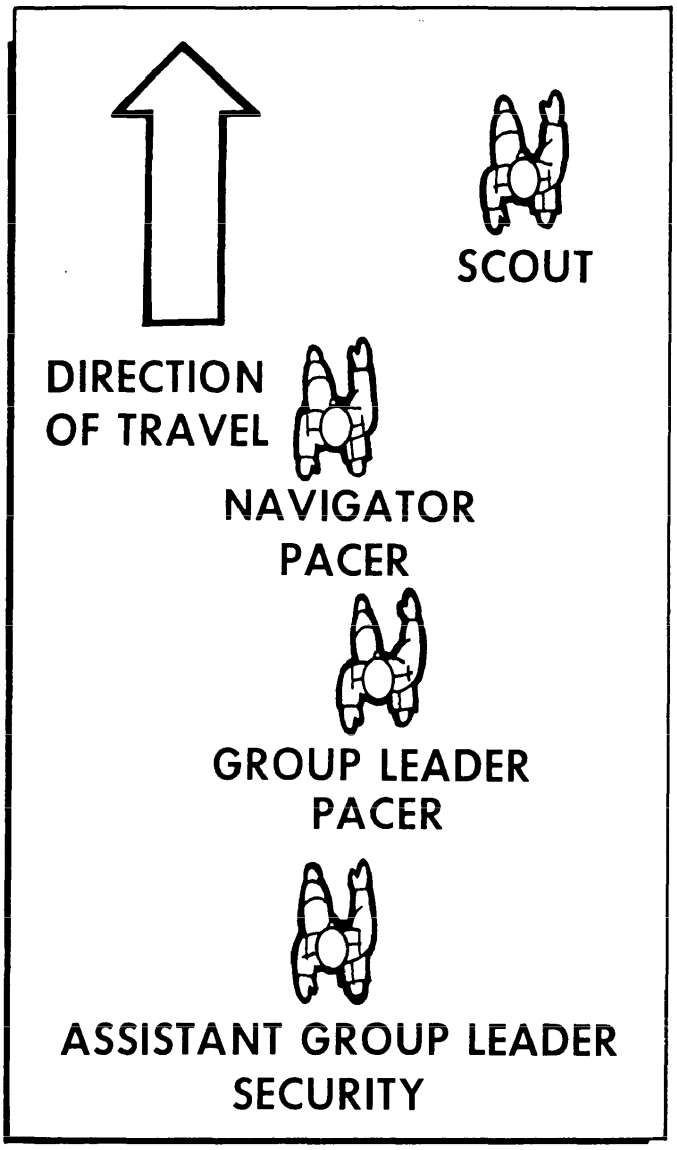

Figure 28-49. File Formation.

-2. There are a few disadvantages to movement in this manner. This formation of travel is hard to control in areas of dense vegetation with poor visibility and makes straying from the group likely. Although the paths may be faint, this mode of travel will also form a large number of trails. The rate of travel will be slower overall when traveling this way. An example of how personnel may be dispersed using the squad column methods is shown in figure 28-50.

(c) In the squad line, all personnel are arranged in a line. This formation is used primarily by the Army as an assault formation because it is best for short, fast movements.

-1. The advantage of this formation is that it is the quickest way to cross such obstacles as roads, fences, and small open spaces. It provides for tight control of individual movement while providing security for short-distance moves.

-2. The disadvantages are that there are extreme communication and control problems. Some personnel in this formation may be forced to traverse undesirable rough terrain in contrast to the other two formations. Figure 28-51 illustrates the organization of personnel in this type formation. The speed at which these formations will progress will vary with terrain, light, cover, enemy presence, health of personnel, etc.

l. Regardless of the formation used, the evader should pay particular attention to the technique used to travel. Knowing how to walk or crawl may make the difference between success and failure.

(1) Correct walking techniques can provide safety and security to the evader. Solid footing can be maintained by keeping the weight totally on one foot when stepping, raising the other foot high to clear brush,

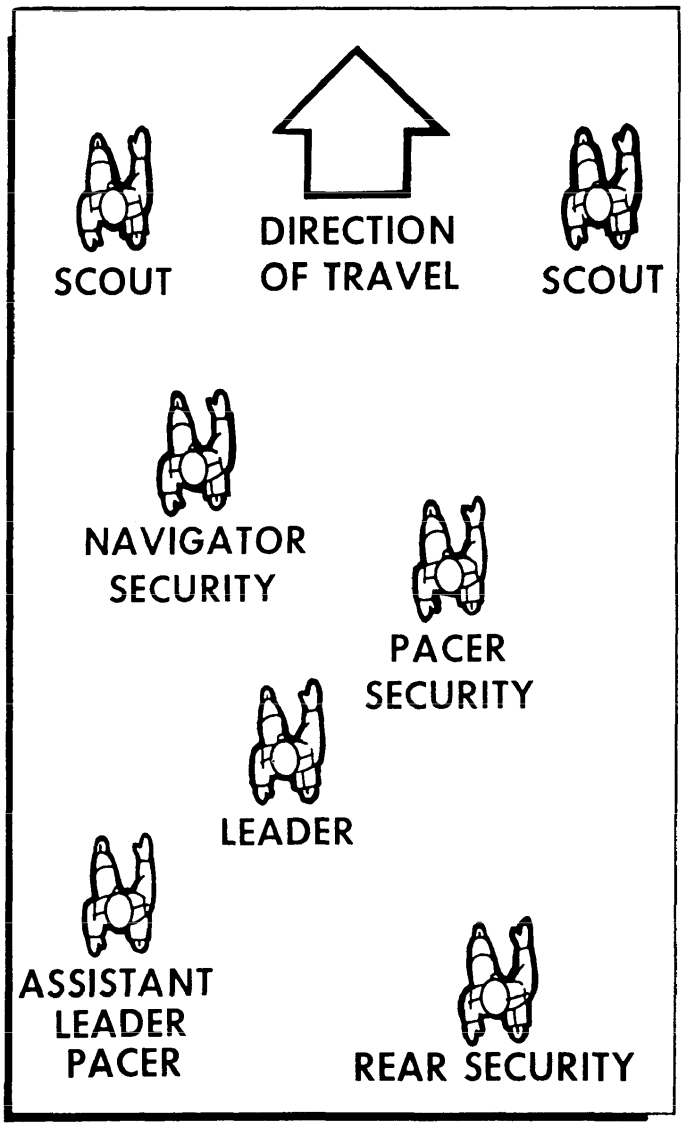

Figure 28-50. Squad Formation.

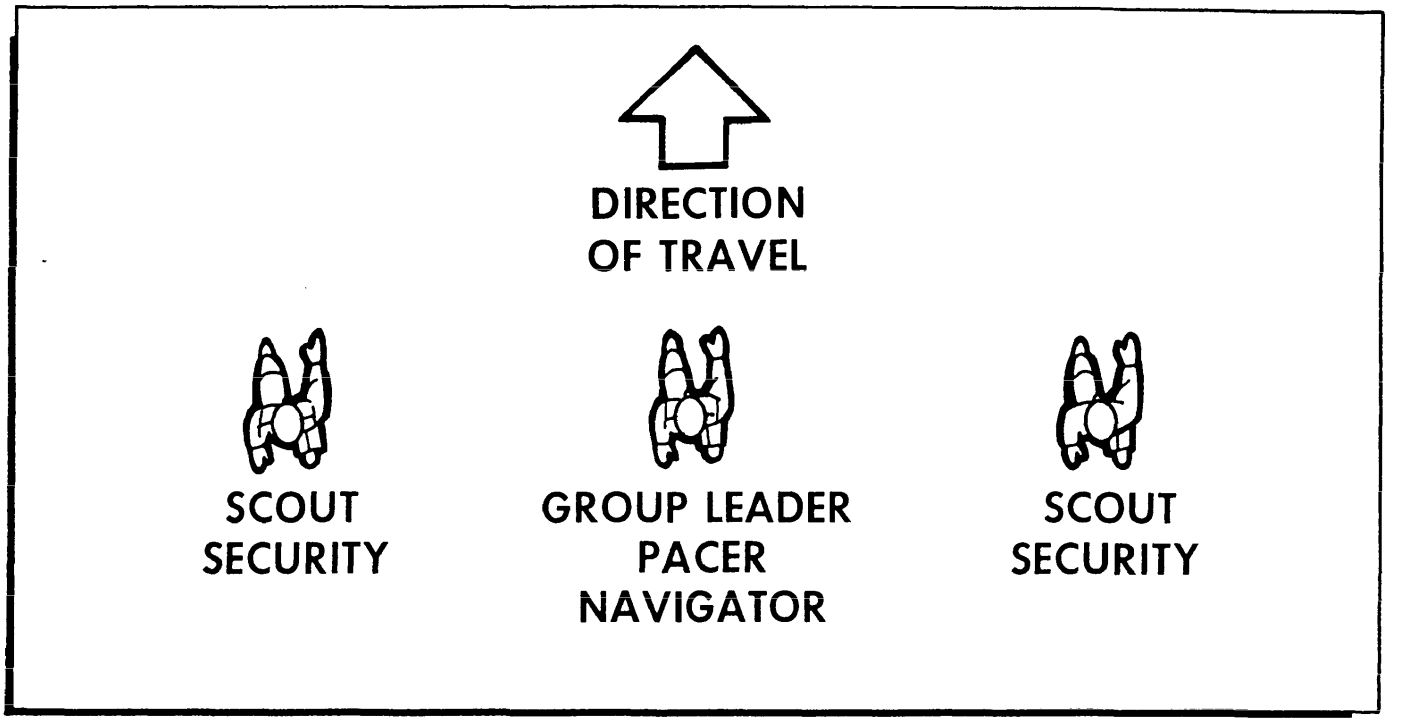

Figure 28-51. Squad Line.

grass, or other natural obstacles, and gently letting the foot down, toe first. Feel with the toe to pick a good spot—solid and free of noisy materials. Lower the heel only after finding a solid spot with the toe. Shift the weight and balance in front of the lowered foot and continue. Take short steps to avoid losing balance. When vision is impaired at night, a wand probe, or staff, should be used. By moving these aids in a figure-eight motion from near the ground to head height, obstructions may be felt.

(2) Another method of movement is by crawling. Crawling is useful when a low silhouette is required. There are times when evaders must move with their bodies close to the ground to avoid being seen and to penetrate some obstacles. There are three ways to do this: the low crawl, the high crawl, and the hands-and-knees position. Evaders should use the method best suited to the condition of visibility, ground cover, concealment available, and speed required.

(a) The Low Crawl. This can be done either on the stomach or back, depending on the requirement. The body is kept flat and movement is made by moving the arms and legs over the ground (figure 28-52).

(b) The High Crawl. This is a position of higher silhouette than the low crawl position, but lower than the hands and knees position. The body is free of the ground with the weight of the body resting on the forearms and lower legs. Movement is made by alternately advancing the right elbow and left knee, left elbow and right knee, elbows and knees laid flat on their inside surfaces (figure 28-53).

(c) Controlled Movement. The low crawl and high crawl are not always suitable when very near an enemy. They sometimes cause the evader to make a shuffling noise which is easily heard. On the other hand, carefully controlled movement can be made to be silent, and these techniques present the lowest possible silhouettes.

(d) The Hands-and-Knees Crawl. This position is used when near an enemy. Noise must be avoided, and a relatively high silhouette is permissible. It should only be used when there is enough ground cover and concealment to hide the higher silhouette involved (figure 28-54).

m. If evaders are moving as a group and are forced to disperse, being able to account for everyone after regrouping is important. Likely locations for rallying points are selected during map study or reconnaissance.

(1) Selecting a Rallying Point. The group leader must:

(a) Always select an initial rallying point. If a suitable area for this point is not found during map study or reconnaissance, the leader can select it by grid coordinates or in relation to terrain features.

(b) Select likely locations for rallying points en route.

(c) Plan for the selection and designation of additional rallying points en route as the patrol reaches suitable locations.

(d) Plan for the selection of rallying points on both near and far sides of danger areas which cannot be bypassed, such as trails and streams. This may be done

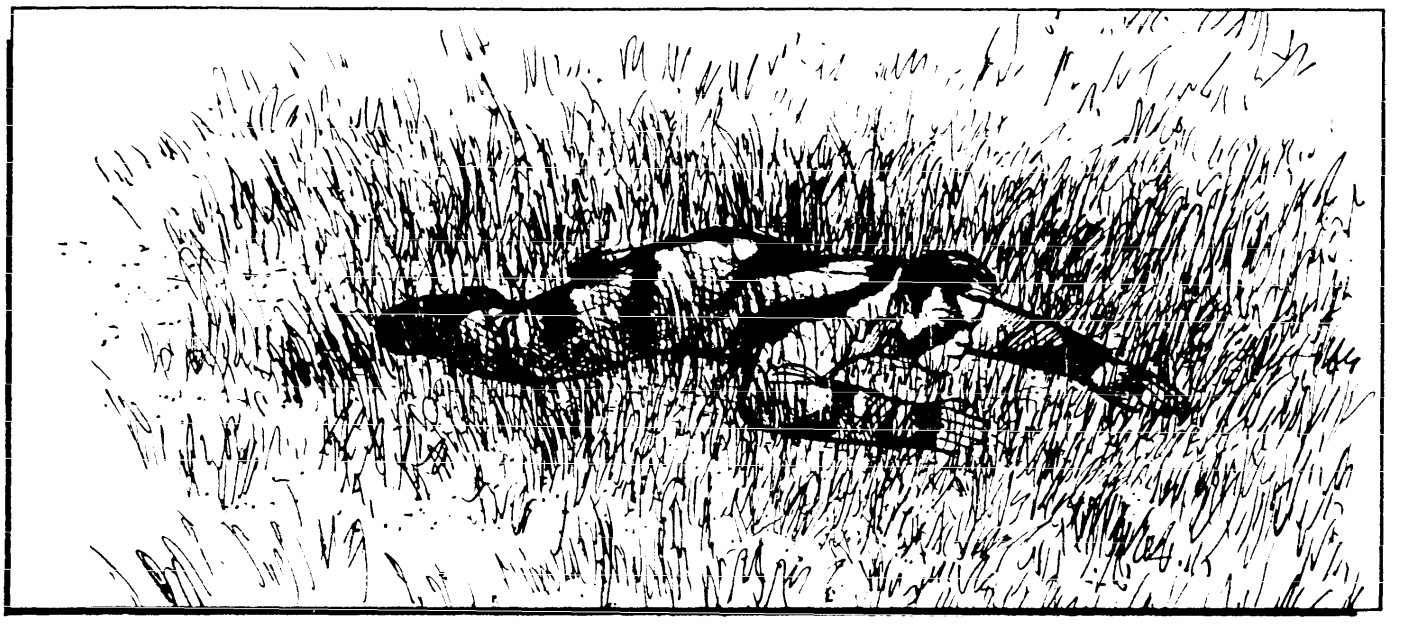

Figure 28-52. Low Crawl.

by planning that, if good locations are not available, rallying points will be designated in relation to the danger area; for example, "...50 yards this side of the trail." or "...50 yards beyond the stream."

(2) Use of Rallying Points. If dispersed by enemy activity or through accidental separation, each evader in the group should be prepared to evade, individually, to the regrouping (rallying) point to arrive at a predesignated time. If this is not possible, the individual will become a "lone evader." The group should not make any effort to locate someone not reaching the rally point. The group should formulate a new plan with new rallying points and clear the area.

(a) Rallying points should be changed or updated as they are passed. Points should not be directly on the line (route) of travel. By selecting points off line, the job of searchers (trackers) is made more difficult and the chance of being "headed off" or "blind stalked" by the enemy is reduced.

Figure 28-53. High Crawl.

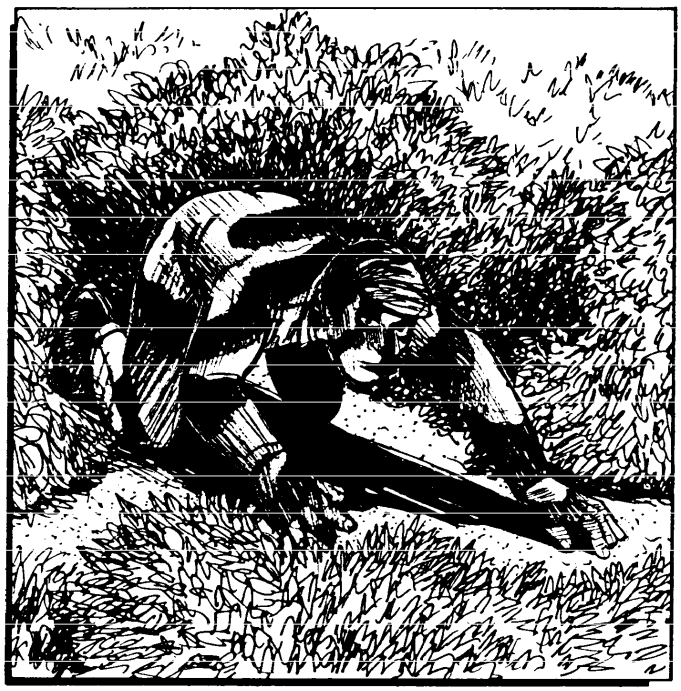

Figure 28-54. Hands-and-Knees Crawl.

(b) If the group is dispersed between rallying points en route, the group rallies at the last rallying point or at the next selected rallying point. The group leader announces the decision at each rallying point as to which point the group will rally.

(3) Actions at Rallying Points. Actions to be taken at rallying points must be planned in detail. Plans for actions at the initial rallying point and rallying points en route must provide for the continuation of the group as long as there is a reasonable chance to evade as a group. An example of a plan would be for the group to wait for a specified period, after which the senior person present will determine actions to be taken based on personnel and equipment present. Even during movement phases, it is important to be able to check on the presence and status of all group members. A low toned, actual head count starting at the rear of the formation might be one way to do this; hand signals is another. One reason for keeping in touch with everyone is to establish new plans or adjust old ones while moving.

28-17. Barriers to Evasion Movement:

a. Obstacles. Throughout the evasion episode, many obstacles may be encountered which may impede evaders or influence the selection of travel routes. These barriers or obstacles can be divided into natural ones, such as rivers or mountains, and human ones, such as border guards or manmade fences or roads. Some of these obstacles may be helpful while others might be a hinderance.

(1) Rivers and Streams. When crossing rivers and streams, bridges and ferries can seldom be used since the enemy normally establishes checkpoints at these locations. This leaves a choice of fording, swimming, crossing by boat, or using some improvised method (figure 28-55).

(2) Mountains. In mountainous areas, survival may be the primary concern. It may be necessary for evaders

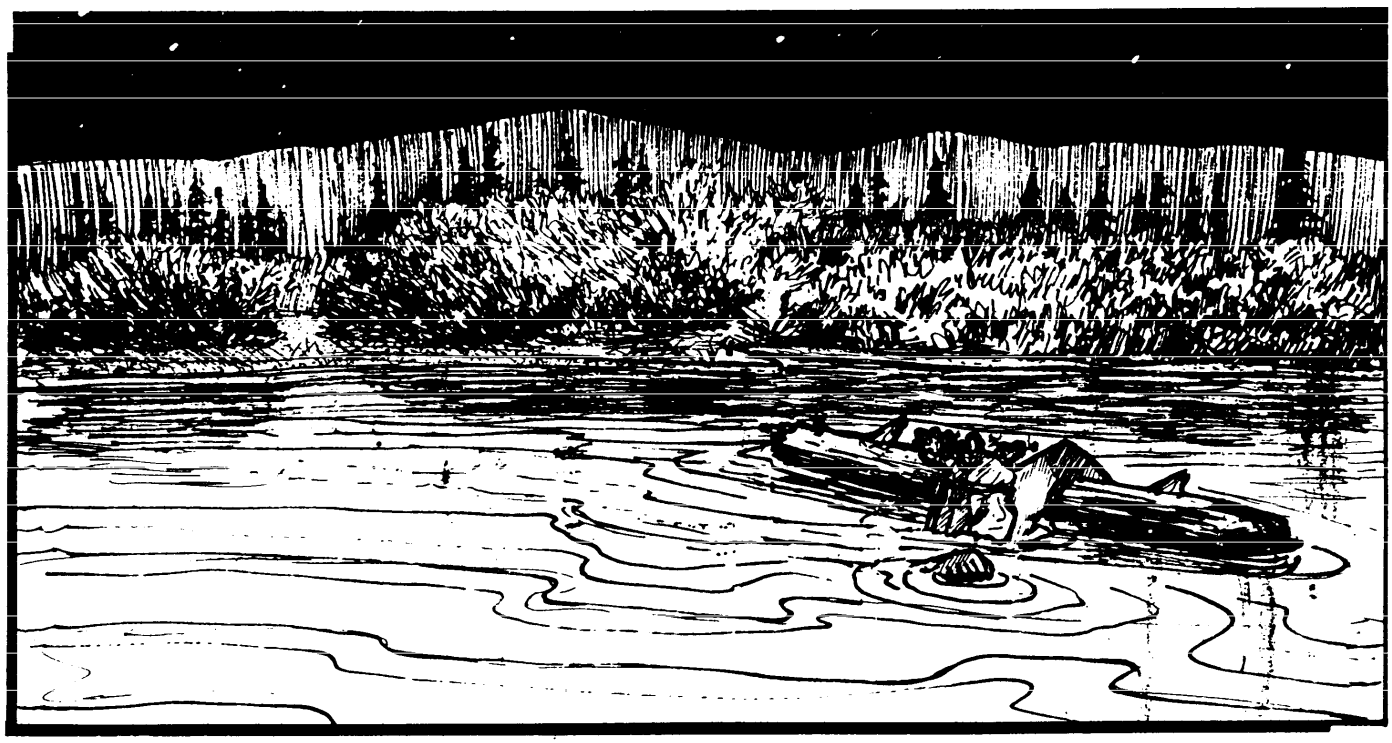

Figure 28-55. River Crossing.

Figure 28-56. Weather.

to remain in one location for an extended period of time, perhaps even waiting for the coming of spring before attempting travel. Many mountainous areas, however, are havens which afford cover, water, food, and low population densities. Also, the chances of receiving assistance from people in areas where homes and farms are separated by great distances are more likely. When traveling in mountainous regions, evaders should not forget to use the military crest if concealment is available. In plains areas, evaders should use depressions, drainages, or other low spots to conceal their movements. Route selection should be planned with the utmost care to avoid unnecessary delays caused by cliffs, large bodies of water, and flat areas.

(3) Vegetation. Some swamps, drainage areas, and thickets may be too thick for evaders to penetrate, and may require that a detour or alternate route be used. If the vegetation can be moved through, evaders should take care not to leave evidence of passage by disturbing the growth.

(4) Weather. Weather can sometimes be used to screen evaders from the enemy. Certain weather conditions mask the noise made by traveling (figure 28-56). Moving during a rainstorm may erase the footprints left by an evader; but after the rain the soft soil will leave definite signs of passage. Thunder may mask the sounds evaders make, but lightning may cause them to be seen. Snowstorms may be used to cover evaders' signs and sounds, but once the storm is over, evaders must use extreme care not to leave a trail.

b. Artificial Obstacles. Evaders may also encounter a wide variety of artificial obstacles while traveling within enemy territory or when attempting to leave a controlled area. As a general rule, evaders should *not* attempt to penetrate these obstacles if they can be bypassed. If an analysis of the situation reveals the obstacles cannot be bypassed, evaders must be skilled in the methods and techniques for dealing with specific artificial barriers to evasion. If possible, move to a less fortified (controlled) area or find a better damaged area in the barrier.

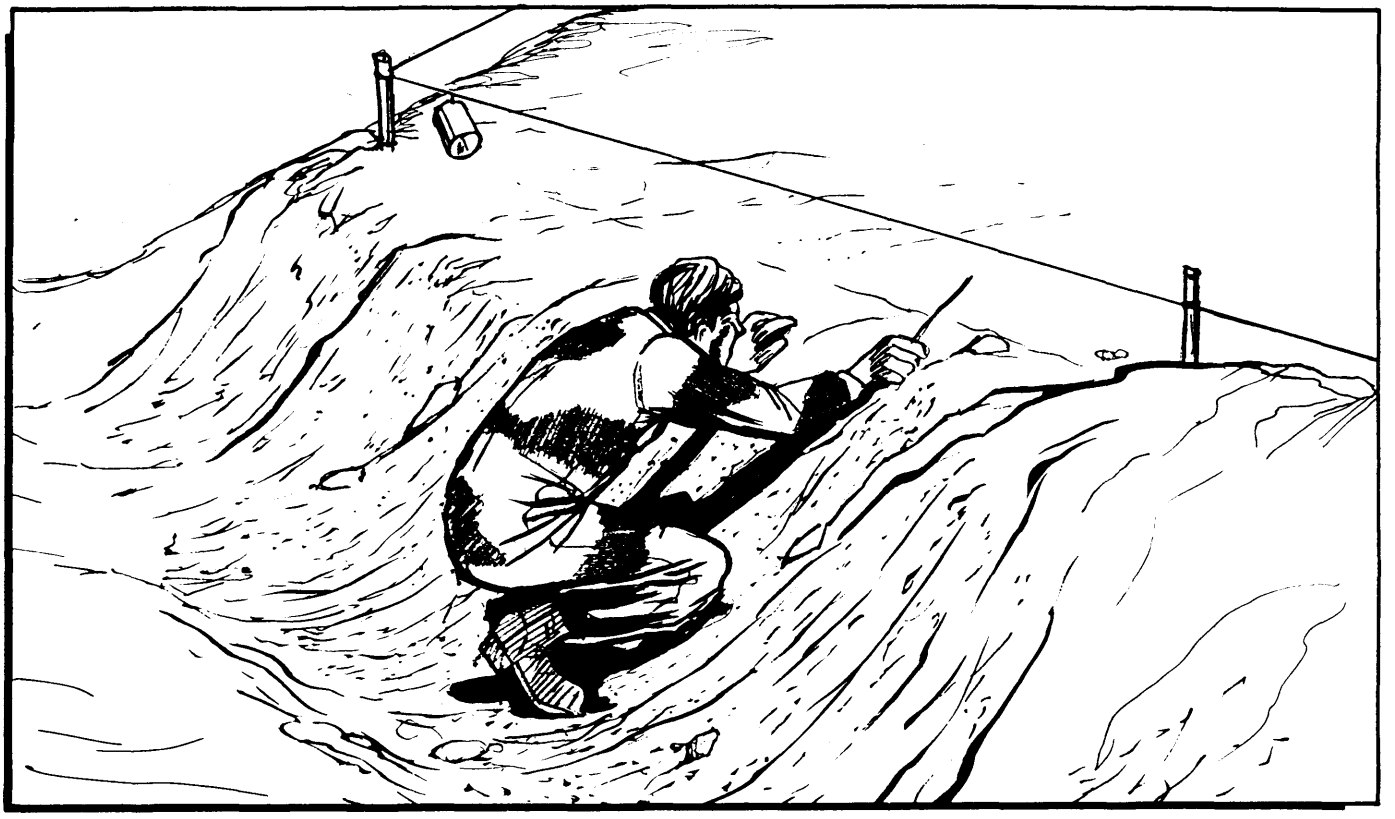

Figure 28-57. Trip Wires.

(1) Evaders may encounter trip wires. These wires may be attached to pyrotechnics, booby traps, sensor devices, mines, etc. These wires are normally thin, olive green (or other colors that blend with the environment), strong, and extremely difficult to see. A supple piece of wood can be improvised and used as a wand to detect these wires (figure 28-57).

(a) A tripwire may be set up to be from 1 inch to a number of feet above the ground and to extend any number of feet from the device to which it is attached.

(b) The pressure necessary to activate a sensing device, mine, pyrotechnic device, or other trap-associated device to which the wire may be connected can vary from a few ounces to several pounds. This means that the evader must be very careful when attempting to determine the presence of these devices.

(c) Once a tripwire has been detected, evaders should move around the wire if possible. If not possible, they should go either over or under it. They should not tamper with or cut the wire. If one device is discovered, be alert for "backup" devices.

(d) A number of devices activated by tripwires have a combination pressure-release arming mechanism. Cutting the wire or releasing the tension in the wire may activate the device. Some devices are electrically activated when there is a change in the current flowing through the attached wire—either because the wire is cut, in some way grounded, or otherwise altered. Evaders should take extreme care to avoid touching tripwires, but if contact is made, they must try to avoid sufficient pressure for activation.

(2) Illumination flares may also present a problem to evaders. These, of course, can be activated by evaders themselves by a tripwire, by the enemy in the form of electronically activated ground flares, or by flares dropped from an overflying aircraft. Other overhead flares may be fired by mortars, rifles, artillery, and hand projectors.

(a) The illumination flares may burn as bright as 20,000 candlepower and illuminate up to a 300-foot radius in case of a ground flare, or a much larger area in the case of an overhead flare which is lofted or dropped and burns high above the ground.

(b) If evaders hear the launching burst of an overhead flare, they should, if possible, get down while it is rising and remain motionless. If caught in the light of a flare when they blend well with the background, they should freeze in position and not move until the flare goes out. The shadow of a tree will provide some protection. If caught in an open area, they may elect to crouch low or lie on the ground and, as a general rule, should not move after the area is illuminated.

(c) However, if they are caught in the light of a ground flare and their position is such that the risk of

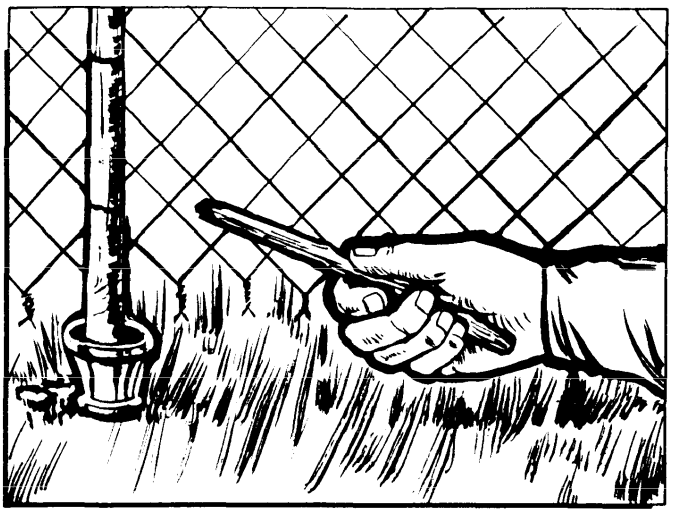

Figure 28-58. Electrified Fences.

remaining is greater than that of moving, they should move quickly out of the area. If within a series of obstacles or an obstacle system, evaders must remember running can be extremely dangerous because of the obstacles in the area and the fact that movement, especially fast movement, catches the eyes of an observer. If it is determined they cannot quickly move out of the area because of possible serious injuries due to existing obstacles or because they may be observed by the enemy, evaders should drop to the ground and conceal themselves as much as possible.

(d) Evaders should remember the light of a flare (either ground or overhead bursts) is temporarily blinding and the eyes should be covered to conserve night vision.

(e) If caught by a flare when actually penetrating an obstacle such as a concertina wire, evaders should get as low as possible, stay still, and cover their eyes. The light of a flare can act to an evader's advantage because the searching enemy will lose its night vision which may add to the evader's chance for success in departing the area after the flare has burned out. The light of a flare also creates very dark shadows which, under some circumstances, can afford good concealment from enemy observation.

(3) Various types of chain and wire fences may hinder the progress of evaders who are moving to the safety of friendly areas.

(a) For indications of electrical fences, evaders should watch for dead animals, insulators, flashes from wires during storms, and short circuits causing sparks (figure 29-58). A quick simple test can be conducted to determine if a wire is electrified. This test is made by carefully approaching the wire holding a stem of grass or a small, damp stick on the wire. If the wire is charged, a mild shock will result but will not cause injury.

(b) Evaders should use a wand to check for booby traps between strands of multi-strand barbed wire. Generally, they should penetrate the fence under the wire

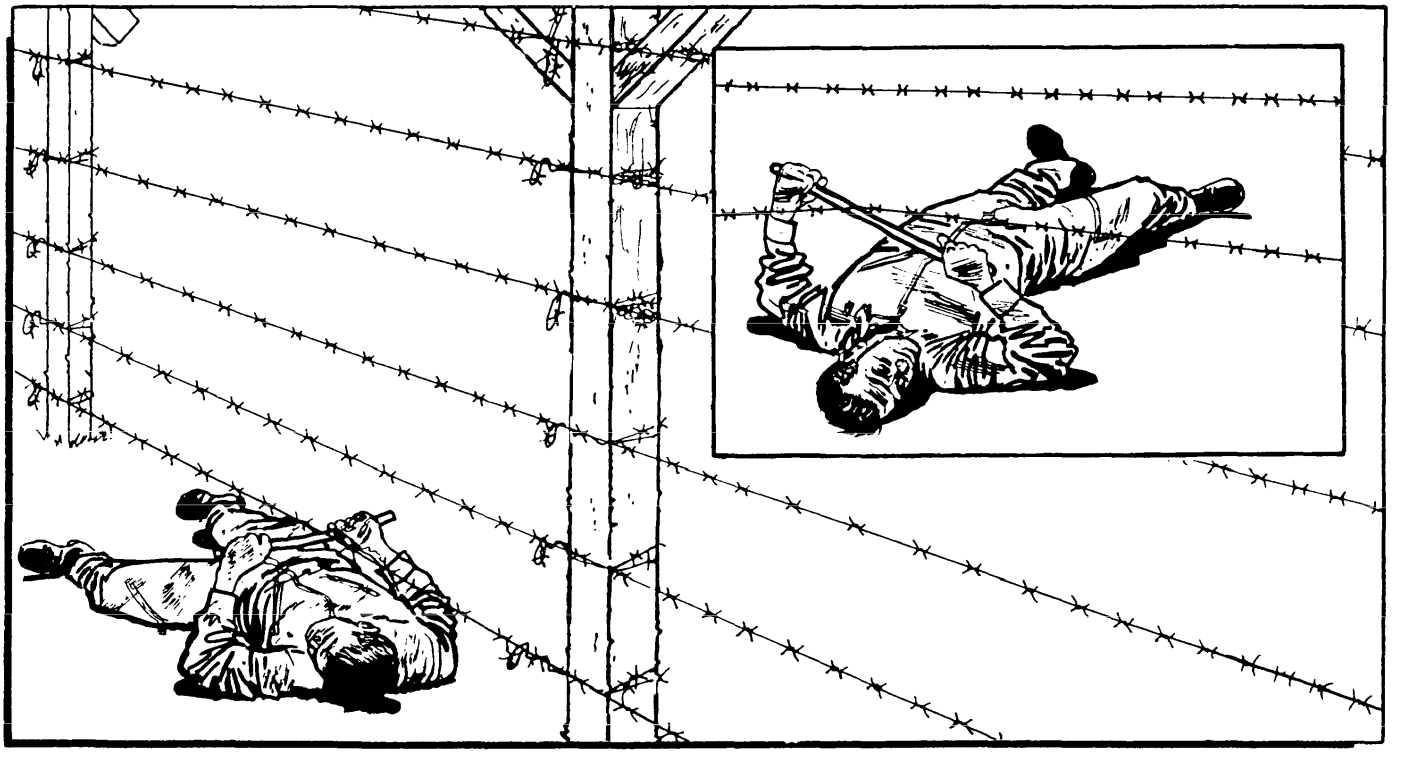

Figure 28-59. Penetrating Wire.

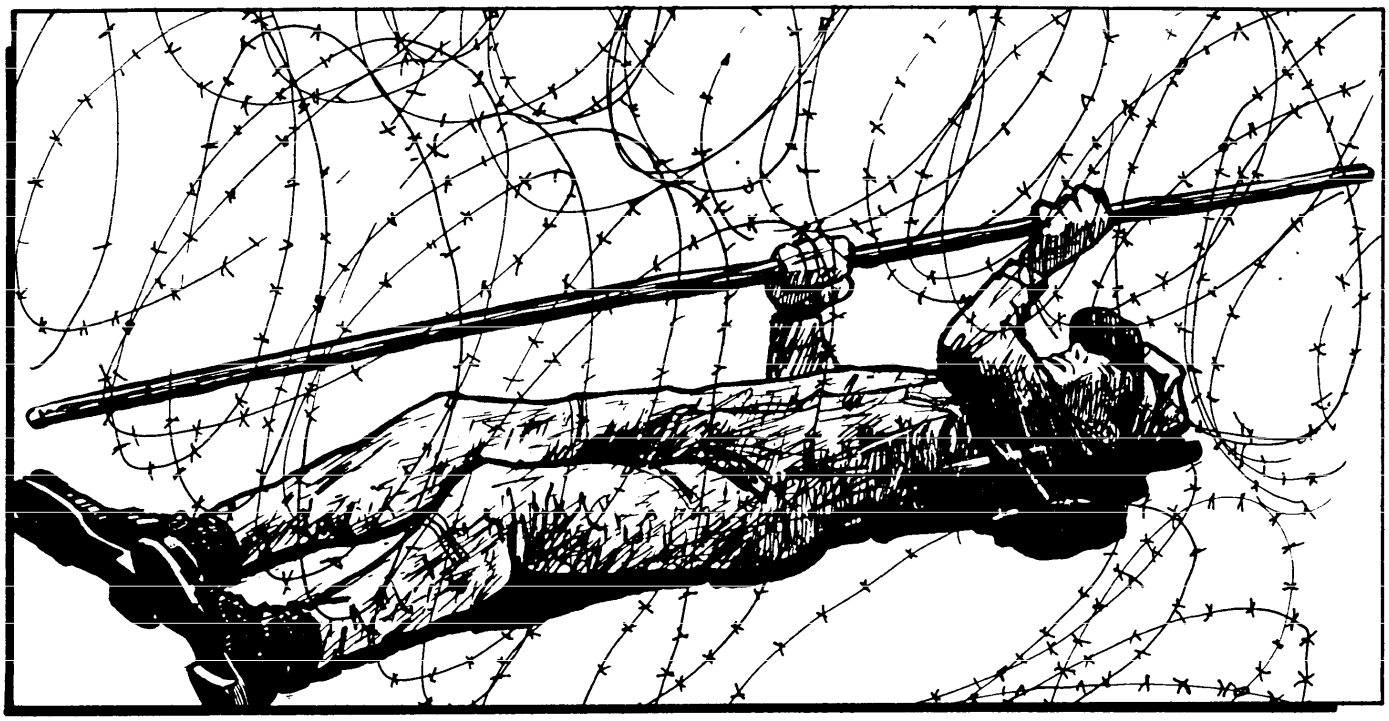

Figure 28-60. Penetrating Concertina Wire.

closest to the ground with the body parallel or perpendicular to the wire, depending on circumstances (figure 28-59). They should lie flat on their backs both to project the lowest possible silhouette and to provide good visibility of the wire against the sky. The probe can sometimes be used to lift the wire. If the lowest wire is close to the ground and is tight, evaders may have to modify their approach to the problem.

(c) The apron fence is penetrated in the same manner as any multi-strand fence—one wire at a time. Evaders should check the area between wires before proceeding.

(d) Concertina wire is penetrated with the body perpendicular to the wire using a probe to lift the wire if it is not secured to the ground (figure 28-60). If the wire is secured to the ground, the evader can crawl between the loops. If two loops are not separated enough, they may be tied apart using shoe laces, string, suspension line, or strips of cloth. After passing through, the ties should be removed for future use and to erase evidence of travel.

(e) Chain link fences should be avoided completely if at all possible. These fences are usually found only in highly sensitive zones. This means the area is probably more highly guarded and patrolled than other areas. There also may be other traps or devices installed. The fence may also be electrified. If the fence must be penetrated, the evader should go under it if possible (figure 28-61). If digging is required, the soil should be placed on the opposite side so it can be re-

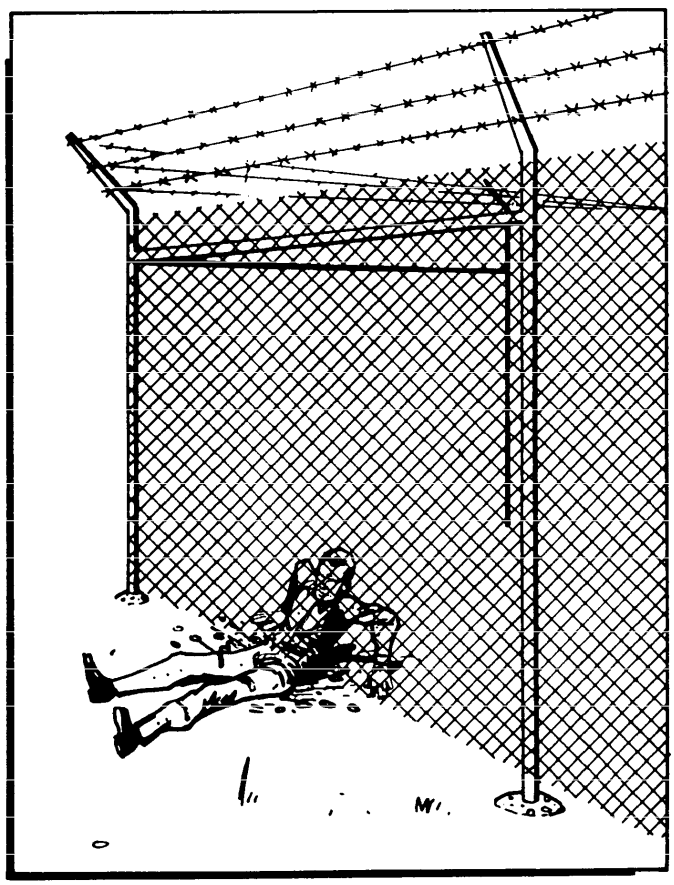

Figure 28-61. Penetrating Chain Link Fence.

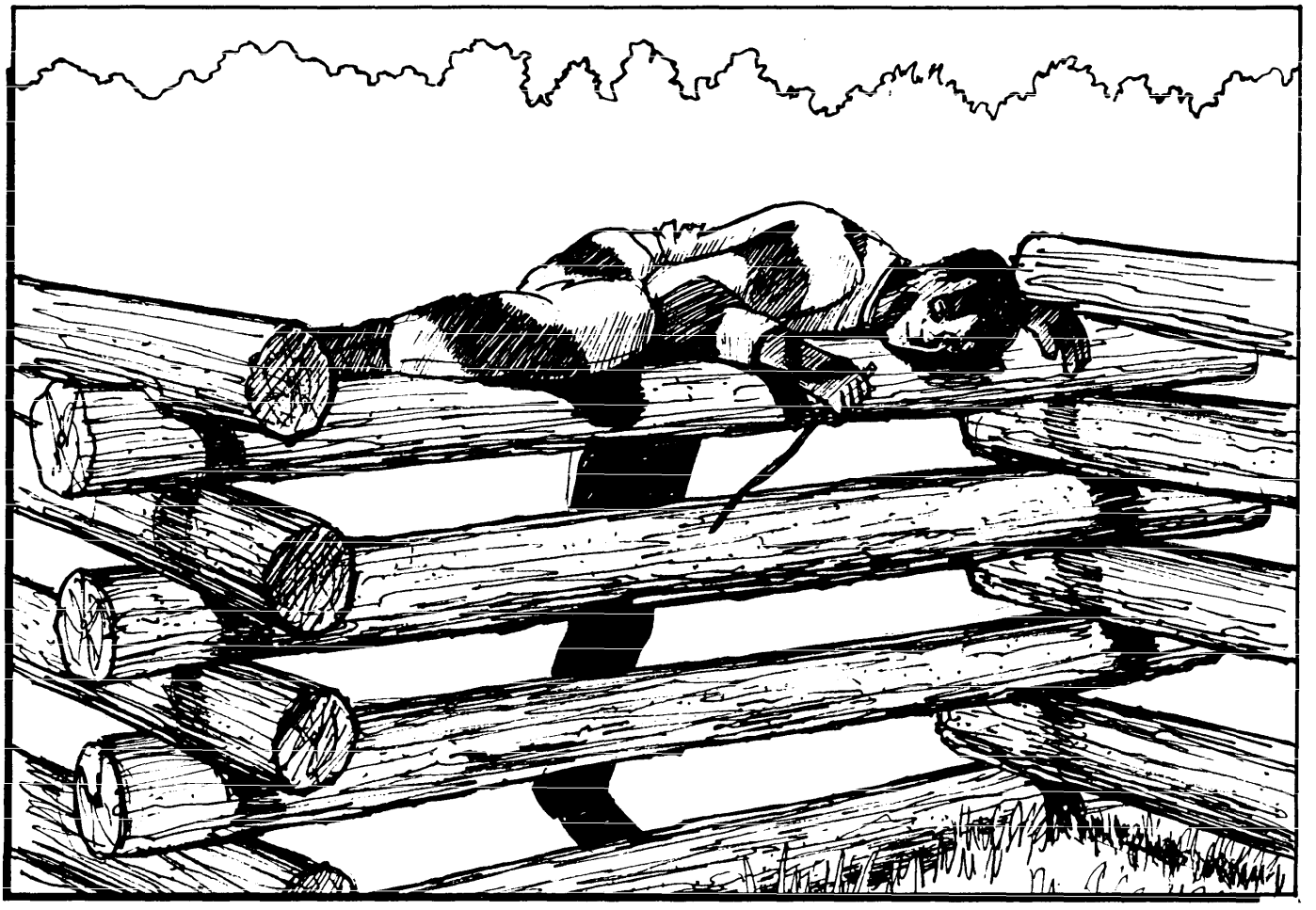

Figure 28-62. Penetrating Log Fence.

placed to remove evidence. Climbing the fence is recommended only as a last resort.

(f) Evaders may encounter rail and split-rail fences while evading or escaping. The fences are penetrated by going under or between lower rails if possible. If not, evaders should go over at the lowest point, projecting as low a silhouette as possible (figure 28-62). They should check between the rails and on the other side of the fence to detect tripwires or booby traps. Firmness of the ground should be checked on both sides of the fence. The body should be parallel to the fence before penetration.

(4) Raked or plowed areas may be found in areas of both low and high density security. If such an area is encountered, evaders should roll across the area, after making sure it is not a mine field, to avoid leaving footprints; or they may side-step, walk backwards, or brush out footprints. Any of the above may be done when it is a requirement not to leave clear-cut evidence of the direction of movement.

(5) Roads are common barriers to evasion and escape. When roads are encountered, evaders should closely observe the road from concealment to determine enemy travel patterns (figure 28-63). Crossing from points offering best concealment such as bushes, shadows, etc., is best (figure 28-64). Evaders should cross at straight stretches of road in open country and on the inside of curves in hilly or wooded areas. This allows the evader to see in both directions so the chances of being spotted or surprised in the open is minimized. Avoid leaving tracks both in the road and on the shoulder of the road.

(6) Culverts and drains offer excellent means of crossing a road unobserved (figure 28-65).

(7) Railroad tracks often lie in the path of evaders. If so, evaders should use the same procedures for observation as for roads. If it is determined that tracks are patrolled, a check should be made for booby traps and tripwires between tracks. Aligning the body parallel to

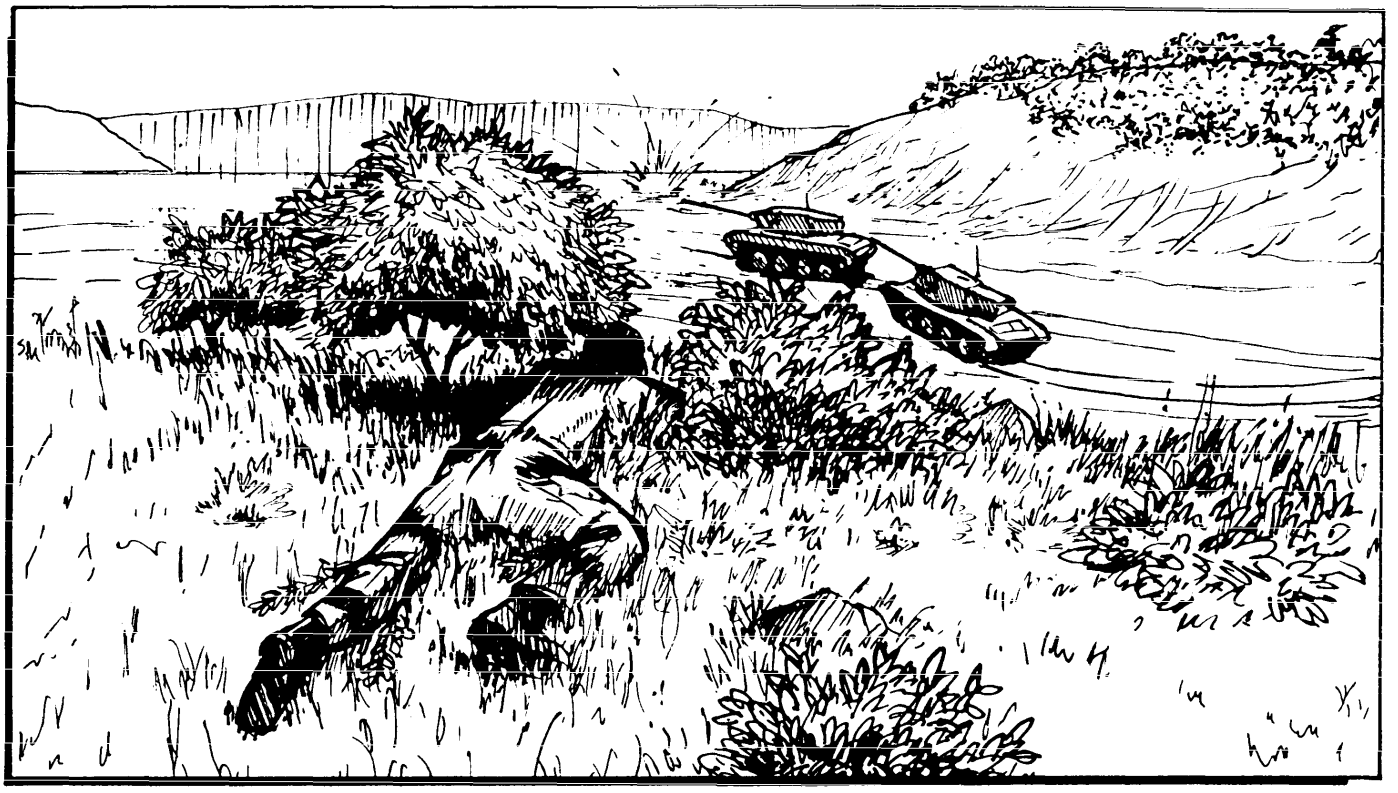

Figure 28-63. Common Barriers.

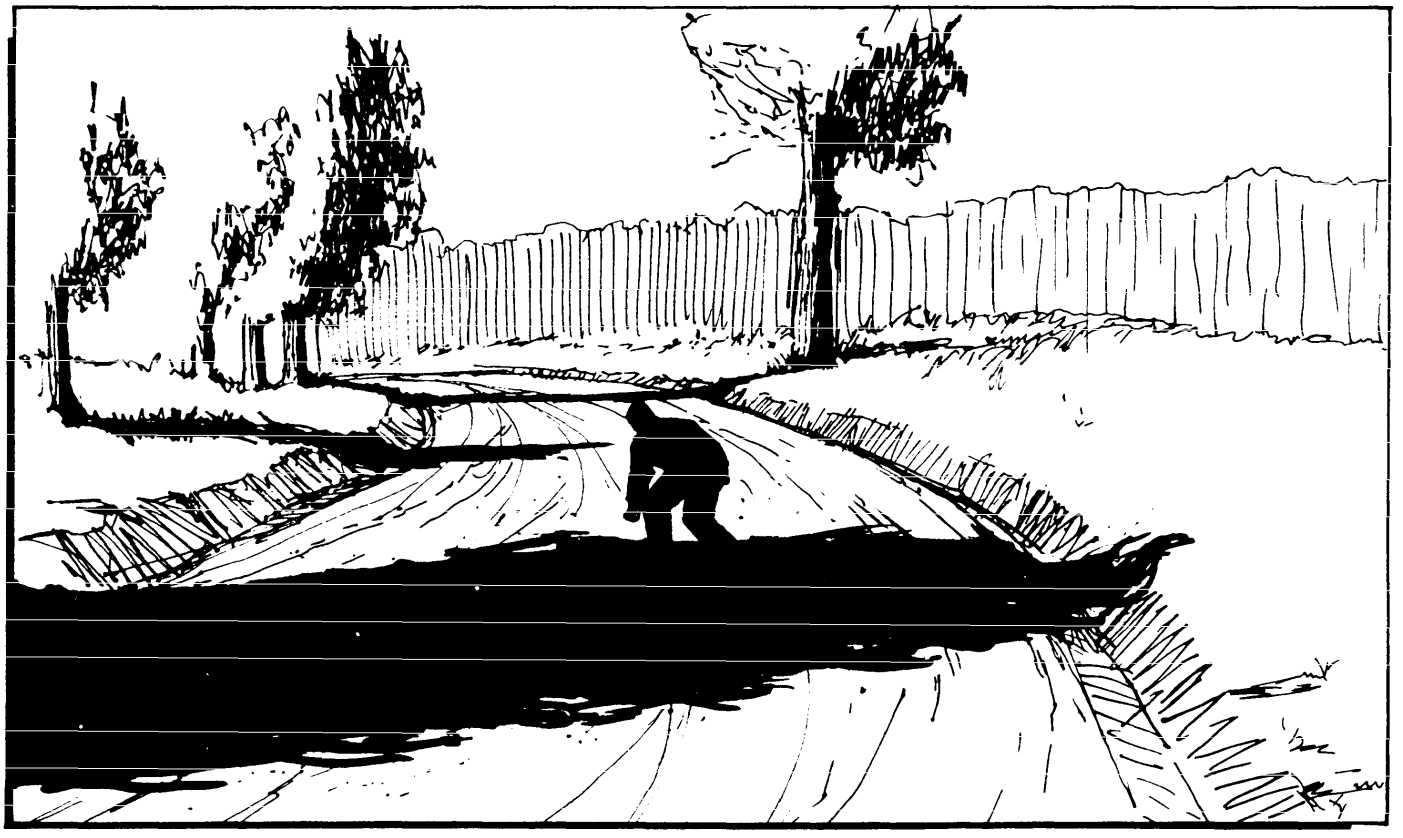

Figure 28-64. Crossing Roads.

Figure 28-65. Crossing at Culverts.

the tracks with face down next to the first track, evaders should carefully move across the first track in a semi-pushup motion, repeating for the second track and subsequent sets of tracks (figure 28-66). If there is a third rail, they should avoid touching it as it could be electrified. Sound detectors can also be attached to the tracks and can reveal any crossing if a track is touched. If determined from observation that the tracks are not

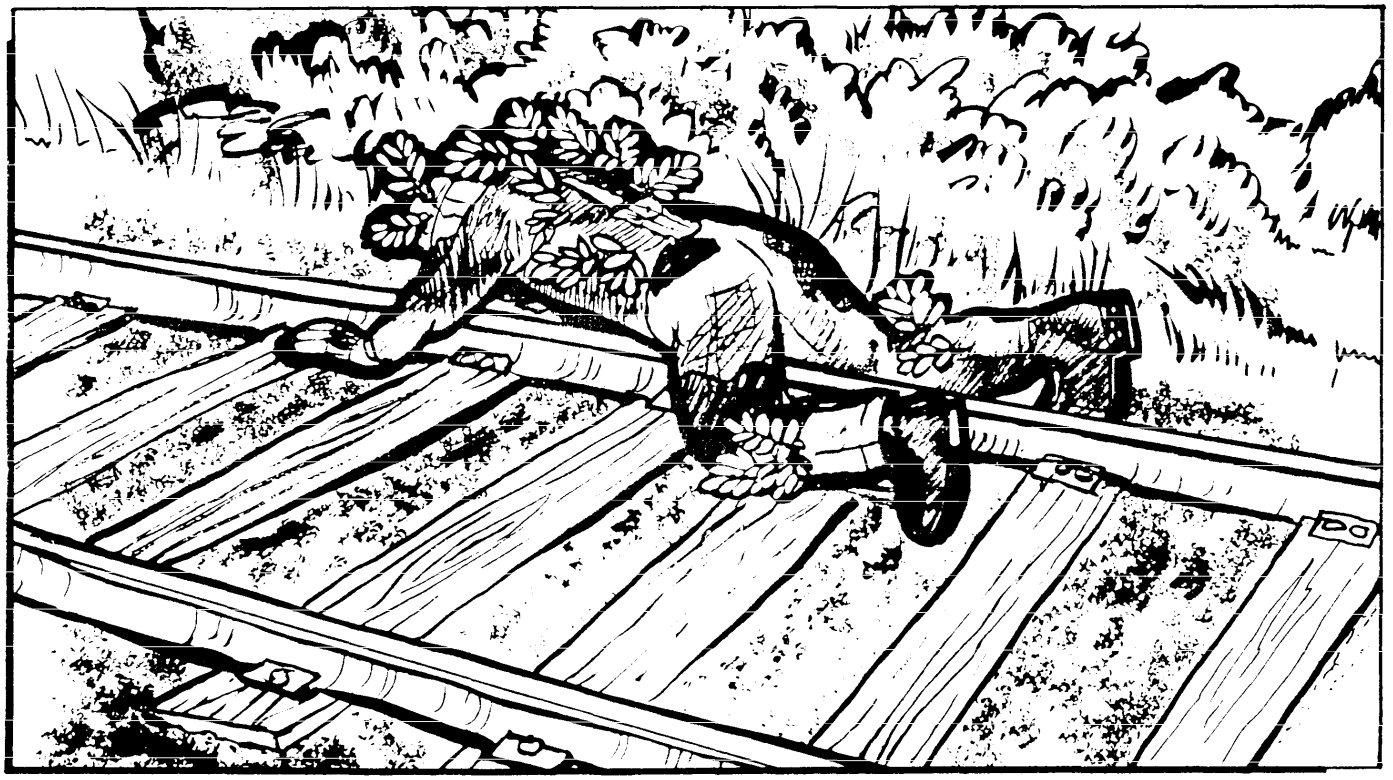

Figure 28-66. Crawling Over Railroad Tracks.

Figure 28-67. Climbing Down Cliff.

patrolled, evaders should cross in a normal walking or hands-and-knees manner, attempting to attract as little attention as possible. Evaders should try to keep their hands and feet on the railroad ties to prevent leaving foot or hand prints in the adjacent soil or gravel.

(8) Deep ditches (such as tank traps or natural drainages) may be obstacles with which evaders must deal. Ditches should be entered feet first to avoid injury to the head or upper torso should there be large rocks, barbed wire, or other hazards at the bottom (figure 28-67). Using a wand to detect tripwires and booby traps in the ditch and on the sides is highly recommended. Maintaining a low silhouette upon exiting the ditch is imperative.

(9) Open terrain complicated by guard towers or walking patrols is a definite hazard to evaders. These areas should be avoided if possible. If it becomes necessary to traverse open terrain or come near guard towers, evaders should stay low to the ground and, when possible, travel at night or during inclement weather. Use terrain masking since night vision devices may be used near border areas (figure 28-68).

(10) The problem of crossing areas which have been contaminated as a result of enemy or friendly NBC operations may arise. Chemical contamination should be suspected when the following are observed (figure 28-69):

(a) Shell craters with liquid in the bottom.
(b) Liquid droplets on vegetation.
(c) Water with "film" on the surface.
(d) Unexplained dead animals.
(e) Unseasonal discoloration of vegetation.

NOTE: Without protective clothing, mask, and accessories, evaders should bypass contaminated areas if possible.

(11) CAUTION: Stay away from borders unless absolutely necessary. The crossing of one or more borders presents a major problem. These areas may be located in any type of terrain.

(a) In areas where there is no well-defined terrain feature to indicate the border, artificial obstacles such as electrified or barbed wire fences, augmented with tripwires, anti-personnel mines, or flares may be encountered. Open areas may be patrolled by humans or dogs, or both, particularly during the hours of darkness. The enemy may also use floodlights and plowed strips as aids to detecting evaders (figure 28-70).

(b) The plan to cross a border must be deliberate and must be designed to take advantage of unusually bad weather (as a major distraction to the enemy force) or areas where security forces are overextended. These areas are usually found where there are natural obstacles.

(c) Crossings should be made at night, when possible, in battle-damaged areas. If it is necessary to cross during daylight hours, evaders should select a crossing point which offers the best protection and cover. They should then keep the area under close observation for several days to determine:

-1. The number of guards in the area.
-2. The manner of their posting.
-3. Aerial patrols and their frequency.
-4. The limits of the areas they patrol.
-5. Location of mines, flares, or tripwires.

(12) A difficult task in any situation is the attempt to cross the forward edge of the battle area. If unable to determine the general direction to friendly lines, evaders should remain in position and observe the movement of enemy military forces or supplies, the noise and flashes of the battle area, or the orientation of enemy artillery. After arriving in the combat zone, evaders should select a concealed position from which as much of the battle area as possible may be observed. They can then select a route and critical terrain features on which they can guide when infiltrating back to friendly positions under the cover of darkness. Several alternate

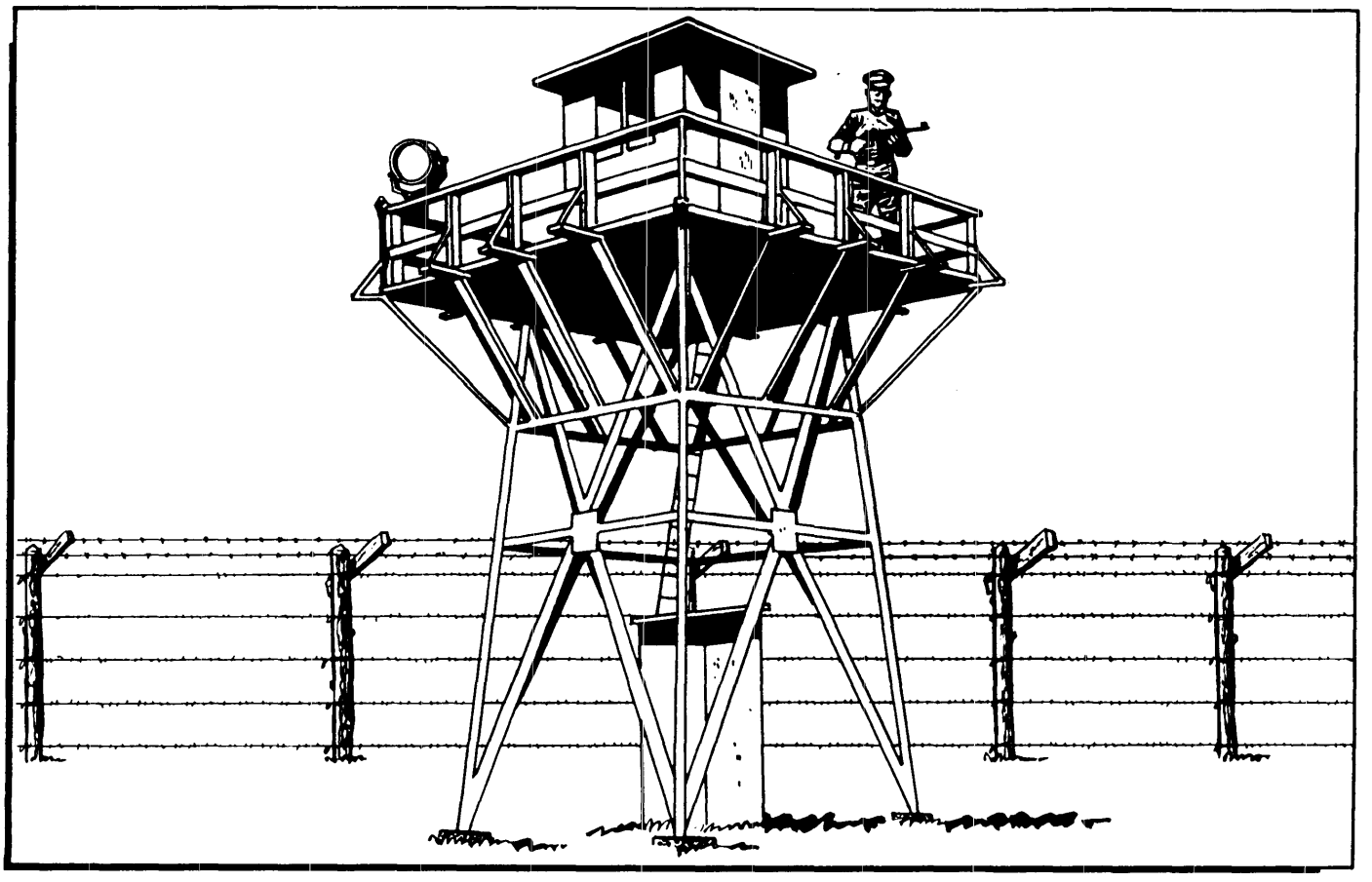

Figure 28-68. Open Terrain.

Figure 28-69. Contaminated Areas.

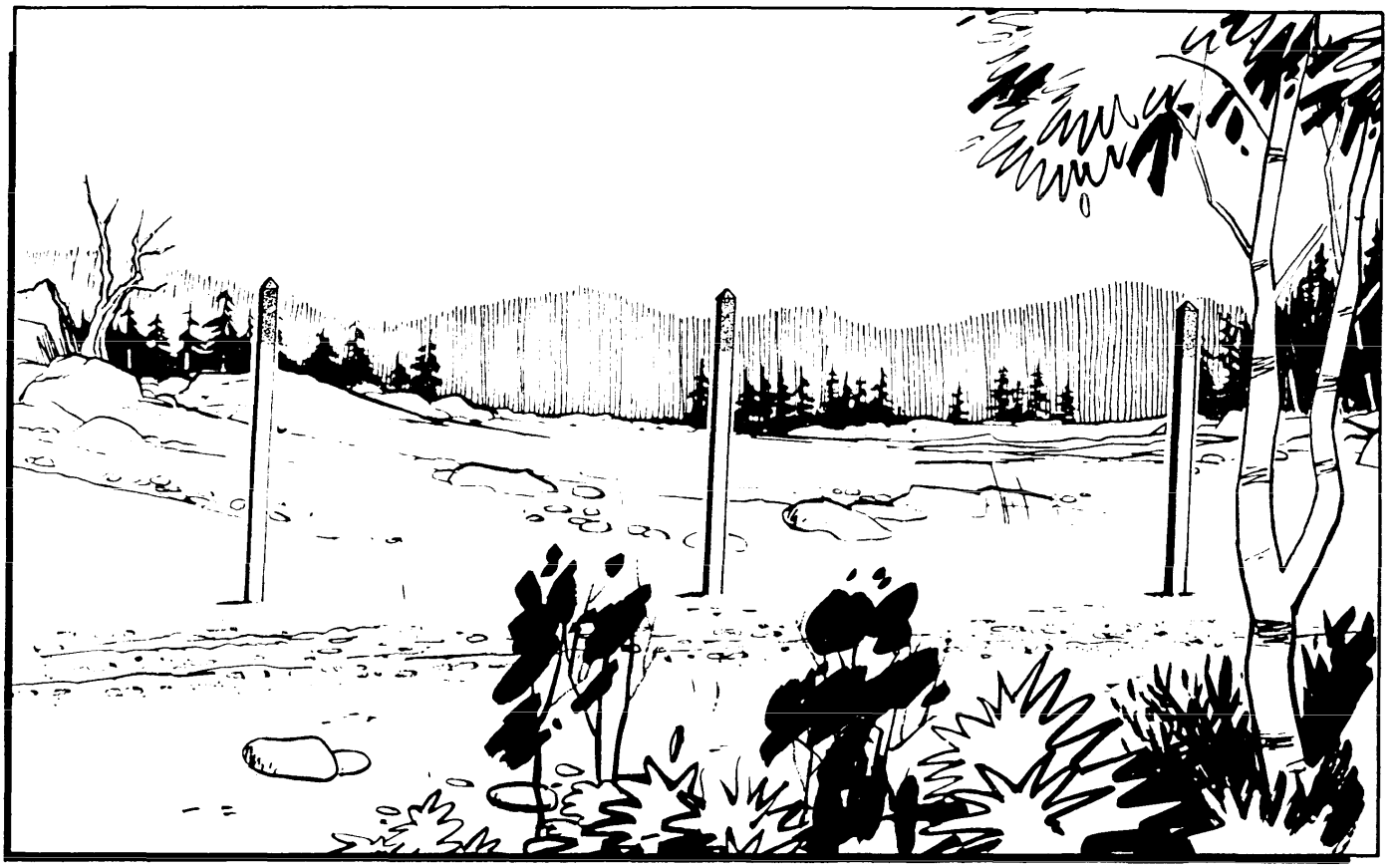

Figure 28-70. Border Crossings.

routes should be selected with care to avoid "easy" approaches to friendly lines which are more likely to be covered by friendly fire and enemy patrols. If in uniform, select exposure time during daylight hours and be close enough to be easily recognized by friendly troops.

(13) Evaders should also watch out for friendly patrols. If a patrol is spotted, evaders should remain in position and allow the patrol to approach them. When the patrol is close enough to recognize them, evaders should have a white cloth displayed before the patrol gets close enough to see the movement. A patrol may fire at any movement. Shouting or calling out to them jeopardizes both the patrol and the evader. Evaders should stand silently with hands over their head and legs apart so their silhouettes are not threatening. If evaders elect not to make contact with a patrol, they should, if possible, observe their route and approach friendly lines at approximately the same location. This may enable them to avoid mine fields and booby traps. (NOTE: The practice of following any patrol is extremely dangerous. The last persons in line are charged with security, and anyone following them would be considered hostile and eliminated.)

(14) If unable to contact a friendly patrol, the only alternative for evaders may be to make a direct approach of front-line positions. This will require them to crawl through the enemy's forward position near forward friendly elements. This action should be done during the hours of darkness. Once near friendly lines, however, evaders should not attempt to make contact until there is sufficient light for them to be recognized.

(15) In dogs, the ability to perceive odors is much greater than that of humans.

(a) In this portion, the term dog is meant to describe only the animals specifically trained in the areas of patrolling, guarding, and searching. Since dogs are basically odor-seeking animals, anything developed to work against their odor-seeking capabilities is worthy of experimentation for survivors (evaders).

(b) A problem which must be considered is evaders will not be working solely against a dog, but against a dog handler as well. There is no simple, sure method of evading a dog. Some possible means which could be tried by evaders are:

-1. Dogs detect the fatty acids in dead-skin cells that humans shed by the thousands every day. Scenting dogs may be distracted by scattering an irritant such as pepper behind the evader or traveling across an asphalt road on a hot day.

-2. Dogs track better when the weather is humid and the air is still—there is less evaporation and dissipation of odor.

-3. If evaders know they are being followed by dogs, either from the landing site or as a result from an escape, they should try to use water to conceal their tracks and eliminate their scent.

-4. If there is a choice of terrain and it is possible to travel on a hard surface, evaders should do so rather than travel on soft ground.

-5. Evaders should always attempt to move downwind of a dog. This should be attempted when they are traveling in open country or penetrating obstacles such as dog guard posts or border areas. If penetration of obstacles or escape is planned (after careful location and study of guard and dog areas of responsibility and their methods), evaders should select a time for movement when noise will distract the dog to a point away from the planned maneuver.

-6. If evaders are physically capable, they should attempt to maintain the maximum distance possible from dogs. Moving fast through rugged terrain will slow and probably defeat the handlers of dogs. Here evaders must choose between making mistakes in travel techniques while evading or being caught by dogs if they don't move fast enough.

28-18. Evasion Aids:

a. Survival Kits. Personnel may sometimes find it practical to devise and carry compact personal survival kits to complement issued survival equipment. If E&E kits are provided, potential evaders should be familiar with them, their uses, and their limitations.

b. Maps. Any maps of the area in an evader's possession should not be marked. A marked map in enemy hands can lead to the compromise of people and locations where assistance was given. Evaders should be wary of even accidentally marking a map; for example, soiled fingers will mark a map just as plainly as a pencil.

c. Pointee-Talkee. The "pointee-talkee" is a language aid which contains selected phrases in English on one side of the page and foreign language translations on the other side. To use it, evaders determine the question and statement to be used in the English text and then point to its foreign language counterpart. In reply, the natives will point to the applicable phrase in their own language; evaders then read the English translation.

(1) The major limitation of the "pointee-talkee" is in trying to communicate with illiterates. In many countries the illiteracy rate can be astoundingly high, and personnel have to resort to pantomime and sign language which have been relatively effective in the past.

(2) "Pointee-talkee" phrases are presented under the following eight subheadings:

(a) Finding an interpreter.
(b) Courtesy phrases.
(c) Food and drink.
(d) Comfort and lodging.
(e) Communications.
(f) Injury.
(g) Hostile territory.
(h) Other military personnel.

d. Barter Kits. Barter kits may be available in some commands. If not, crewmembers may elect to develop their own. Items for consideration should be selected from area studies. Some items to consider might be rings, watches, knives, local currency, coins, and lighters. Items should have no markings of personal significance or military value. Military items packed in kits may be considered if not essential to the evader. Flashing large amounts of cash or valuables can have negative results in a depressed, war-torn area. Show only small amounts and drive a hard bargain.

e. Other Evasion Aids. Information on other evasion aids and tools is available from unit intelligence officers.

f. Assisted Evasion. There may be people in a hostile nation or in an enemy-occupied country who are dissatisfied with existing conditions.

(1) History has revealed that in every major conflict there are groups of people in every country who will aid a representative of their government's enemies. The motivating force behind these groups may vary from purely monetary considerations to idealistic concepts of government reform. In many cases, their real objective will be the political advancement of their particular group. During WW II, many underground or resistance groups and movements were established in occupied countries. One of the major purposes or functions of these groups was the aiding of downed allied aircrew personnel. In most cases, the driving force behind these movements was patriotism and desire for political recognition for their cause.

(2) These circumstances favor active resistance movements. One of the functions of such movements may be the operation of escape and evasion (E&E) systems for the purpose of returning evaders to friendly territory.

(3) US Special Forces may also organize and operate E&E mechanisms (figure 28-71).

(a) E&E Organizations. Assistance may range from that rendered by a sympathetic individual to elaborate E&E nets organized by local inhabitants. E&E organizations may be limited in nature, such as providing assistance to reach a national frontier, or they may be linked to larger organizations capable of returning to friendly control.

(b) Acts of Mercy. These are usually isolated events during which evaders may be provided food, shelter, or medical attention for a brief period of time. Local people may find an exhausted or incapacitated

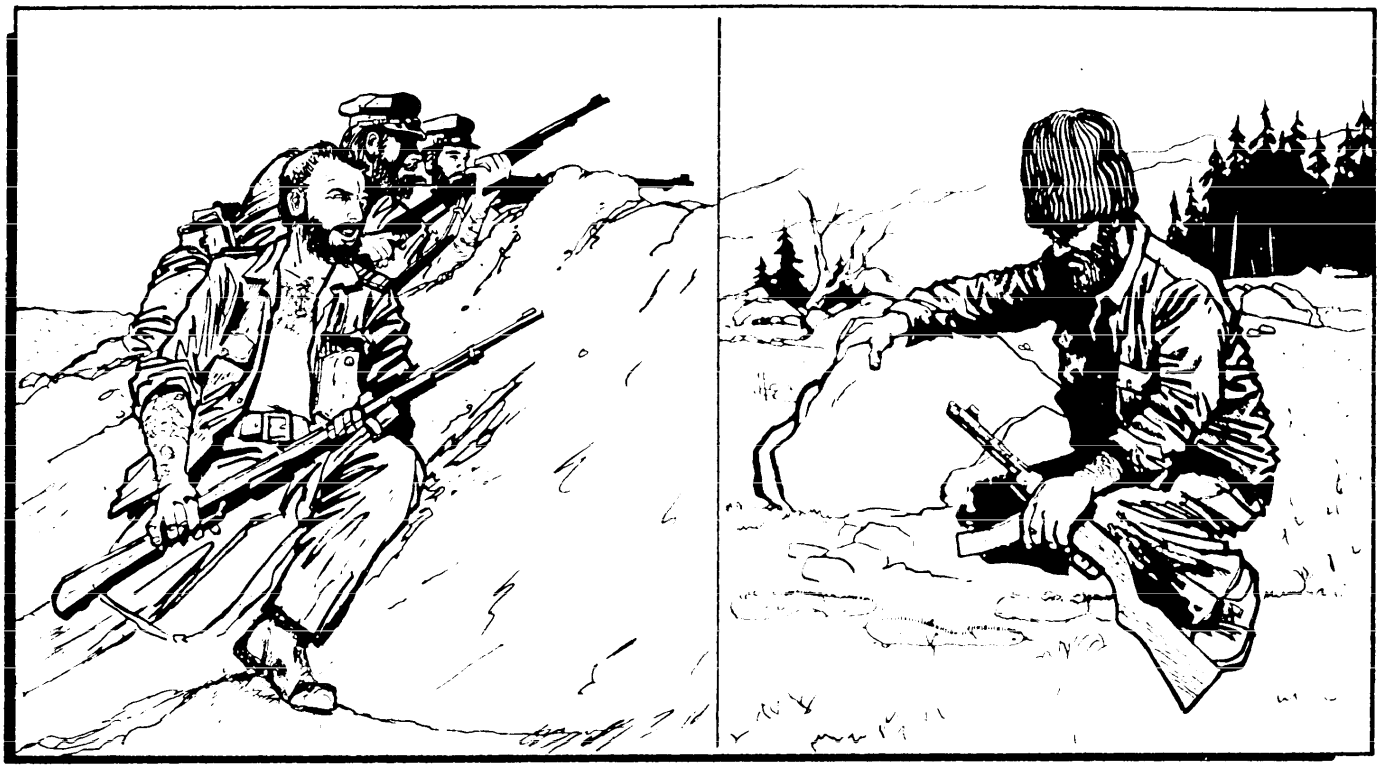

Figure 28-71. E&E Organizations.

evader and provide that evader with limited sustenance. This type of assistance is frequently offered with reluctance or under fear of reprisal because an act of providing comfort to the enemy would mean punishment. Unless an evader is in immediate need of medical attention, acts of mercy may consist of only an offer of food followed by an urgent plea that the evader leave the area immediately. If an evader is physically able to depart with a reasonable chance of evading capture, he or she should do so. An evader should not insist on receiving additional aid other than what is offered by the person who renders assistance only through human impulses (figure 28-72).

(4) Evaders must understand when dealing with any indigenous personnel while in enemy territory, their own actions will govern the treatment they will receive at the hands of these people. How evaders conduct themselves may also have much to do with getting back to their own forces should they fall into the hands of irregulars friendly to their (the evaders) own cause. The following list of suggestions may be a useful guide in dealing with these people or groups.

(a) Evaders should understand that failure to cooperate or obey may result in death.

(b) Evaders should try to avoid making any promises they cannot personally keep.

(c) Evaders should remember that the four conditions called for by the rules of land warfare must be met before members of an irregular group can be recognized as qualifying for PW status in the event of capture. These same rules will also apply to evaders who are involved with these groups.

(d) Prisoners of war, according to the current Geneva Convention, are persons belonging to one of the

Figure 28-72. Receiving Aid.

following categories, who have been captured by the enemy. Members of other militias and volunteer corps, including those of organized resistance movements, belonging to a conflicting Party and operating in any territory, even if this territory is occupied, provided that such groups fulfill the following four conditions of:

-1. Being commanded by a person responsible for subordinates.

-2. Having a fixed distinctive sign recognizable at a distance.

-3. Carrying arms openly.

-4. Conducting their operations in accordance with the laws and customs of war.

(5) If evaders join such a unit, the closest thing to a guarantee of treatment as a military person will be their uniforms if they are captured.

(6) If evaders have the opportunity to influence the group they are with, they should try to encourage them to abide by the four conditions mentioned.

(7) Evaders must avoid becoming associated in any way with atrocities these groups may commit against civilians, prisoners, or enemy soldiers.

(8) Evaders should not become involved in their political or religious discussions, take sides in their arguments, or become involved with the opposite sex.

(9) Evaders should show consideration for being allowed to share food and supplies. It may also be helpful if evaders understand and show interest in the assister's customs and habits.

(10) The overall best and safest course for evaders to follow is to exercise self-discipline, display military courtesy, and be polite, sincere, and honest. Such qualities are recognized by any group of people throughout the world. The impression left can influence the aid provided to future evaders.

g. E&E Lines. An E&E line is a system of one or more secret nets organized to contact, secure, and when possible, evacuate friendly personnel. Well-organized and supported lines normally can be expected to provide the following assistance:

(1) Temporary shelter, food, and equipment for the next phase of the journey.

(2) Clothing and credentials acceptable in the area to be traveled.

(3) Information concerning enemy security measures along the evasion route.

(4) Local currency and transportation.

(5) Medical treatment.

(6) Available native guides.

h. Conduct of E&E Lines. The success of an E&E organization depends almost entirely upon its security. The organization of a line includes much planning and work carried out under dangerous conditions. The security of the system often depends upon the evader's cooperation and working knowledge of how it functions, how it may be contacted, and what rules of personal conduct are expected of the evader. The following paragraphs summarize the major aspects of the operation of an E&E line.

(1) Contacting the Line. Premission briefings may inform evaders where to go and what actions to take to make contact with an E&E mechanism. After being picked up by an evasion and escape mechanism, evaders will be moved under the control of this mechanism to territory under friendly control or to a removal area, and arrangements may be made for air or sea rescue. The organizer of a line in friendly but enemy-occupied territory normally will have arranged a network of spotters who will be especially active when evaders are in the immediate area, but so will the enemy police and counterintelligence organizations. For this reason, certain precautions must be observed when making contact.

(2) Approach. Help may be refused by a person simply because he or she thinks someone else has seen the evaders approach to seek assistance. If captured with a local helper, an evader will become a prisoner, but the helper and perhaps an entire family may be more severely punished.

(3) Making Contact. Contacts with the natives are discouraged unless observation shows they are dissatisfied with the local governing authority, or previous intelligence has indicated the populace is friendly. Evaders should proceed to, and remain in, the nearest SAFE area where arrangements for contact can be developed. If the E&E system is operating successfully, the spotter will know evaders are present and will search the immediate area, making frequent visits to designated contact points. Identification signs and countersigns, if used, may be included in the preoperational briefing. It is seldom advisable to seek first contact in a village or town. Strangers are conspicuous by day, and there may be curfews or other security measures during the hours of darkness. The time of contact should be at the end of the daylight period or shortly thereafter. Darkness will add to the chance of escape, if the contact proves to be unfriendly, and may be advantageous to the contact in providing further assistance.

(4) Procedure After Contact. If contact is made, evaders may be told to remain in the vicinity where spotted, or, more likely, they will be taken to a house or other structure used by the E&E net as a holding area. It must be decided at this time whether or not to trust the contact. If there is any doubt, plans should be made to leave at once. It is also possible that the house may not belong to the E&E organization but rather to someone who will look after evaders until arrangements can be made for the line to identify and accept them in E&E net.

(5) Establishing Identity. Verification of identity will be required before anyone is accepted as a bona fide evader. The constant danger facing the operators of an

escape line is the penetration of the E&E system by enemy agents pretending to be evaders or escapees. Evaders should be prepared to furnish proof of identity or nationality. Since it may lead to later difficulties of identification, they should never give a false name—just their name, grade, service number, and date of birth. It is best for them to avoid talking as much as possible.

(6) Awaiting Movement on the Line. Delays can be expected while proceeding along the escape line. If the period of waiting is prolonged, frustration and impatience may become unbearable, leading to a desire to leave the holding area. This must not be done, because if seen by other people, the lives of the assisting personnel and the existence of the entire line itself may be endangered.

(a) Evaders should follow the orders of those assisting them. If kept indoors for any length of time they can keep fit by moderate physical exercise.

(b) The host should have a plan for rapid evacuation of the area if enemy personnel should raid the holding area; if not, evaders should have a personal plan to include measures for moving all traces of having occupied the area. If the net is being overrun and capture is imminent, evaders must be prepared to fend for themselves. The evader is the only one who knows more than one part of the net. The assisters may attempt to eliminate the security risk to the net.

(7) Traveling the Line. It would be a grave breach of faith and security for evaders to discuss, at any point on the line, the earlier stages of the journey. Evaders might be tested to see if they are trustworthy—they should discuss nothing of the net. For security reasons and to protect the compartmentalization of the line, no information should be revealed. It is also useless to ask where a line leads or how it will eventually reach friendly territory. Evaders should not try to learn or memorize names and addresses and, above all, they shouldn't put these facts or any other information in writing. Evaders should give the impression of having received no assistance from local inhabitants.

(8) Fellow Evaders. Caution is required in the case of fellow evaders on an escape line unless they are personally known. Even when it has been satisfactorily determined that another person is a genuine evader, no information should be given.

(9) Travel with Guides. If under escort, this fact should not be apparent to outsiders. In a public vehicle, for example, evaders should never talk to their guide or appear to be associated with the person in any way unless told to do so. This will lessen the possibility of both the evader and the guide being apprehended if one should arouse suspicion. It should always be possible for the guide to disown an evader if the guide gets into difficulty. When evaders are escorted, they should follow the guide at a safe distance, rather then walk right next to the person, unless instructions indicate the latter action is required (figure 28-73).

(10) Speaking to Strangers. Evaders should never speak to a stranger if it can be avoided. As a last resort, they should pretend to be deaf and dumb or even half-witted. This technique has often been successful. To discourage conversation in a public conveyance, they can also pretend to read or sleep.

(11) Personal Articles and Habits. Evaders should not produce articles in public which might show their national origin. This pertains to items such as pipes, cigarettes, tobacco, matches, fountain pens, pencils, and wristwatches. Evaders should also ensure their personal habits do not give them away; for example, they should not hum or whistle popular tunes or utter involuntary oaths. Again, in restaurants, imitating local customs in the use of knives and forks and other table manners is advisable. Study of the area before the mission may help evaders avoid making mistakes.

(12) Payment to Helpers. On an escape line, evaders should not offer to pay for board, lodging, or other services rendered. These matters will be settled afterwards by those who are directing and financing the line. If in possession of escape kits or survival packs, evaders should keep them as reserves for emergencies. If they

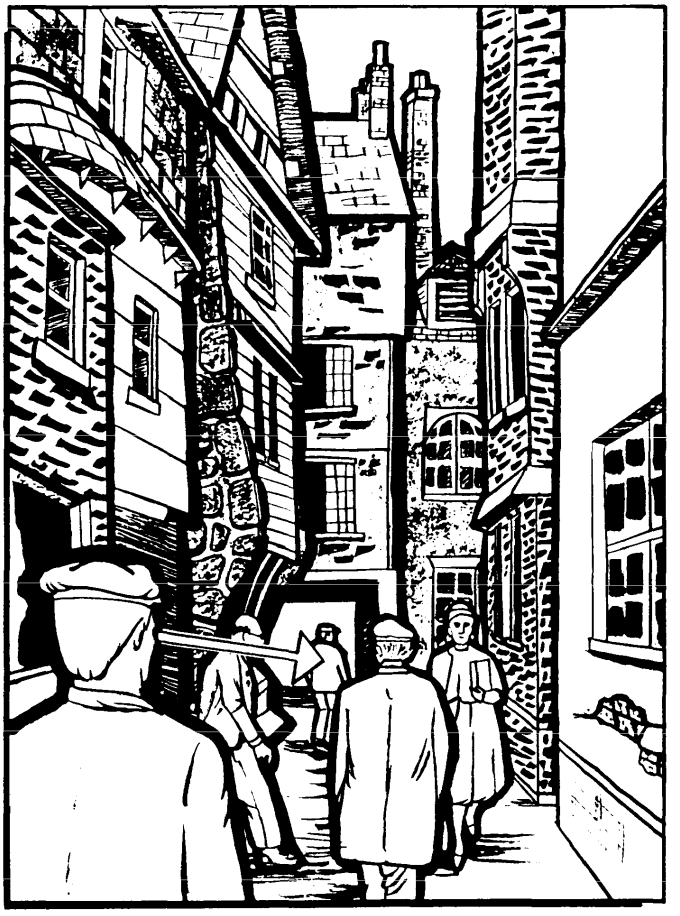

Figure 28-73. Travel with Guide.

have no food reserve, they should try to build up a small stock in case they are forced to abandon the line.

(13) Evaders Conduct:

(a) Be polite by local standards.

(b) Be patient and diplomatic.

(c) Avoid causing jealousy. Disregard the sex of the assisters.

(d) Avoid discussions of a religious or political nature.

(e) Eat and drink if asked, but don't over indulge or become intoxicated.

(f) Don't take sides in arguments between assisters.

(g) Don't become inquisitive or question any instruction.

(h) Help with menial tasks as directed.

(i) Write or say nothing about the other people or places in the net.

(j) Don't be a burden; care for self as much as possible.

(k) Follow all instructions quickly and accurately.

28-19. Combat Recovery:

a. Air recovery is one of several means of transportation for downed crewmembers in their quest for their final goal—returning to their own lines and units. How recovery will be effected will depend on a number of factors, among them are the following:

(1) Terrain.

(2) Capability of the rescue vehicle.

(3) Condition of the survivor (evader).

(4) Enemy activity in the area.

(5) Weather conditions.

(6) High or priority mission.

b. Even though a maximum effort will be made to recover downed aircrew members, survivors can jeopardize the whole rescue operation and the lives of rescue personnel in a combat zone by not taking a responsible role in recovery operations. The responsibilities are many and varied but essential to a successful rescue mission. Evaders should recall that even though they may have little experience in participating in actual rescues, they must nonetheless be very proficient in their actions. Evaders should always remember other people are endangering their lives in an attempt to retrieve them.

c. There are two basic types of air-recovery vehicles—rotary wing and fixed-wing aircraft. The rotary wing type can extract evaders from remote areas. With air-to-air refueling, the range of these aircraft has increased; they are limited only by the endurance of the crewmembers who operate them.

d. Survivors must be proficient in the operation of all the survival equipment at their disposal. For example, they must be able to switch off the beeper on the radio to receive verbal instructions from the rescue commander.

e. The initial contact with rescue or other combat aircraft in the area must be done as directed by authorities in that theater of operations; for example, in Southeast Asia, a contact method of transmitting 15-seconds beeper, 15-seconds voice (call sign), and 15-seconds monitoring was used. The method an evader should use to establish contact with rescue will be briefed before the mission.

f. One important aspect of the rescue process is evader authentication by rescue personnel. Survivors must be able to authenticate their identity through the use of questions and answers, responding as directed before the missions. Authentication in a combat area changes rapidly to reduce the chances of compromising the rescue efforts. Survivors (evaders) must keep up with these changes so their rescue can be made without undue danger to rescue personnel.

g. The purpose of filling out and using a personal authenticator card is positive verification of an evader's identity which is essential before risking search and rescue aircraft or the lives of assisters. The purpose of the photographs, descriptions, fingerprints, etc., on the card is to ensure all possible means are used for the proper identification of personnel. Intelligence personnel are responsible for ensuring that personnel fill out the card completely and that they are aware of the purpose and use of the information. When filled in, the personal authenticator card becomes classified Confidential, and is reviewed at least semiannually by both the crewmember and intelligence personnel. (NOTE: See AFR 64-3, Wartime Search and Rescue (SAR) Procedures.)

h. When selecting a site for possible evasion recovery, there is much for evaders to keep in mind. The area they choose could well decide the success or failure of the mission.

(1) The potential recovery site should be observed for 24 hours, if possible, for signs of:

(a) Enemy or civilian activity.

(b) Roads or trails.

(c) Farming signs.

(d) Orchards.

(e) Tree plantations.

(f) Domesticated animals or droppings.

(g) Buildings or encampment areas.

(2) The rescue site should be observable by aircraft but unobservable from surrounding terrain if possible. There should also be good hiding places around the area. The site should include several escape routes so evaders can avoid being trapped by the enemy if discovered. There should be a small open area for both signaling and recovery. It would be beneficial if the surrounding terrain provided a masking effect for rescue forces in order to avoid enemy observation and fire.

i. The size of evasion ground-to-air signals should be as large as possible but must be concealed from people passing by. Evaders should remember the six-to-one ra-

tio. The contrast these signals make with the surrounding vegetation should be seen from the air only. Any signal displays should be arranged so they can be removed at a moment's notice since enemy aircraft may also fly over the immediate area.

(1) All of the principles of regular (nontactical) signals should be followed by those building evasion signals. Crewmembers may be prebriefed as to the appearance of specially shaped signals (figure 28-74).

(2) Evasion signals, like all others, must be maintained to be effective. At times, evaders may be preinstructed to set out their signals according to a prearranged time schedule.

j. Whatever signal devices are available to evaders, they must be able to use them (mirror, flare, gyro-jet, etc.) with proficiency. These signals, like those used in nontactical situations, are to be used either to gain the attention of friendly aircraft or rescuers, or when directed by rescue. Extreme care must be taken to minimize or eliminate chances of enemy elements spotting the signals. For example, the strobe light and mirror can be directed and aimed instead of being used in an indiscriminate manner.

(1) If evaders are in or on the water, they should use lights, flares, dye, whistles, etc., with extreme care as they are readily distinguishable over water at great distances.

(2) In addition to knowing how to use radios correctly to effect their rescue, evaders should also be familiar with the special points of evasion radio procedures; for example, ensuring the radio transmits continuously during a night recovery operation using the electronic locator finder (ELF) system.

(3) It is also the evaders' responsibility to communicate all signs of enemy activity, such as:

(a) Locating anti-aircraft emplacements.

(b) Identifying when they are firing.

(c) Assisting strikes by spotting hits (high, low, or on target).

(d) Determining effectiveness of hits.

(e) Notifying personnel of changes in small arms positions, etc.

(4) Downed evaders can normally expect to be hoisted to a helicopter by one of five methods: basket, Stokes litter, bell, horse collar, or forest penetrator. Other pickup devices which may be used are the McGuire Rig, Swiss Seat, Motley Rig, Stabo Rig, rope ladder, or rope. Another method of recovery which may be employed to extract evaders is the Surface-to-Air-Recovery (STAR) System (figure 28-75). Evaders should remember whatever the pickup device, it should always be grounded before they grasp it.

(5) There is also fixed-wing capability of rescuing downed crewmembers. Evaders will be prebriefed as to which type rescue vehicle and systems to expect in their areas of operation. No matter which type is used, evaders must be capable of mounting and riding the rescue

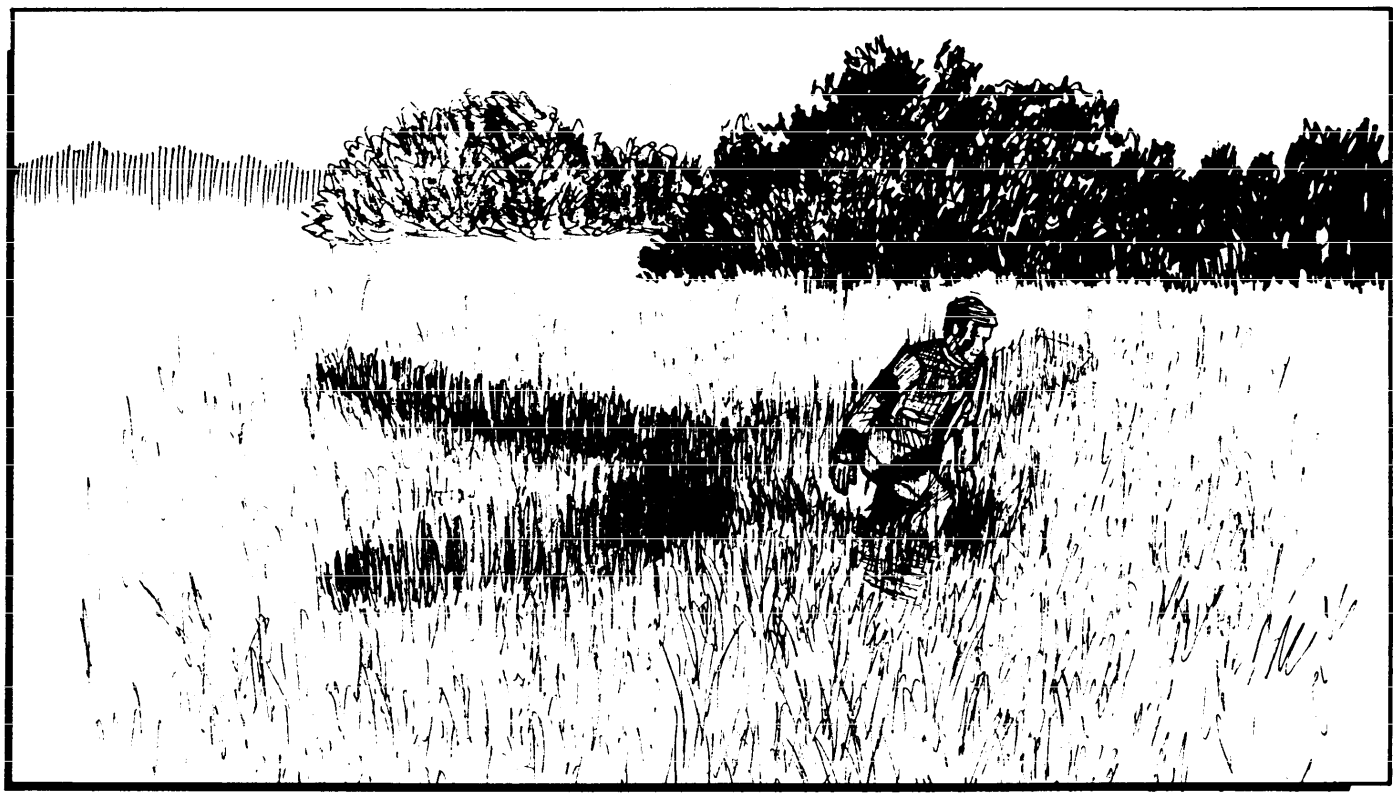

Figure 28-74. Evasion Signals.

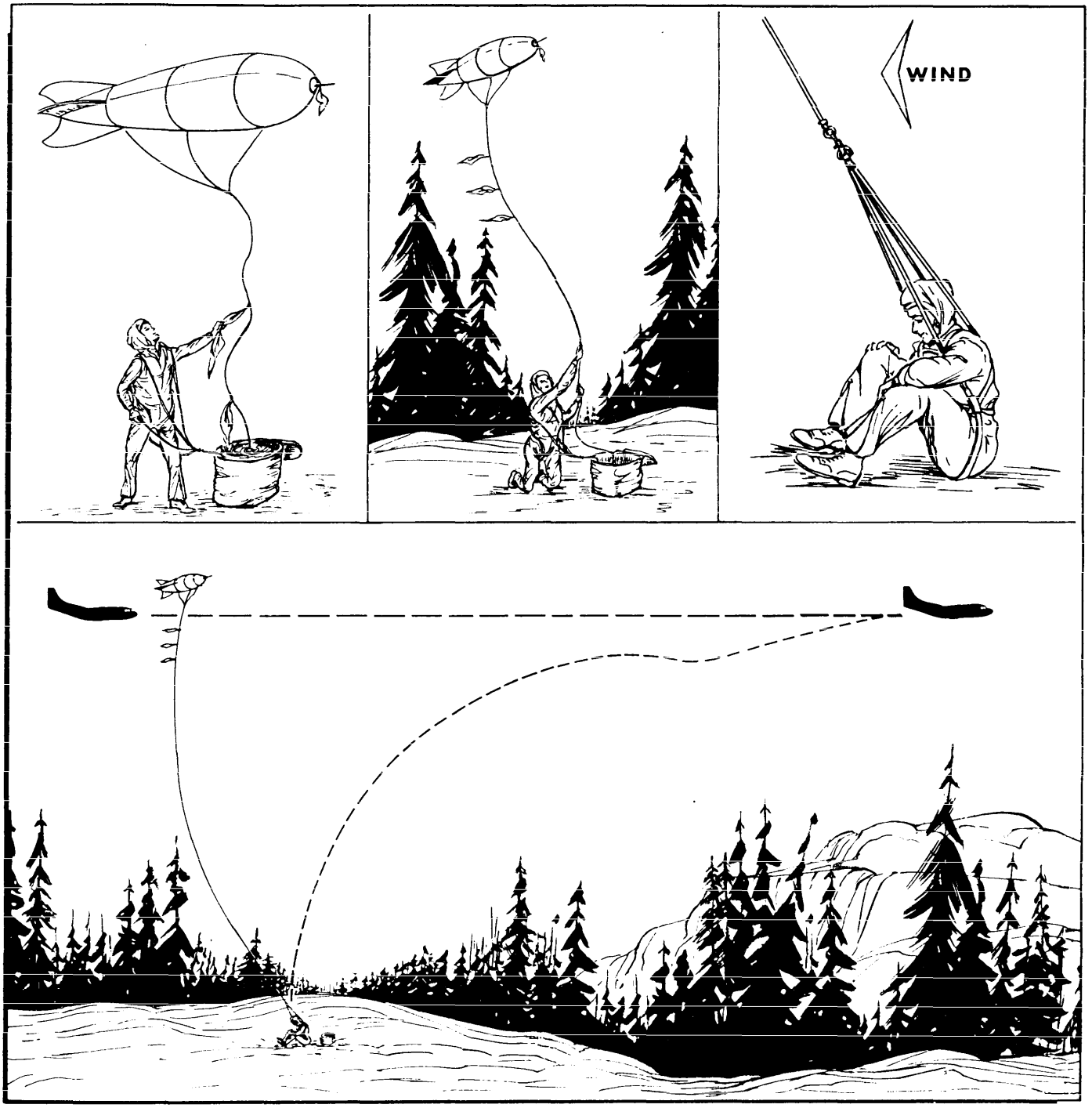

Figure 28-75. Surface-to-Air Rescue.

devices in a minimum amount of time, allowing the rescue craft to effect the rescue and depart quickly.

(6) As downed crewmembers, whether as a result of enemy action or of mechanical failure, it is important they all become familiar with the information that 1 day could prove instrumental in saving their lives. First, they must have prepared themselves to cope with the survival situation before an aircraft emergency. This can be done by including, as part of their preflight planning, a thorough inspection of survival equipment to determine its availability and serviceability. Second, they must realize there are many types of recovery vehicles available in the Air Force inventory, and a knowledge of all recovery techniques is a necessity. They should request detailed briefings from area or local rescue personnel who will explain the operational limita-

tions and recovery potential for each. Third, evaders must be capable of fulfilling their part in the recovery operation. This can be done by knowing when, where, and how to initiate communications and how to cooperate with the rescue aircraft crew.

(7) Other forms of assistance which may be available to evaders are Special Forces, Combat Control, RECON, SEALS, Riverine Operations, and Submarines. While aiding evaders is not the primary mission of these groups, as a secondary mission, they may travel in or near SAFE areas on their return journey to check for the presence of evaders.

Part Ten

INDUCED CONDITIONS — NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC)

Chapter 29

NUCLEAR CONDITIONS

29-1. Introduction. The possibility of "induced conditions" has served to intensify the difficulties of basic and combat survival because of the serious problems posed by nuclear, biological, and chemical warfare. Though the prescribed survival procedures recommended in other parts of this regulation are still applicable, a number of additional problems are created by the hazards of induced conditions (figure 29-1).

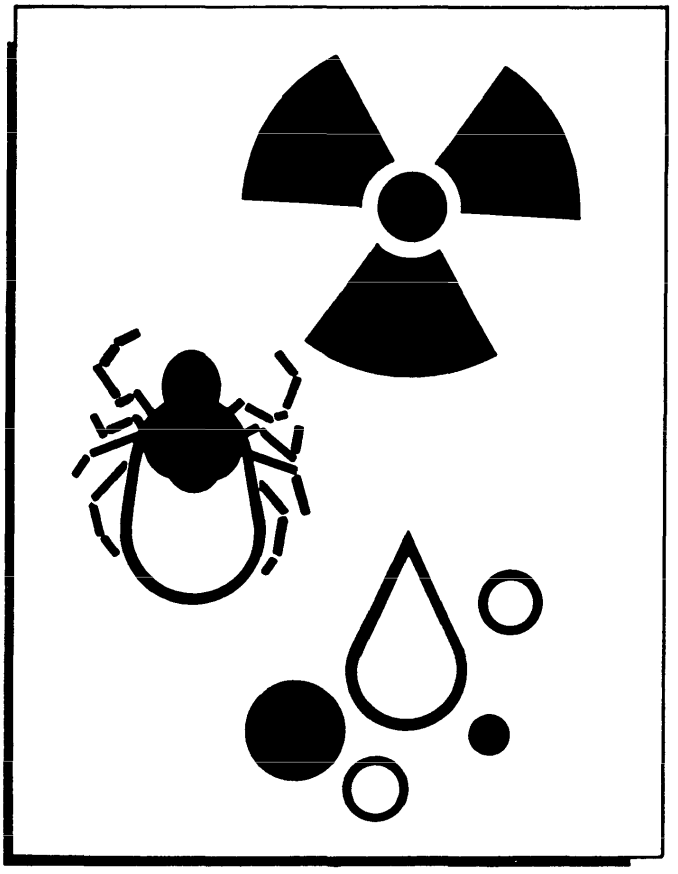

Figure 29-1. Induced Conditions.

29-2. Effects of Nuclear Weapons. Nuclear weapons cause casualties and material damage through the effects of blast, thermal radiation, and nuclear radiation. The degree of hazard from each of these effects depends on the type of weapon, height of the burst, distance from the detonation, hardness of the target, and explosive yield of the weapon.

a. Blast. The blast wave is the cause of most of the destruction accompanying a nuclear blast. After a nuclear detonation, a high-pressure wave develops and moves outward from the fireball. The front of the wave travels rapidly away from the fireball as a moving wall of highly compressed air. An example of the speed of the blast wave is: At 1 minute after the burst, when the fireball is no longer visible, the blast wave has traveled about 40 miles and is still moving slightly faster than the speed of sound. There are strong winds associated with the passage of the blast wave. These winds may have a peak velocity of several hundred miles an hour near ground zero. Ground zero is the point on the ground directly above or below the point of detonation. The overpressure, which is the pressure in excess of the normal atmospheric pressure, and the winds are major contributors to the casualty and damage-producing effects of the nuclear detonation. The overpressure can cause immediate death or injury to personnel and damage to material by its crushing effect. The high-speed winds propel objects, such as tree limbs or debris, at great speed and turn them into potentially lethal missiles. These winds can also physically throw personnel who are not protected, resulting in casualties. People both inside and outside of a structure may be injured as a result of blast damage to that structure; those inside by the collapse of the structure and by fire; and those outside by the flying objects carried by the winds (figure 29-2).

b. Thermal Radiation:

(1) Heat. Within less than a millionth of a second of the detonation of a nuclear weapon, the extremely hot weapon residues radiate great amounts of energy. This leads to the formation of a hot and highly luminous, spherical mass of air and gaseous residue which is the fireball. The heat radiated from the fireball contributes to the overall damage caused by a nuclear burst by igniting combustibles and thus starting fires in buildings and forests. These fires may spread rapidly among the debris produced by the blast. In addition, this intense heat can burn exposed personnel at great distances from ground zero where the effects of blast and initial nuclear radiation become insignificant. The degree of injury from thermal radiation becomes more marked with the increasing size of the weapon. The degree of injury from thermal radiation is also affected by weather and terrain. During periods of limited visibility, the heat effect will be reduced significantly. Additionally, since ther-

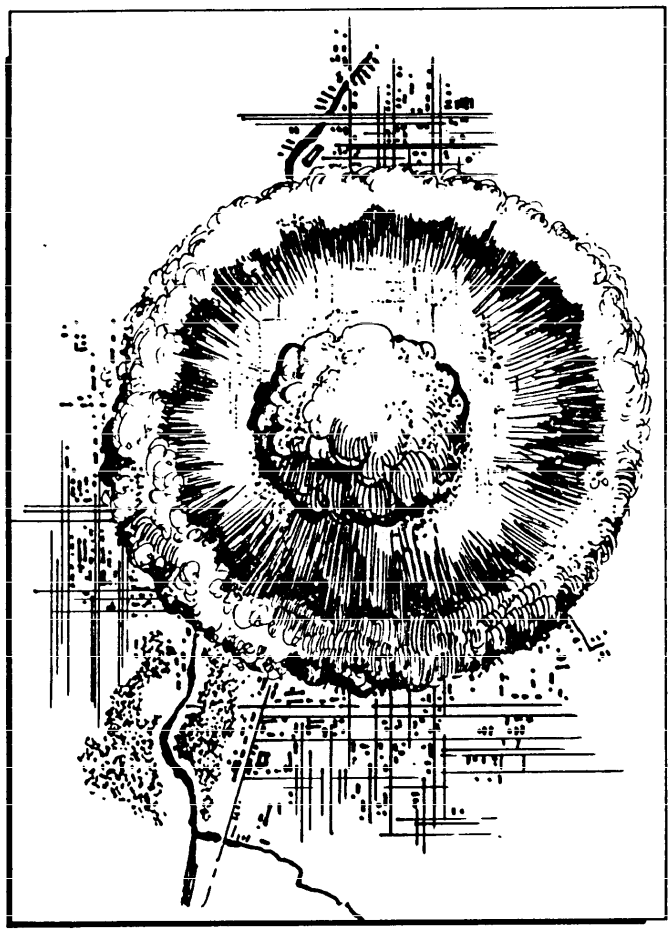

Figure 29-2. Blast.

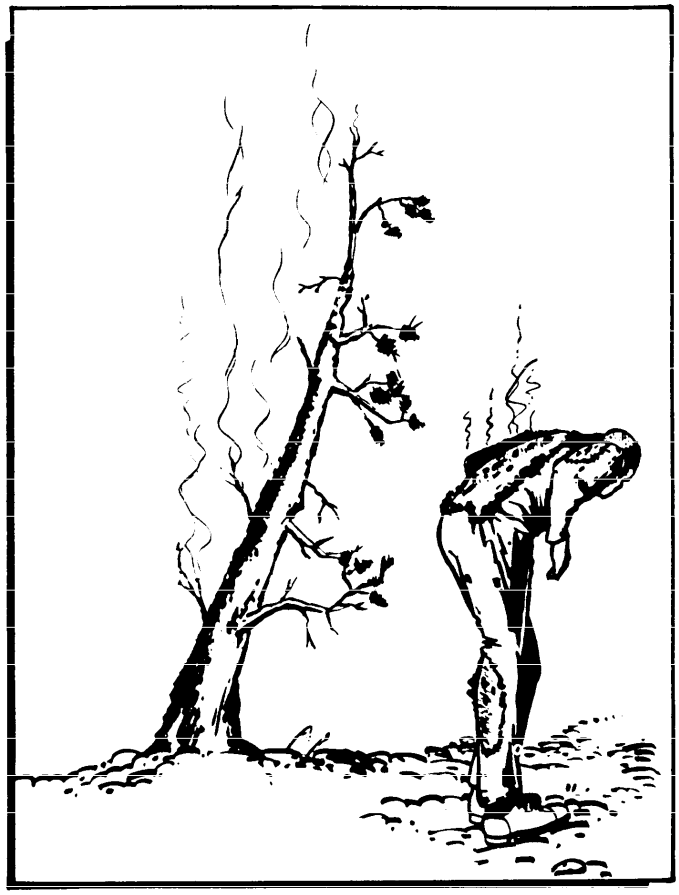

Figure 29-3. Thermal Radiation.

mal radiation is primarily a line-of-sight phenomena, terrain masking can help reduce its effects (figure 29-3).

(2) Light. The fireball formed at the instant of a nuclear detonation is a source of extremely bright light. To an observer, 135 miles away from the explosion, the fireball of a 1-megaton weapon would appear to be many times more brilliant than the Sun at noon. The surface temperatures of the fireball, upon which the brightness depends, do not vary greatly with the size of the weapon. Consequently, the brightness of the fireball is roughly the same, regardless of the weapon yield. This light can cause injuries to personnel in the form of temporary or permanent blindness. Temporary blindness from a burst during daylight should be of very short duration and is not an important consideration for anyone other than aircrew members. At night, this loss of vision will last for longer periods because the eyes have been adapted to the dark. However, recovery should be complete within 15 minutes. The light flash can cause permanent injury to the eyes due to burns within the eye, but this is only likely to occur in personnel who happen to be looking directly at the fireball at the instant of explosion (figure 29-4).

c. Nuclear Radiation:

(1) Initial nuclear radiation is the radiation emitted in the first minute after detonation. For practical pur-

Figure 29-4. Light.

poses, it consists primarily of neutrons and gamma rays. Both of these types of radiation, although different in character, can travel considerable distances through the air and can produce harmful effects in humans. Gamma rays are invisible rays similar to X rays. These penetrating rays interact with the human body and cause damage to tissues and the blood-forming cells. The effects of neutrons on the body resemble those of gamma rays. They are highly penetrating and are easily absorbed by human tissue. Neutron radiation can penetrate several inches of tissue. The neutron radiation produces extensive tissue damage within the body. The major problem in protecting against the effects of initial radiation is that a person may have received a lethal or incapacitating dose of radiation before taking any protective action (figure 29-5).

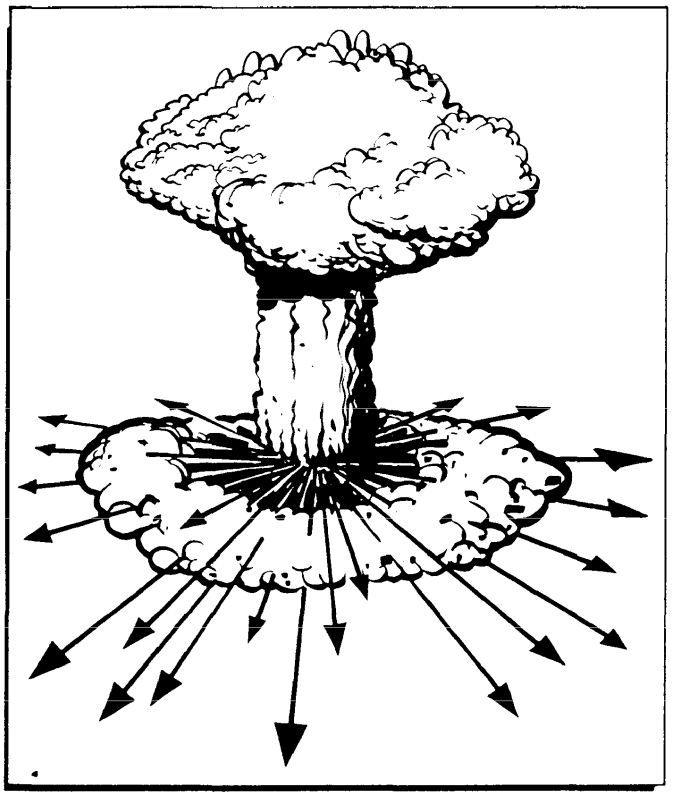

Figure 29-5. Nuclear Radiation.

(2) Residual nuclear radiation is that which lasts after the first minute and consists primarily of fallout and neutron-induced radiation.

(a) The primary hazard of residual radiation results from the creation of fallout. Fallout is produced when material from the Earth is drawn into the fireball, vaporized, combined with radioactive material, and condensed to particles which then fall back to the Earth. The larger particles fall back immediately in the vicinity of ground zero. The smaller particles are carried by the winds until they gradually settle on the Earth's surface. The contaminated areas created by fallout may be very small or may extend over many thousands of square miles. The dose rate may vary from an insignificant level to an extremely dangerous one for all personnel not taking protective measures.

(b) A secondary hazard which may arise is the neutron-induced radioactivity on the Earth's surface in the immediate vicinity of ground zero. The intensity and extent of the induced radiation field depend on the type of soil in the area around ground zero, the height of the burst, and the type and yield of the weapon. The only significant source of residual radiation from an airburst weapon is induced activity in the soil of a limited circular pattern directly beneath the point of burst (figure 29-6).

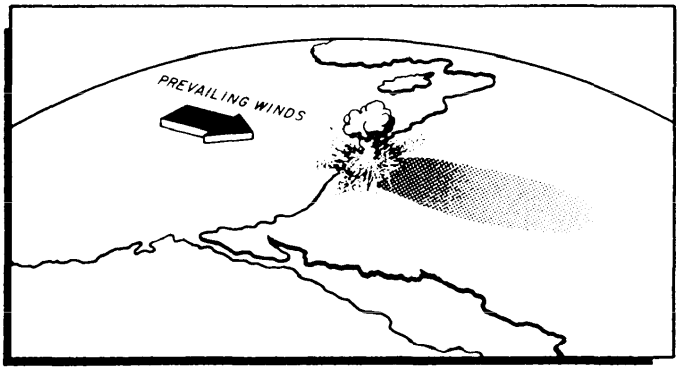

Figure 29-6. Residual Radiation.

29-3. Types of Nuclear Bursts. Nuclear bursts may be classified into three types according to the height of burst—airbursts, surface bursts, and subsurface bursts (figure 29-7).

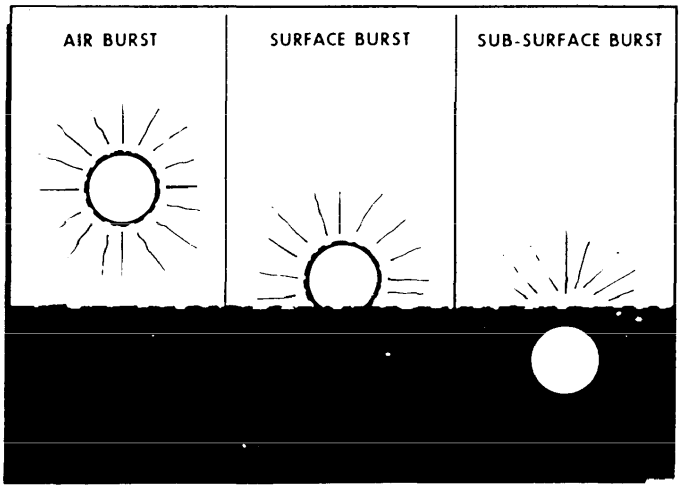

Figure 29-7. Types of Blasts.

a. Airburst. The detonation of a nuclear weapon at such a height that the fireball does not touch the surface of the Earth is called an airburst. Blast, thermal radiation, and initial radiation effects are increased in a low airburst. Fallout of radioactive material from an airburst is not of survival significance unless rain or snow falls through the radioactive cloud and brings the material to Earth. Neutrons from the detonation will cause induced radiation in the soil around ground zero. Except for very high airbursts, neutron-induced radiation in the area of ground zero will be of concern to survivors who are required to go into or across the area. Radiological monitoring will be required as units pass through such an area so that hazardous levels of radiation can be detected and avoided, if possible.

b. Surface Burst. The detonation of a nuclear weapon at such a height that the fireball touches the surface of the Earth or water is called a surface burst. Blast, thermal radiation, and initial nuclear radiation are not as widespread as from an airburst. Induced radiation is present but will be masked by residual radiation from fallout. The fallout produced by a surface burst is by far its most dangerous effect because the burst picks up a great deal more debris and radioactivates this debris; and, depending on the prevailing winds, the fallout covers thousands of square miles with high levels of radioactivity.

c. Subsurface Burst. The detonation of a nuclear weapon so that the center of the fireball is beneath the surface of the Earth or water is called a subsurface burst. If a fireball of this type breaks through the surface, fallout will be produced. Thermal radiation will not be a significant hazard since it will be almost completely absorbed by the soil. Blast effects will also be significantly reduced. Shock waves passing through the ground or water will extend for a limited distance. The range of the initial nuclear radiation will be considerably less than from either of the other two types of bursts because this will also be absorbed to a great extent by the soil. However, extremely hazardous residual radiation will occur in and around any crater. If the fireball does not break the surface, shock waves will pass through the ground and craters may result due to settling.

29-4. Injuries. The explosion of a nuclear bomb can cause three types of injures—blast, thermal radiation, and nuclear radiation. Many survivors receive a combination of two or all three of the above injuries. For example, an unprotected person could be killed by a piece of debris, could be burned to death, or could be killed by initial nuclear radiation if the person is within a few thousand yards from the center of the blast (figure 29-8).

Figure 29-8. Injuries.

a. Blast Injuries. Direct blast can cause damage to lungs, stomach, intestines, and eardrums, or can cause internal hemorrhaging. However, the direct blast is not considered a primary cause of injury because those close enough to suffer serious injury from the direct blast will probably die as a result of initial thermal radiation, or they will be crushed to death. The greatest number of blast injuries are received as an indirect result of the blast from falling buildings, flying objects, and shattered glass.

b. Thermal Radiation Injuries. Burns are classified in degrees according to the depth to which the tissues are injured. In first-degree burns, the skin is reddened as in sunburn. In second-degree burns, the skin is blistered as from contact with boiling water or hot metal. In third-degree burns, the skin is destroyed or charred and the injury extends through the outer skin to deeper tissues. The degree of burn received from thermal radiation depends upon weather conditions, distance from the explosion, and available protection. Many thermal casualties are compounded by nuclear radiation and indirect blast injury. This makes it difficult to attribute casualties to thermal radiation alone.

c. Nuclear Radiation Injuries. The injurious effects of nuclear radiation from a nuclear explosion represent a new threat which is completely absent in conventional explosions. This does not infer that this source of injury is the most important in a nuclear explosion. Rays from radioactive material are not as great a hazard as people fear. The amount of danger from fallout depends upon where and how the nuclear bomb explodes and how well the person is protected. The greatest danger from residual radiation (fallout) comes from exposure for a long period of time to radioactive particles which are nearby, or from dust settling on the body or clothing. Since fallout (like X rays) can destroy living tissue, particularly in the blood-forming system, the exposure of persons working in a radioactive or "hot" area must be controlled so as not to exceed a safe limit. Although a person can become seriously ill and even die from breathing radioactive dust, there is less danger from this than when the whole body is exposed to fallout. Remember, all types of radiation are dangerous (nuclear, thermal, X ray, or even that from an infrared lamp).

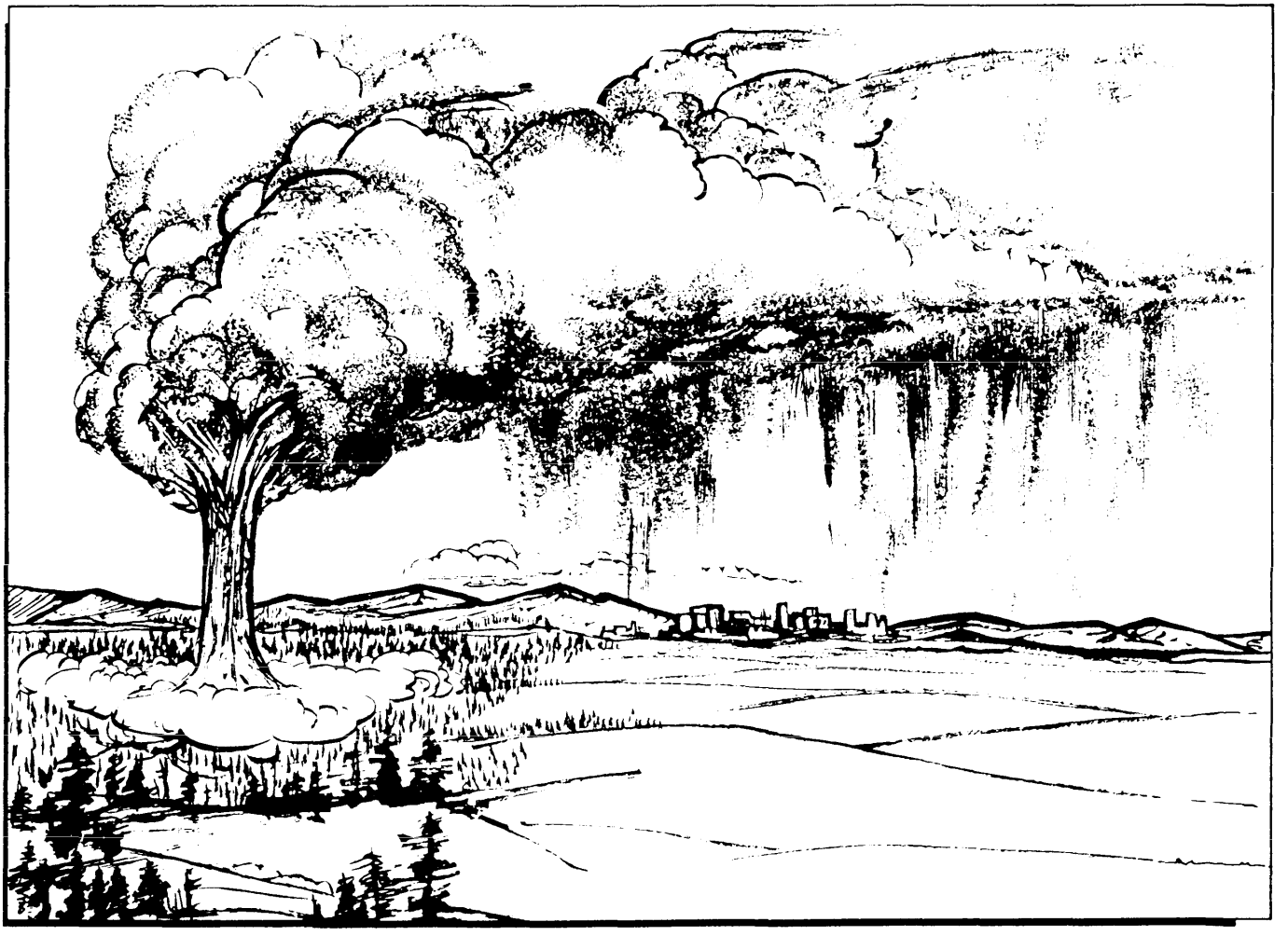

Figure 29-9. Fallout.

29-5. Types of Residual Radiation. The radioactive debris deposited on the surface as fallout contains three types of nuclear radiation—alpha particle emission, beta particle emission, and gamma radiation (figure 29-9).

a. Alpha Emitters. Alpha particles have low-pentrating abilities; therefore, survivors can easily shield themselves against these particles. Although alpha particles emitting (being given off) from radioactive elements will not penetrate the skin, alpha emitters present a serious hazard if ingested, inhaled, or allowed to enter the body by any other means. From a survival standpoint, alpha particles present the least danger of the three radiation hazards.

b. Beta Emitters. Basically, beta particles (radiation) are high-speed electrons which are only slightly penetrating; therefore, survivors can easily shield themselves against beta radiation by wearing materials of moderate thickness such as heavy shoes and clothing. Because serious skin burns may result from the direct contact of beta-emitting materials with the skin, survivors should take special care to brush themselves off, wash any previously unprotected areas of the body, or cover any exposed parts of the body. Since beta radiation is rapidly absorded by the air, distance will provide a good form of protection; in fact, 6 to 7 feet of atmosphere will stop most of the beta radiation resulting from fallout. In addition to presenting an external hazard, beta radiation will also cause serious internal effects. By using care in decontaminating foods and water and practicing good hygiene, survivors can greatly decrease the seriousness of this hazard.

c. Gamma Radiation. In contrast to either alpha or beta emitters, gamma radiation is highly penetrating. Gamma rays are similar to light rays and X rays, but are composed of shorter wavelengths and contain greater amounts of energy. Because of their penetrating abilities, they are the most hazardous of all types of external radiation.

(1) Fortunately, for the survivor faced with the important problem of obtaining immediate protection against gamma radiation, the amount of shielding is not as great as that required for the initial gamma radiation emitted during the fireball stage of a nuclear detonation. In addition to shielding, other methods of protection against penetrating gamma radiation, later addressed in more detail, include using the factors of time and distance. Because of the low absorption coefficient of gamma rays, their relative internal hazard is greatly reduced and, in this respect, they are far less dangerous than alpha and beta radiation. However, caution should be taken to ensure no radiation is absorbed—internally or externally.

(2) Since the fallout dust or debris contains particles emitting gamma rays, survivors must be especially careful to decontaminate themselves and their shelter area. Though radioactive fallout sometimes has the appearance of white ash or dust, it usually cannot be detected by the human senses. Survivors must assume any suspicious film of dust on water or plant life is radioactive, and they should apply decontamination procedures.

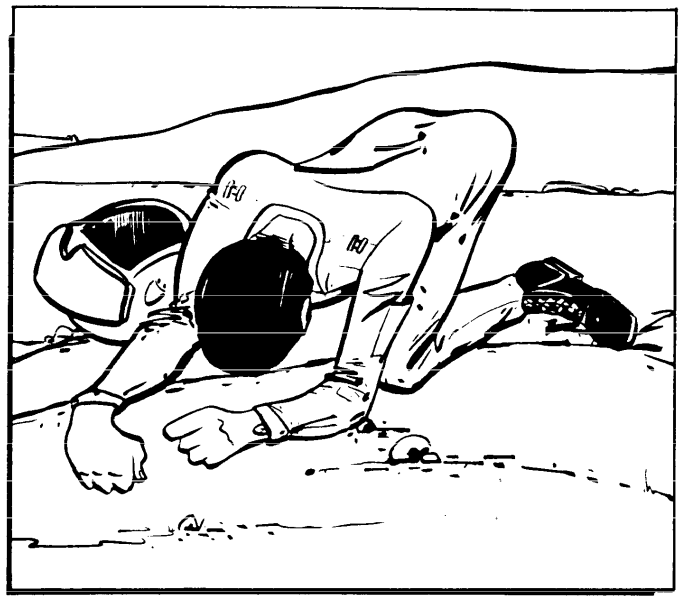

Figure 29-10. Effects.

29-6. Effects of Fallout on the Individual. The most harmful effects of fallout result from the changing of the blood cells. Because of this change in cells, some of the tissues which are essential to normal functioning of the human body are damaged or destroyed. The cells are unable to rebuild, so normal cell replacement in the organism is stopped. In addition, the formed products act as poisons to the remaining cells. The extent of damage to the body cells depends upon the dose received. Therefore, if the body receives a large dose of fallout radiation (gamma rays and possibly some beta particles), so many cells can be affected that survival is unlikely due to infection resulting from the loss of white blood cells (figure 29-10).

a. An overdose of radiation from fallout could be received if the survivor stays in the open and doesn't seek shelter. It is also possible to receive an overexposure from the fallout which settles on the clothing or body. Clothing does not stop gamma rays from penetrating and seriously injuring body tissues. Overexposure can also occur from remaining in a highly radioactive area too long. A survivor should not leave a shelter area unless absolutely necessary.

b. The first indication of an overdose of fallout radiation probably would not show up for several hours or possibly days. The survivor would then most likely become ill and begin to vomit. The time elapsing before the illness would depend on how large a dose was re-

EXPOSURE TYPE	GENERAL SYMPTOMS	ONSET OF SYMPTOMS	ABLE TO WORK	MEDICAL CARE	DEATHS	REMARKS
50-200r	Nausea, weakness, fatigue, possible vomiting, possible radiation burns	Within 24 hours	Yes	No	5%	
200-450r	Nausea, weakness, fatigue, vomiting, diarrhea, loss of hair, radiation burns, easy to bleed	3-6 hours	No	Yes	Less than 50%	Sick a few days, 1-2 weeks temporary recovery, then serious symptoms
450-600r	Same as 200-450r, plus hemorrhaging and infection	Within 3 hours	No	Yes	More than 50%	1 week temporary recovery, die without medical aid
600r+	Same as 450-600r, plus severe bloody diarrhea	Within 1 hour	No	Yes	100%	Death within 14 days
2000r+	Complete incapacitation	Within minutes	No	Yes	100%	Death within hours
Internal Radiation	Varies in proportion to internal dose	Varies	Varies	Varies	Varies	
Mild skin Injury	Itching and/or redness of skin, possible hair loss	1-2 days	Yes	No	None	
Severe Injury	Same as mild, plus radiation burns, & hair loss	1-2 days	Yes	Yes	Varies	Death depends on burn area

Figure 29-11. Radiation Sickness Symptoms.

ceived. When vomiting starts, it does not necessarily mean death will follow. For a few days, a survivor might feel far below par, but with proper medical care, complete recovery is possible (figure 29-11).

29-7. Radiation Detection. Since radiation is invisible and cannot be detected by the physical senses, detection instruments are used. This equipment includes devices for measuring the amount and intensity of area contamination and devices for determining the radiation dosage a survivor has received while in a contaminated area. A single radiation measurement usually has limited operational significance, except to personnel in the immediate area, since it gives information at the point of the reading only. However, a number of individual measurements considered together can give a picture of the radiation pattern over an entire area. A number of readings made at the same point over a period of time are required to determine the rate of decay of the fallout. Several different points for taking readings may be required in varying types of terrain.

a. Measurement of Radiation. Instruments developed for the detection and measurement of radiation are called radiac instruments. Radiac instruments measure the absorption of radiation, either in terms of dose-rate or dosage (figure 29-12).

(1) Dosage is the term applied to the total or accumulated amount of ionizing radiation (beta or gamma) received regardless of the time involved. Dosage is measured in terms of roentgens (r) or milliroentgens (mr). One milliroentgen is .001 of a roentgen. The total quantity of ionization received during a single radiation experience is called a dose. The radiation dose is also referred to as an exposure dose.

(2) When it is desirable to know how fast a certain dosage is being received, the term dose-rate is used to

Figure 29-12. Detection.

indicate this rate. Dose-rate is the amount of radiation being received per unit of time. Generally, the dose-rate is expressed in r/hr or mr/hr. The dose-rate is also used to indicate the level of radioactivity in a contaminated area (figure 29-13).

b. Radioactive Decay. The concept of radioactive decay is of vital importance in obtaining protection against nuclear fallout and in determining survival procedures. The debris from a nuclear explosion is made up of a mixture of radioactive materials of many kinds: unfissioned particles, fission products, and numerous other radioisotopes created by the neutron activation of inert material that takes place during the explosion. Fortunately, of the nearly 200 isotopes emerging, 70 percent are short-lived materials with a half-life of less than 1 day. Some elements, however, take a much longer time to decay; these are known as long half-life elements.

(1) Half-life is the time required for a radioactive substance to lose 50 percent of its activity through decay. Half-life for a mixture of isotopes (a term used to define precise species of elements) is not as simple as that described for a single radioactive isotope. The activity of the mixture diminishes very quickly after detonation, but as time passes, the longer-lived species become responsible for the major part of the radiation remaining, so that total radioactivity diminishes much more slowly.

(2) As a rule of thumb, radioactivity may be said to decrease in intensity by a factor of 10 for every sevenfold increase in time following the peak radiation level. Figure 29-13 illustrates the rapidity of the decay of radiation from fallout during the first 2 days after the nuclear explosion which produced it. Notice that it takes about seven times as long for the dose-rate to decay from 1000 roentgens per hour (1000 r/hr) to 10 r/hr (48 hours) as to decay from 1000 r/hr to 100 r/hr (7 hours). Only in high fallout areas would the dose-rate 1 hour after the explosion be as high as 1000 roentgens per hour.

(3) If the dose-rate 1 hour after an explosion is 1000 r/hr, it would take about 2 weeks for the dose-rate to be reduced to 1 r/hr solely as a result of radioactive decay. Weathering effects will reduce the dose-rate further; for example, rain can wash fallout particles from plants and buildings to lower positions on or closer to ground. Surrounding objects would reduce the radiation dose from these low-lying particles. Figure 29-13 also illustrates the fact that at a typical location where a given amount of fallout from an explosion is deposited later than 1 hour after the explosion, the highest dose-rate and the total dose received at that location are less than at a location where the same amount of fallout is deposited 1 hour after the explosion. The longer fallout particles have been airborne before reaching the ground, the less dangerous is their radiation.

(4) Two weeks after the last burst, the occupants of most shelters could begin working outside the shelters, increasing the number of hours each day. Exceptions would be in thermal damaged areas or in areas of extremely heavy fallout such as might occur downwind from important targets attacked with many weapons, especially missile sites and very large cities. To know when to come out safely, occupants would either need a reliable fallout meter to measure the changing radiation dangers, or they would need to receive information based on measurements made nearby with a reliable instrument, using the information in figure 29-14.

29-8. Body Reactions to Radiation. The effects of ionizing radiation upon the human body may be divided into two broad categories—chronic effects and acute effects.

a. Chronic Effects. Chronic effects are defined as those occurring some years or generations after exposure to radiation. Included in this category are the cancer-producing and genetic effects. While of concern because of their possible damage to future generations, these effects are of minor significance insofar as they may affect immediate survival.

b. Acute Effects. Acute effects are of primary significance in survival. Some acute effects appear within a few hours after exposure to radiation. These effects are the result of direct physical damage to tissue caused by

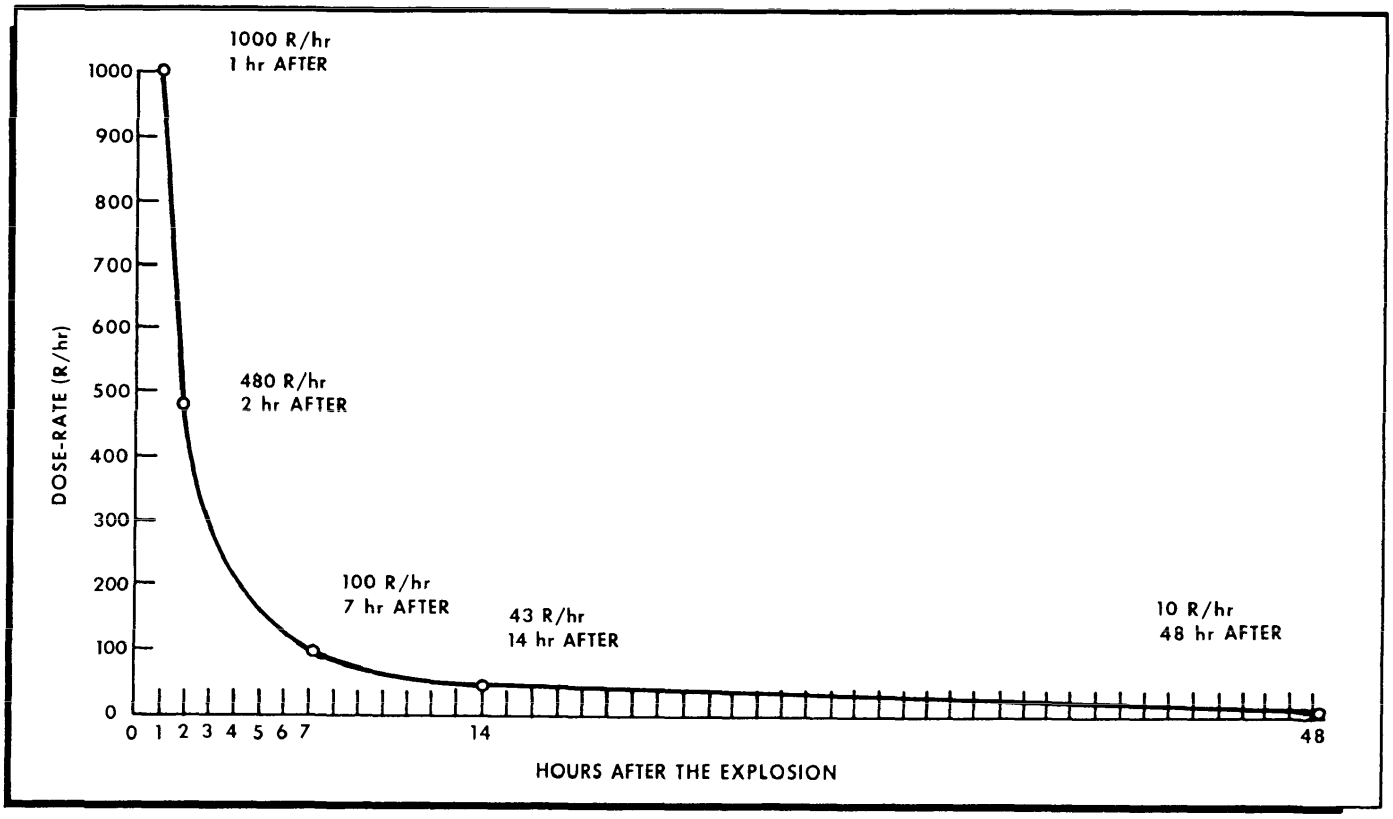

Figure 29-13. Decay Ratio.

radiation exposure; beta burns are examples of acute effects.

c. Body Damage. The extent of body damage depends to a large degree on the part and extent of the body exposed and the ability of the body to recover from radiation damage. Certain parts of the body, such as the brain and the kidneys, have little ability to recover from injury, while other portions of the body, such as the skin and bone marrow, can repair damage. The extent of body exposure to radiation is of great importance in determining the chances of subsequent recovery. If a dose of 350 roentgens was applied to just a small portion of the body, such as the hands or face, there would probably be little effect on overall health. Serious damage would, of course, be created in these exposed parts.

d. Hazards from Residual Radiation. There are two main hazards resulting from residue hazard, resulting from highly penetrating gamma radiation and less penetrating beta radiation which causes burns; and an internal hazard, resulting from the entry of alpha- and beta-emitting particles into the body.

(1) The external hazards result in overall irradiation and serious beta burns, while the internal hazards result in irradiation of the critical organs such as the gastrointestinal tract, thyroid gland, and bone.

(2) A very small amount of radioactive material can cause extensive damage in these and other parts of the body if allowed to enter the body by consumption of contaminated food or water or by absorption by the bloodstream through cuts or abrasions in the skin. By comparison, the material gaining entry by breathing presents a lesser hazard. Fortunately, most of the fallout particles are filtered out by the upper respiratory tract as seen in the observations of victims on the Marshall Islands who were accidentally exposed to fallout during the 1954 nuclear test. By using good hygiene and careful decontamination of food and water, a survivor can further reduce the internal hazard.

e. Degree of Radiation Damage. Because of the sensitivity of the gastrointestinal tract to radiation, the severity and the speed with which vomiting and diarrhea appear after exposure are good indicators of the degree of radiation damage. Almost everyone confined to immediate action shelters after a nuclear attack would be under stress and without clean surroundings. Many would also lack adequate water and food. Under these conditions, perhaps half the survivors who receive a whole-body dose of 200-450 roentgens would die within a few days. The human body can repair most radiation damage if the daily radiation doses are not too large.

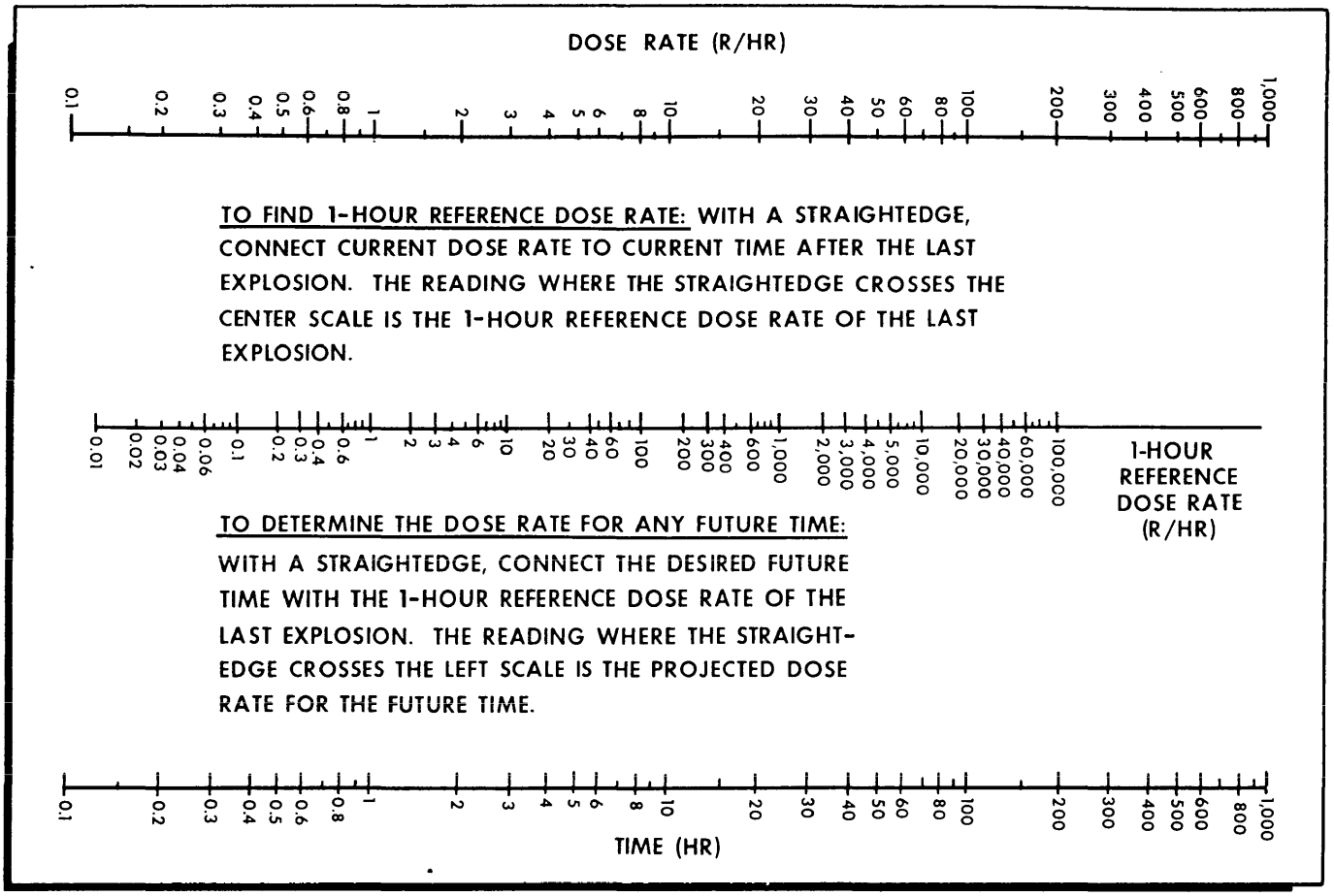

Figure 29-14. Dose Rate.

29-9. Countermeasures Against Penetrating External Radiation:

a. The means of protection from external radiation are threefold—time, distance, and shielding. By controlling the length of exposure time, by controlling the distance between the individual and the source of radiation, and most important of all, by placing some absorbing or shielding material between the survivor and the source of radiation, the survivor's level of radiation can be significantly reduced and thereby increase the chances of survival.

(1) Time. The effect of time on radiation exposure is easy to understand. Take a simple example such as the following: Assume a person is in an area where the radiation level from penetrating external radiation is 100 roentgens per hour and the dose-rate is constant; then in 1 hour, that person would receive 100 roentgens (or more properly, roentgen absorbed dose (rad)); in 2 hours, 200 rad; and in 8 hours, 800 rad. The important implication for a survivor is that, since radiation dosages received should be considered to be essentially cumulative, as little time as possible should be spent in an unprotected area, whether constructing a shelter or searching for water. Time is also of vital importance from another standpoint, that of radioactive decay. Knowledge of this characteristic can serve as one of the primary means of protection against radiation from fallout. The importance of time as a protective factor may be seen clearly by the following example. If survivors were to enter a high-intensity fallout area of 1000 roentgens per hour in which the radiation intensity had just peaked and remain there for 1 hour in the open, they would accumulate a biologically damaging dose of approximately 650 rad. This is a dose strong enough to kill 9 out of 10 people exposed to it. If, however, they entered this same area some 48 hours later and remained there for 1 hour, they would receive a dose of approximately 10 rad. Even if they were then required to remain in the open for 24 hours, their dose would only be 170 rad. Two weeks after the completed fallout, they would receive only one rad per hour in this same area. They could then remain in the area for several months, accumulating a dose of 180 rad, and not develop severe radiation sickness because of the rate at which the dosage was received (figure 29-15).

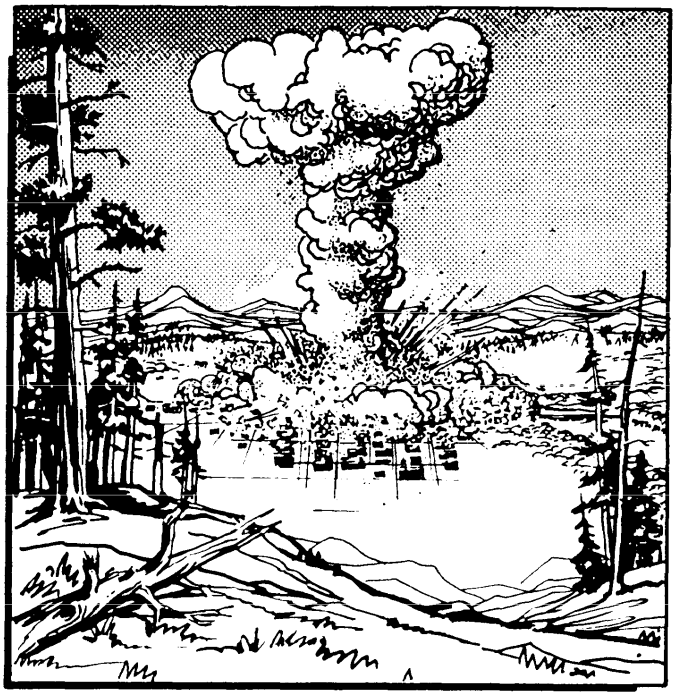

Figure 29-15. Countermeasures.

(2) Distance. Distance is effective as a means of protection against penetrating gamma radiation as shown by the inverse square law. This law states the intensity of radiation decreases by the square of the distance from the source. In other words, survivors exposed to 1000 units of penetrating external radiation at 1 foot from the source would receive only 250 units at 2 feet; when they double the distance, the radiation level is reduced by $(1/2)^2$ or one-fourth the amount. When the distance is tripled, the dose is reduced to $(1/3)^2$ or one-ninth of the original amount (or 111 units). At 10 feet, this is further reduced to $(1/10)^2$ or one-hundreth of the radiation exposure at 1 foot. This relationship of distance to intensity of radiation exposure is dependent upon the distribution pattern of the radiation source. As just seen, if the radiation is concentrated into a very small area (referred to as a point source), the intensity is decreased to about one-fourth the original amount each time the distance is doubled. A complicated relationship, however, is obtained when the radiation source is not concentrated in a point, but is spread around in random patterns as in the case of surface contamination from fallout.

(3) Shielding. The third and most important method of protection against penetrating radiation is that of shielding. Since the damaging effects of penetrating radiation arise from the fact that the rays interact with electrons in the body, survivors must place dense material between themselves and the source of radiation. The more electrons there are in the makeup of the shielding material, the more gamma radiation will be stopped from entering the body. Lead, iron, concrete, and water are all examples of good shielding materials. Of the three described countermeasures against penetrating external radiation, shielding gives the greatest protection, is the easiest to use under survival conditions, and is, therefore, the most desirable. If shielding is not possible, however, the other precautions should be rigorously followed. The degree of protection they afford is significant and could provide the necessary margin of safety for survival (figure 29-16).

Figure 29-16. Shielding.

b. It is a common misconception that radioactive fallout can impart its radioactivity to the object with which it comes in contact, such as fruits and vegetables. The rays from radioactive fallout particles cannot make something radioactive merely by being in contact with it. For this reason, canned foods and smooth-skinned fruits and vegetables may be eaten once they have been decontaminated.

(1) Everyone entering a contaminated area should wear protective clothing (CW ensemble) to prevent exposure to radioactive dust. The main reason for this precaution is to shield the skin from beta particles. Beta particles won't penetrate far into the body, but they will harm the skin. The effect, a reddening and blistering of the skin, is called a "beta burn." Such damage may not appear until sometime after exposure since beta particles have a delayed action. Survivors may not know they have received skin burns from beta particles until it is too late. Therefore, protective clothing should be worn as instructed. Sleeves should be down and buttoned, wrist and ankle openings taped, and gloves and boots worn, if possible.

(2) Alpha particles are lowest in ability to penetrate, but they are most hazardous when taken into the body through contaminated food and drink. The best defense against alpha particles is to ensure all food is properly decontaminated before consumption.

(3) If at all possible, a survivor should always avoid "hot" areas. Sometimes, a survivor cannot avoid contact with this environment and, when entering a "hot" area, should keep radioactive dust off the body and out of the body's system. If survivors inhale radioactive dust, they can suffer serious internal injury. If there is radioactive dust in "hot" areas, a protective filter should be used over the mouth and nose.

c. The presence of fallout material in the area will require some minor modification of medical procedures. Wounds should be covered to prevent entry of active particles. Burns from beta activity are treated like any other burn, except the burned surface should be washed. Measures to prevent infection should be emphasized since the body will be especially sensitive to infections because of changes in the blood. Extra attention should be given to the prevention of colds and respiratory infections. The eyes should be covered to prevent entry of particles. Improvised goggles may be used for this purpose.

29-10. Shelter. A sufficient thickness of shielding material will reduce the level of radiation to negligible proportions. The thickness required to reduce gamma radiation from fallout is much less than that necessary against initial gamma radiation since fallout radiation has much less energy than the initial radiation from a nuclear explosion. Thus, a comparatively small amount of shielding material can provide good protection against residual gamma radiation.

a. The following table illustrates the thicknesses of various materials required to reduce the penetration from residual fallout gamma sources by 50 percent:

Iron and steel	.7 inches
Concrete	2.2 inches
Brick	2.0 inches
Dirt	3.3 inches
Ice	6.8 inches
Wood (soft)	8.8 inches
Snow	20.3 inches

b. The principle of half-value layer thickness is useful in understanding the absorption of gamma radiation by various materials. According to this principle, if 2 inches of brick reduce the level of gamma radiation by one-half, adding another 2 inches of brick will reduce the intensity by another half, namely to one-fourth the original amount; 6 inches will reduce the level of fallout gamma radiation to one-eighth its original amount; 8 inches to one-sixteenth; and so on. Thus in a shelter protected by 3 feet of earth, a radiation intensity of 1000 roentgens per hour on the outside would be reduced to about one-half roentgen per hour inside the shelter.

c. Areas where terrain provides natural shielding and easy shelter construction, such as the sides of ditches, ravines, rocky outcroppings, hills, and riverbanks, are ideal locations for an emergency shelter (figure 29-17). In level areas lacking natural protection, dig a foxhole or slit trench.

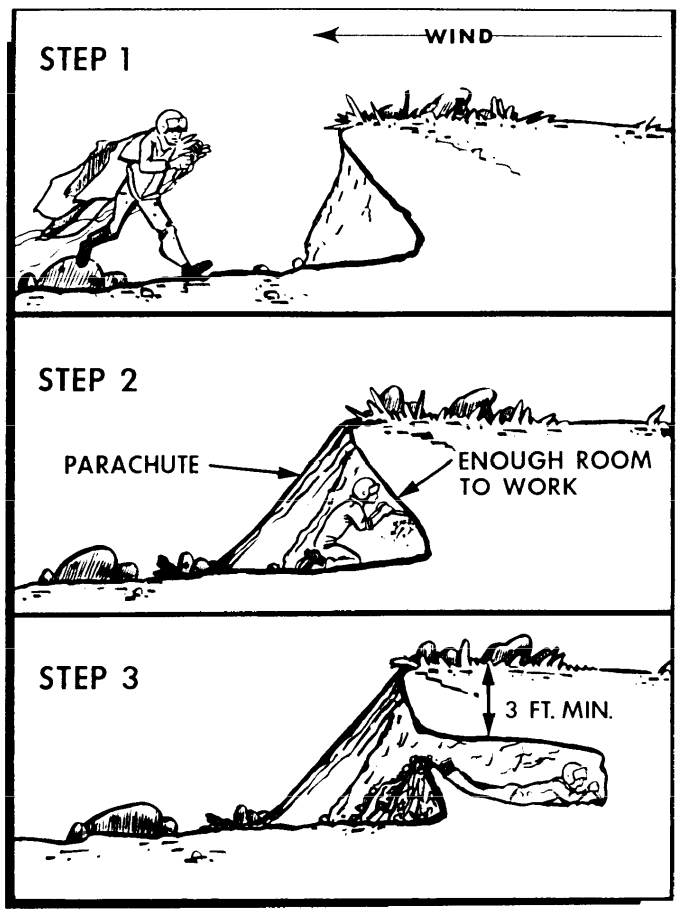

Figure 29-17. Immediate Shelter.

(1) In digging a trench, the survivor should work from the inside of the hole as soon as it is large enough to cover part of the body to prevent exposure of the entire body to radiation. In open country, an attempt should be made to dig the trench from a prone position, stacking the dirt carefully and evenly around the trench. On level ground, the dirt should be around the body for additional shielding. Depending upon soil conditions, the time to construct a shelter will vary from a few minutes to a few hours. Rapid shelter construction will limit the dosage received. Building a shelter under a tree is not recommended because cutting or digging out the numerous roots will be very difficult. Another disadvantage in making a shelter under trees is that more of the gamma rays from fallout particles on the leaves and branches would reach and penetrate the shelter than if

these same particles were on the ground. Many gamma rays from fallout particles on the ground would be scattered or absorbed by striking rocks, clods of earth, tree trunks, or buildings before reaching a below-ground shelter (figure 29-18).

(2) While an underground shelter covered by 3 or more feet of earth would provide the best protection against fallout radiation, the following additional unoccupied structures (in the order listed) offer the next best protection:

(a) Caves and tunnels covered by more than 3 feet of earth.

(b) Storm or storage cellars.

(c) Culverts.

(d) Basements or cellars of abandoned buildings.

(e) Abandoned buildings made of stone or mud.

d. Building a roof on the shelter should not be required. A roof should only be added if the materials are readily available to the survivor and will require only a brief exposure to the outside contamination. If the construction of a roof would require extended exposure to penetrating radiation, it would be wiser to leave the shelter roofless. The function of a roof is to lend distance from the source of fallout to the body, and unless dense roofing is used, a roof provides only scant shielding. A simple roof can be constructed out of a piece of parachute anchored down by dirt, rocks, or other refuse from the shelter. Large particles of dirt and other debris may be removed from the top of this parachute canopy by beating it at frequent intervals. Such a parachute cover will not offer shielding from the radiation emitted by active fission products deposited on the outer surface, but it will increase the distance from the fallout source and keep the shelter area covered from further contamination.

e. The primary criterion for locating and establishing a shelter site should be to obtain protection as rapidly as possible against the high intensity radiation levels of early gamma fallout. Five minutes to locate the shelter site is an excellent guide. Speed in obtaining shelter is essential. Without shelter, the dosage received in the first few hours will exceed that received during the rest of the week in a contaminated area; the dosage received in this first week will exceed that accumulated during the rest of a lifetime spent in the same contaminated area.

(1) Several initial actions should be kept in mind while seeking a shelter location. The survivor should:

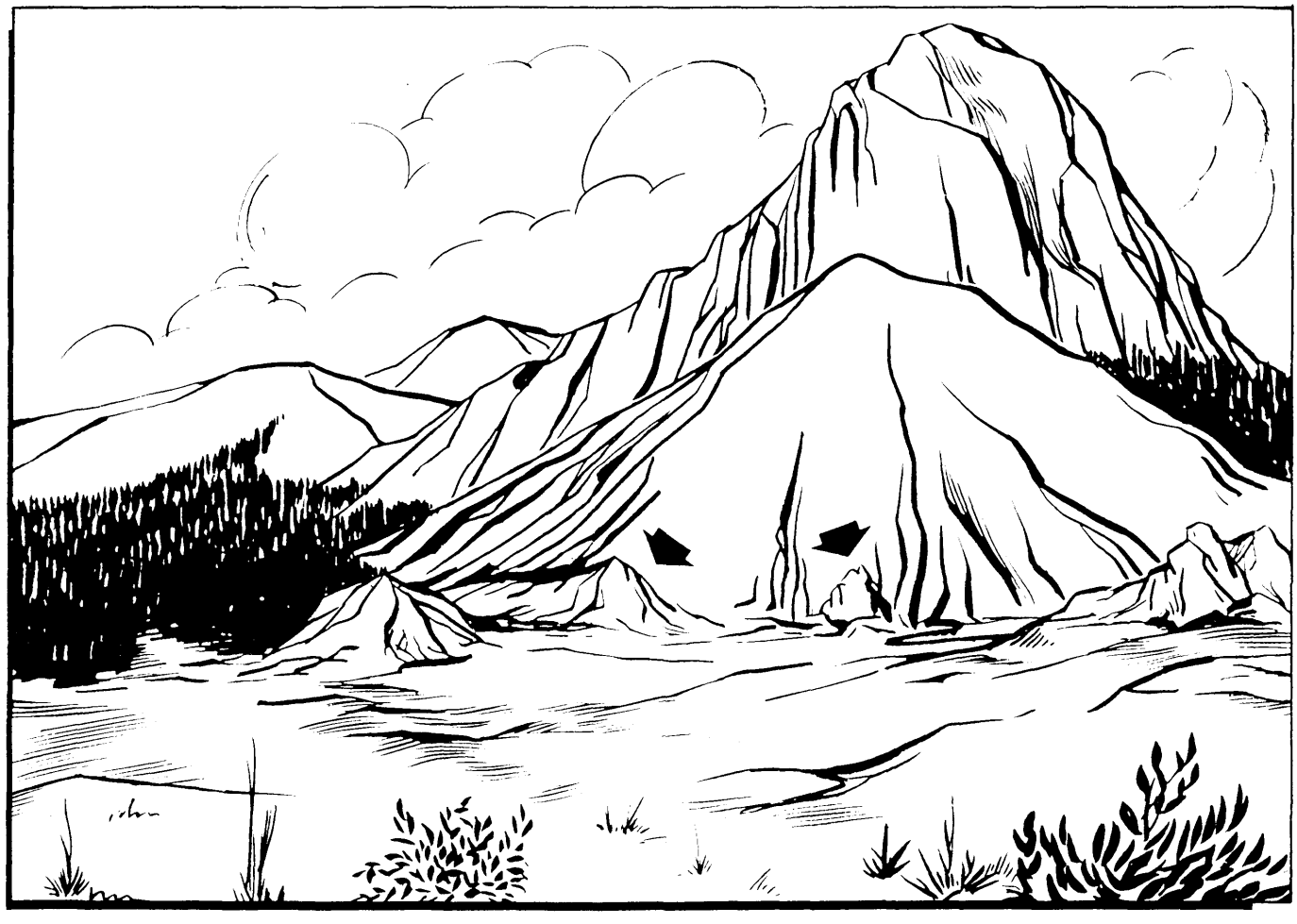

Figure 29-18. Terrain That Provides Natural Shielding.

(a) Where possible, attempt to remain with the aircraft until it is possible to eject or land in an area at least 20 miles upwind or crosswind from any known target. This action will ensure the landing area will have a minimum amount of fallout (figure 29-19).

(b) If it can be controlled, parachute opening should be delayed until a comparatively low altitude is reached in order to reduce the time of exposure to fallout during the descent.

-1. During the descent, select areas on the ground likely to provide good shelter.

-2. Immediately upon landing, take the parachute and survival kit and find cover and protective shelter.

-3. Take precautions to avoid detection and capture, but not at the expense of additional exposure to radiation which will lessen the chance of survival.

(2) In selecting and establishing the shelter, the survivor should keep the following additional factors in mind in order to reduce the time of exposure and the dosage received:

(a) Where possible, seek a crude existing shelter which can be improved. If none is available, dig a trench.

(b) Dig the shelter deep enough to obtain good protection, then enlarge it as required for comfort.

(c) Cover the top of the foxhole or trench with any readily available material and a thick layer of earth, if possible, without leaving the shelter.

(d) During the descent and while constructing a shelter, keep all clothing on, as well as a cap, scarf, and gloves to obtain protection against burns from beta radiation.

(3) The shelter location should be brushed or scraped clean of any surface deposit with a branch or some other object to be certain that contaminated materials are removed from the area to be occupied. The swept area should extend at least 5 feet beyond the area where the shelter is being dug. Any material brought into the shelter should be decontaminated. This includes grass or foliage that is being used as insulation or bedding material, outer clothing (especially footgear), and the parachute if it is to be used. If weather permits and the parachute and outer clothing are heavily contaminated, the survivor may want to remove them and bury them under a foot of earth at the end of the shelter. These may later (after decay factor) be retrieved when leaving the shelter. If these materials are dry, decontamination may be done by beating or shaking them outside the entrance to the shelter to remove the radioactive dust (figure 29-20). Any body of water, even though it may contain contaminated particles, may be used to rid materials of excess fallout particles by simply dipping

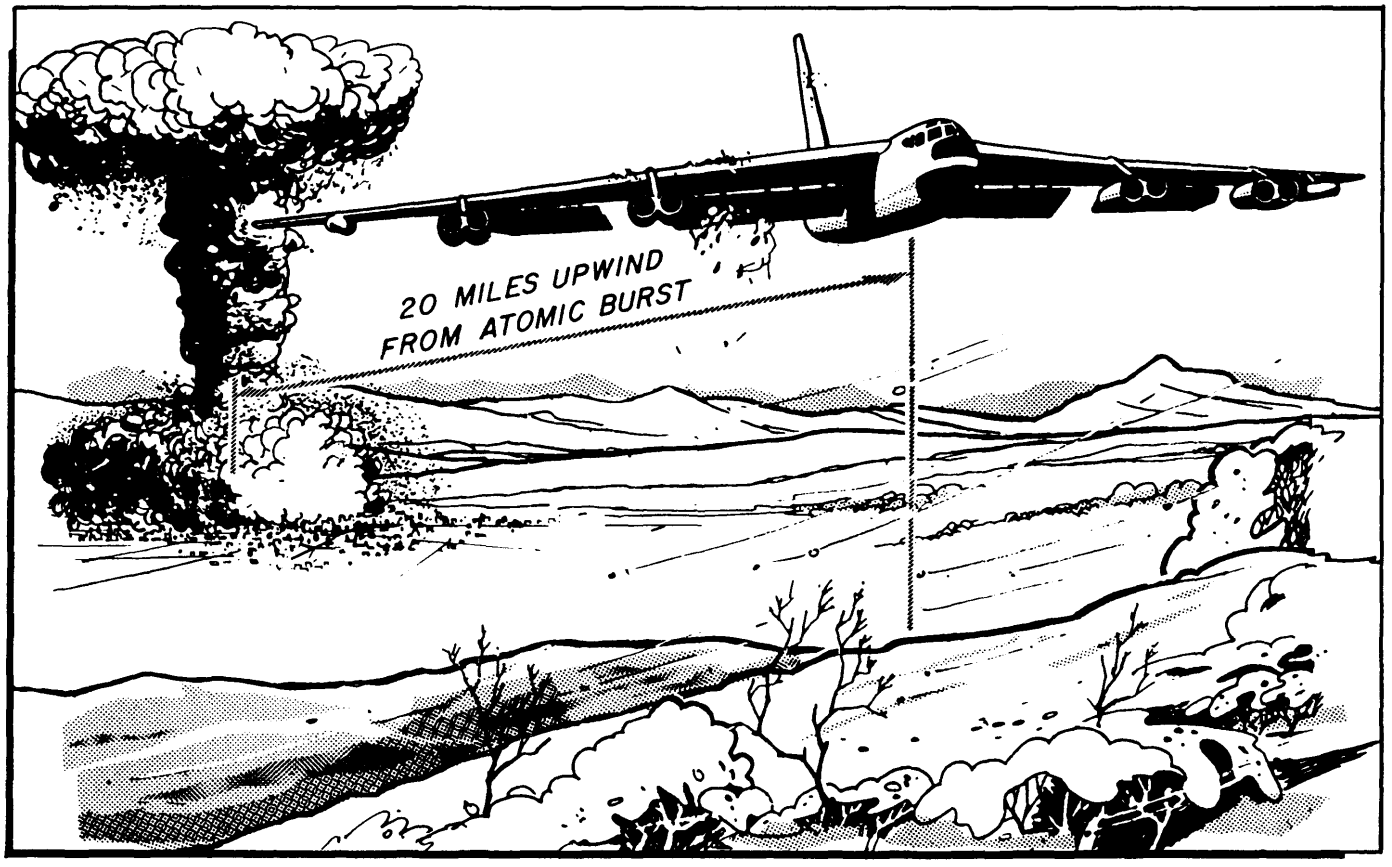

Figure 29-19. Route of Travel.

the materials into the water and shaking them to remove excess water. Do not wring out materials since this will trap the contaminated particles. If at all possible, wash the body thoroughly with soap and water without leaving the shelter. This washing will remove most of the harmful radioactive particles which are likely to cause beta burns or other damage. If water is not available, the face and any other exposed skin surfaces should be wiped to remove contaminated dust and dirt. This may be done with a clean piece of cloth or a handful of uncontaminated dirt obtained by scraping off the top few inches of soil and using the "clean" dirt.

f. Upon completion of the shelter, the survivor should lie down, keep warm, sleep, and rest as much as possible during the time spent in the shelter. There is no need to panic if nausea and symptoms of radiation sickness are experienced. Even small doses of radiation can cause these symptoms which may disappear in a short time. The following provides the time necessary to avoid serious dosage and still allow the opportunity to cope with survival problems:

(1) Complete isolation should be maintained from 4 to 6 days following delivery of the last weapon. A very brief exposure for procurement of water on the third day is permissible, but exposure should not exceed 30 minutes.

(2) On day 7, one exposure of not more than 30 minutes.

(3) On day 8, one exposure of not more than 1 hour.

(4) From day 9 through day 12, exposure of 2 to 4 hours per day.

(5) From day 13 on, normal operation, followed by rest in a protected shelter.

29-11. Water. In a fallout contaminated area, available water sources may be contaminated with radioactive particles. If possible, the survivor should wait at least 48 hours before drinking any water to allow radioactive decay to take place. Selecting the safest possible source of water will greatly diminish the danger of ingesting harmful amounts of radioactivity.

a. Although many factors, such as direction of wind, rainfall, and amount of particulate matter (clay, for example) in the water, will influence the choice in selecting water, the following priorities of water sources are

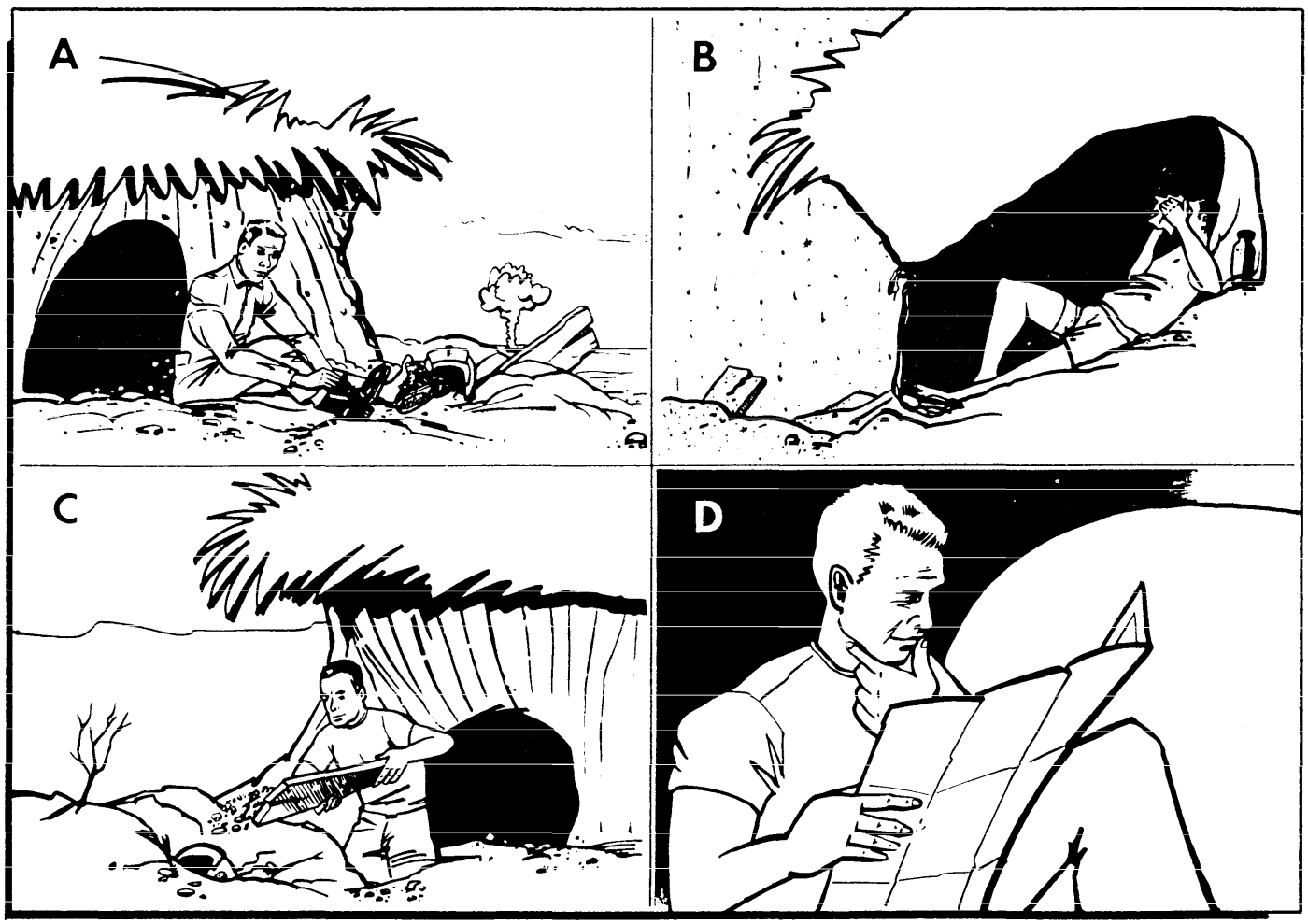

Figure 29-20. Decontamination.

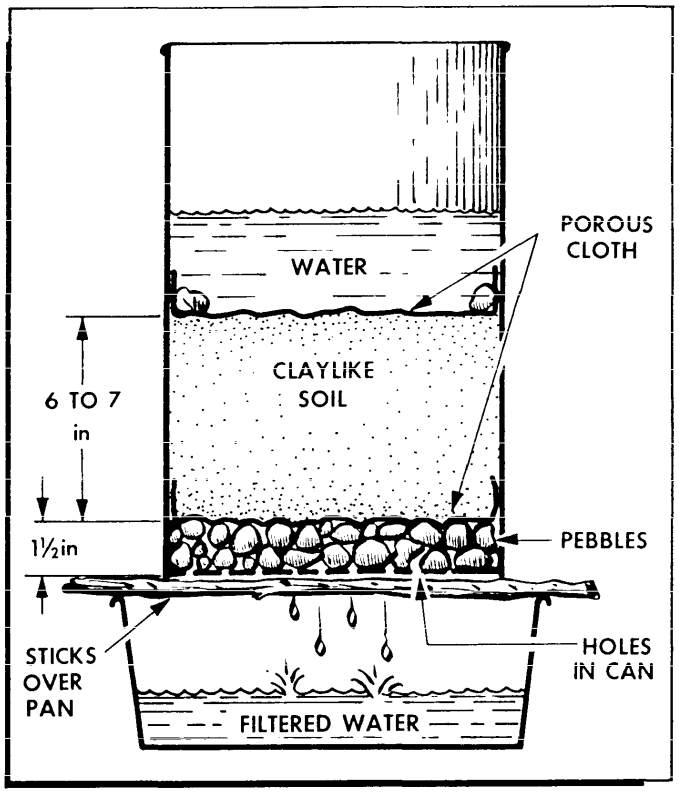

Figure 29-21. Filtering Water.

recommended: (As an additional precaution against disease, all water sources should be treated with water purification tablets from the survival kit or boiled for at least 10 minutes.)

(1) Water from springs, wells, or other underground sources having natural filtration will be the safest sources of water.

(2) Any water in the pipes or containers of abandoned houses or stores will also be free from radioactive particles and, therefore, safe to drink, although precautions will have to be taken against bacteria in the water.

(3) Snow taken from a level which was 6 or more inches below the surface during the fallout should be a safe source of water.

(4) Water from streams and rivers will be comparatively free from fallout within several days after the last nuclear explosion because of the dilution factor. If at all possible, such water should be filtered before drinking.

(5) Water from lakes, pools, ponds, and other standing sources is likely to be heavily contaminated, though most of the heavier, insoluble isotopes will settle to the bottom.

b. The degree of solubility of various isotopes varies. Some fission products are extremely water soluble, but most are relatively insoluble. Certain isotopes, in fact, have been found to be as much as 90 percent insoluble. The significance of this fact is that 99 percent of the radioactivity in water could be removed by filtering it through ordinary earth (figure 29-21). The best method of filtration is to dig sediment holes or seepage basins along the side of a water source. The water will seep laterally into the hole through the intervening soil which will act as a filtering agent and remove the contaminated fallout particles which have settled on the original body of water. It is important the hole be covered in some way (example, with a parachute) to prevent further contamination (figure 29-22).

c. Settling is one of the easiest methods used to remove most fallout particles from water. Furthermore, if the water to be used is muddy or murky, settling it before filtering will extend the life of the filter. The procedure is as follows:

(1) Fill a bucket or other deep container three-fourths full of the contaminated water.

(2) Dig dirt from a depth of 4 or more inches below the ground surface and stir it into the water. Use about a 1-inch depth of dirt for every 4 inches of water.

(3) The water is stirred until practically all of the dirt particles are suspended in the water.

(4) This mixture should be allowed to settle for at least 6 hours. The settling dirt particles will carry most of the suspended fallout particles to the bottom and cover them. The clear water can then be dipped or siphoned out and purified (figure 29-23).

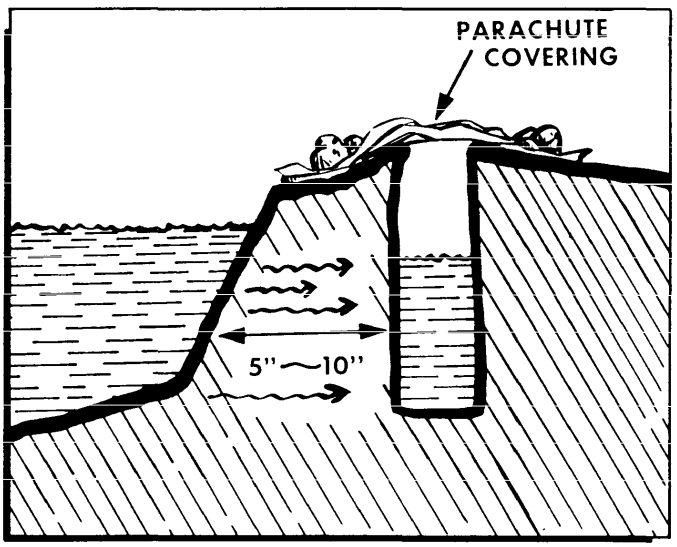

Figure 29-22. Settling Water.

29-12. Food. Obtaining edible food in a radiation contaminated area is possible. Survivors need to follow only a few special procedures in selecting and preparing rations and native foods for use. Since survival rations are protected by secure packaging, they will be perfectly acceptable for use after the ration containers are decontaminated, but survivors should supplement them with any food they can find on their trips away from the shelter. Any processed foods which may be found in abandoned buildings are acceptable for use once they are decontaminated. These include canned and pack-

Figure 29-23. Settling Pool.

aged foods after the containers or wrappers are discarded or washed free of fallout particles, food stored in any closed container, and food stored in protected areas (such as cellars). The containers should be washed before opening. For purposes of discussion, native food sources may be divided into two categories: plant food and animal food.

a. Animal Food. In the category of native animal food, survivors must assume all animals, regardless of their habitat or living conditions, will be exposed to radiation. Since the effects of radiation on animals are similar to those in humans, most of the wild animals living in a fallout area are likely to become sick or die from radiation during the first month following the nuclear explosion. Even though animals may not be completely free from radioactive materials, it may be necessary to use them as a food source. With careful preparation and adherence to several important principles, animals can be safe sources of food.

(1) If an animal appears to be sick, it should not be eaten. The animal may have developed a bacterial infection as a result of a radiation dose. Contaminated meat could cause severe illness or death if eaten, even if thoroughly cooked.

(2) All animals should be carefully skinned to prevent any radioactive particles adhering to the outside of the skin from gaining entry into the body.

(3) Meat around the bones and joints should not be eaten. A large percentage of radioactivity in the body of animals is found in the skeleton. The remaining muscle tissue of the animal, however, will be safe to eat. Before cooking the animal, survivors should cut the meat away from the bone, leaving approximately one-eighth of a inch of meat on the bone. All internal organs such as the heart, liver, and kidneys, normally used as survival food, should be discarded (figure 29-24) since they tend to concentrate beta and gamma radioactivity. All meat should be cooked until it is very well done. To be sure the meat is well done, it should be cut into pieces less

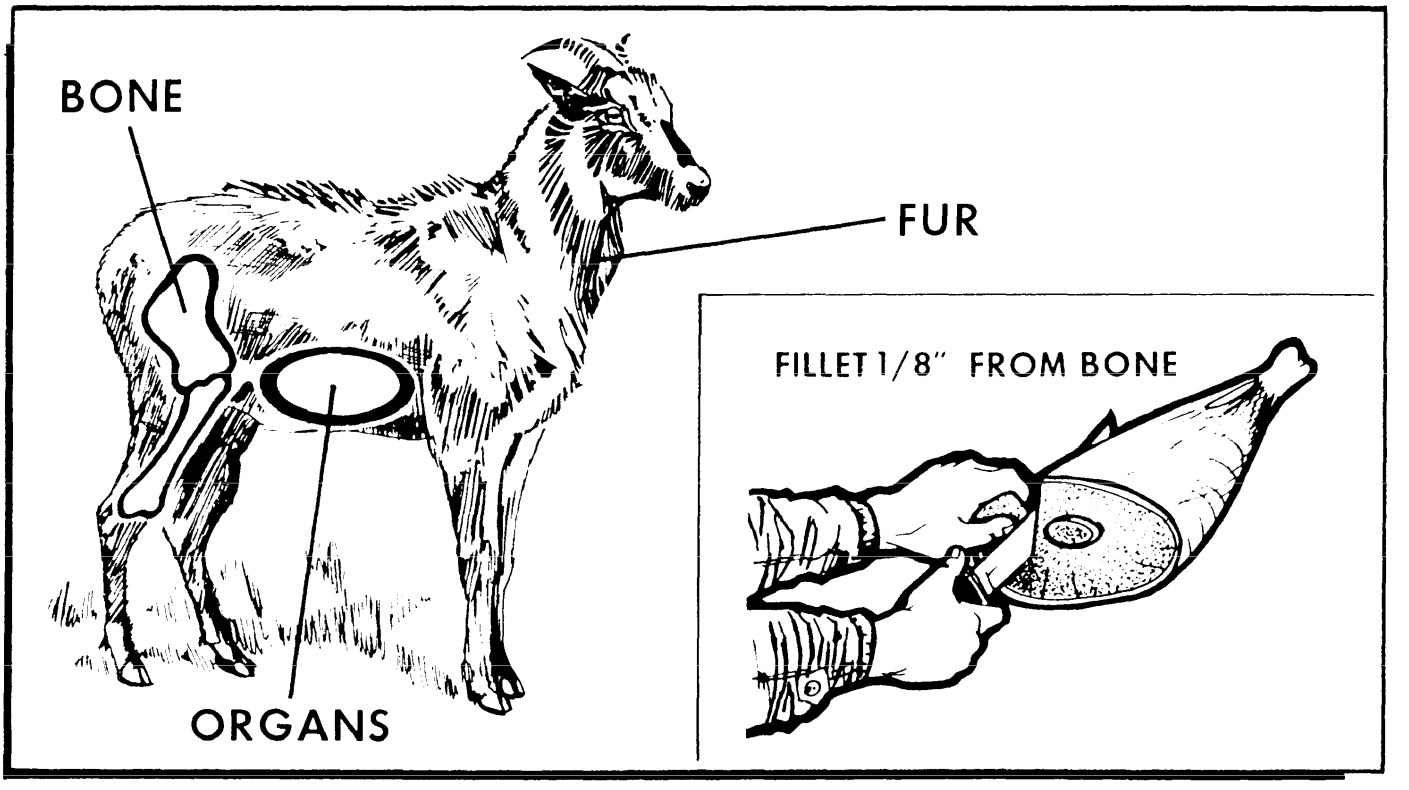

Figure 29-24. Meat Procurement.

Figure 29-25. Collecting Food.

than one-half inch thick before cooking. This precaution also reduces cooking time and saves fuel.

(4) The extent of contamination of fish and clams following nuclear tests in the Pacific was found to be much greater than that of the land animals. On the basis of these findings and those of other tests showing the high concentration of radioactivity in aquatic plants and animals, especially near coastal areas, it is recommended that aquatic food sources be used only in an extreme emergency.

(5) All eggs (excluding the shell), even if laid during the period of fallout, will be safe to eat. Because animals absorb large amounts of radioactive strontium from the plants upon which they graze, milk from any animals in a fallout area should be avoided.

b. Plant Food. Plant foods are contaminated by the accumulation of fallout on their outer surfaces or by means of absorption through the roots.

(1) The survivor's first choice of plant food should be vegetables, such as potatoes, turnips, carrots, and other plants, whose edible portions grow underground. These are the safest to eat once they are scrubbed and the skins removed. Second in order of preference are those above-ground portions of the plant with edible parts which can be decontaminated by washing and peeling their outer surfaces; examples are bananas, apples, and other such fruits and vegetables. Other smooth-skinned vegetables, fruits, or above-ground plants, which cannot be easily peeled or effectively decontaminated by washing the radioactive particles off their surfaces, will be the third choice of emergency food (figure 29-25).

(2) The effectiveness of decontamination by scrubbing is generally inversely proportional to the roughness of the surface of the fruit. After the Marshall Islands incident, smooth-surfaced fruits were found to lose 90 percent of their radioactivity after washing, while washing rough-surfaced plants removed only 50 percent of the contamination. Plant foods, such as lettuce, having a very rough outer surface which cannot easily or effectively be decontaminated by peeling or washing, should be eaten only as a last resort. Other difficult foods to decontaminate by washing with water are dried fruits, such as figs, prunes, peaches, apricots, pears, and soybeans.

(3) Generally speaking, any plant food ready for harvest can be used for food if it can be effectively decontaminated. Growing plants, however, can absorb some radioactive materials through their leaves as well as from soil, especially if rains have occurred during or after the fallout period. With some elements, such as strontium, which is extremely soluble in water, data has shown greater amounts were taken up by plants through

EQUIVALENT RESIDUAL DOSE (ERD): The body can repair 90% of a dose of radiation damage. The unrepaired damage for any given day is the radiation dose multiplied by the ERD factor of the number of days after the exposure. NOTE: Each subsequent dose ERD Factor is based on the number of days after each subsequent dose.

DAY	FACTOR	DAY	FACTOR	DAY	FACTOR	DAY	FACTOR	DAY	FACTOR
1-4	1.000	10	.873	16	.764	22	.670	28	.590
5	.978	11	.854	17	.748	23	.656	29	.578
6	.956	12	.835	18	.731	24	.642	30	.566
7	.934	13	.817	19	.716	25	.629	31	.554
8	.913	14	.799	20	.700	26	.616	32	.543
9	.893	15	.781	21	.685	27	.602	33	.532

$$\begin{pmatrix}\text{1st}\\\text{DOSE}\end{pmatrix}\begin{pmatrix}\text{ERD}\\\text{FACTOR}\end{pmatrix} + \begin{pmatrix}\text{2d}\\\text{DOSE}\end{pmatrix}\begin{pmatrix}\text{2d ERD}\\\text{FACTOR}\end{pmatrix} + \ldots + \begin{pmatrix}\text{X}\\\text{DOSE}\end{pmatrix}\begin{pmatrix}\text{X ERD}\\\text{FACTOR}\end{pmatrix} + \begin{pmatrix}\text{SHELTER}\\\text{DOSE}\end{pmatrix}$$

WATER SOURCES: Uncontaminated water--solar still or snow 6 inches below contamination level. Delay as long as possible from drinking from contaminated sources. PRIORITY: (1) underground, (2) running, (3) stationary. Filter sources 2 & 3 through 12 inches of earth and add purification tablets before use. BOILING WILL NOT REMOVE RADIOACTIVITY.

ANIMAL FOOD: DO NOT BUTCHER SICK ANIMALS. Discard internal organs and meat next to bone. Hides/feathers may be heavily contaminated. Eggs OK to eat.

SEA FOOD: Ocean sources OK, others on a risk basis. Fish from stationary bodies of water probably contaminated.

PLANT FOOD: Plants with edible portions below ground first choice. Smooth plant food easy to wash. Rough surfaced plants difficult to wash. Wash, pare, then wash again.

FIRST AID: NO FIRST AID FOR RADIATION SICKNESS. Infection, main danger. Personal hygiene important. Rest, avoid fatigue. Drink liquids.

BURNS: Normal first aid. Cool and cover burn. Do not use grease, etc. Treat for possible shock. Keep warm, lie with feet above head.

FRACTURES: Normal first aid. Immobilize and splint. Possible shock.

BLEEDING: Normal first aid. Apply pressure at break. Tight tourniquet can cause loss of limb--use only as last resort.

Figure 29-26. Equivalent Residual Dose Rate.

NUCLEAR EXPLOSIONS: FALL FLAT. Cover exposed body parts. Present minimal profile to direction of blast. DO NOT LOOK AT FIREBALL. Remain prone until blast effects over.

SHELTER: Pick ASAP, 5 minutes unsheltered max. PRIORITY: (1) cave or tunnel covered with 3 or more feet of earth, (2) storm/storage cellars, (3) culverts, (4) basements, (5) abandoned stone/mud buildings, (6) foxhole 4 ft deep--remove topsoil within 2 ft radius of foxhole lip.

RADIATION SHIELDING EFFICIENCIES: One thickness reduces received radiation dose by one-half. Additional thickness added to any amount of thickness reduces received radiation dose by one-half.

Iron/Steel	.7 in	Earth	3.3 in	Wood (Soft)	8.8 in
Brick	2.0 in	Cinder Block	5.3 in	Snow	20.3 in
Concrete	2.2 in	Ice	6.8 in		

SHELTER SURVIVAL: KEEP CONTAMINATED MATERIALS OUT OF SHELTER. Good weather; bury contaminated clothing outside of shelter--recover later. Bad weather; shake strongly or beat with branches. Rinse and (or) shake wet clothing--DO NOT WRING OUT.

PERSONAL HYGIENE: Wash entire body with soap and ANY water; give close attention to fingernails and hairy parts. No water: Wipe all exposed skin surfaces with clean cloth or uncontaminated soil. Fallout/dusty conditions, keep entire body covered. Keep handkerchief/cloth over mouth and nose. Improvise goggles. DO NOT SMOKE.

EXIT PLANNING: Explosion time and a dose-rate known, use rate decay nomograph.

Explosion time unknown: 1 Take dose-rate readings every hour. 2 When any reading is 1/2 of any previous reading, multiple time difference between two readings by 7/4. 3 Subtract the resultant from the time of first reading. 4 This new time is approximate time of explosion. Use new time with dose rate nomograph to determine safe exit time.

No rate meter, complete isolation first 4-6 days after last explosion.

Day 3/7: Brief exposure, 30 minutes MAX.

Day 8: Brief exposure, 1 hour MAX.

Days 9-12: Exposure of 2-4 hours per day.

Day 13 on: Normal movement.

MAXIMUM SURVIVAL DOSE/ERD: 200 roentgens

Figure 29-27. Nuclear Explosions.

their leaves than through their roots. In the tests conducted in the Marshall Islands, high levels of radioactivity were found in the water and on the external surfaces of the plants early after the detonation, but only small amounts of beta activity and no alpha activity were detected in the edible portions of the fruits and vegetables. High levels of contamination, similar in activity to that of the contaminated water nearby, were found in the sap of the coconut tree. From these and other tests, we know that small amounts of fission products may be immediately absorbed by plants growing on soil contaminated by fallout material.

(4) If the countermeasures recommended for obtaining protection against penetrating external gamma radiation and beta radiation are taken immediately, and the rules for constructing a shelter and selecting food and water are applied, a survivor's chances of surviving a nuclear attack are excellent. Figures 29-26 and 29-27 contain some summarized information applicable to a radioactive environment.

Chapter 30

BIOLOGICAL CONDITIONS

30-1. Introduction. Biological agents are viruses and micro-organisms, or their products, which are used to cause disease, injury, or death to people, animals, or plants (and, to a lesser extent, deterioration of material). Their use is an attempt to produce disease on a large scale. During war, these agents will probably be used primarily in a strategic role to attack rear area bases.

a. Most micro-organisms are harmless to humans, animals, or plants, and a few are helpful. Yeast is used in bread, beer, and cheese production. Some micro-oganisms, however, do produce disease. Biological agents could consist of:

(1) Fungi - mold, mildew, athlete's foot; histoplasmosis; and other pathogenic fungi.

(2) Bacteria - plague, tularemia, anthrax.

(3) Rickettsiae - Rocky Mountain spotted fever, typhus.

(4) Viruses - yellow fever, smallpox.

(5) Biotoxins - mushroom, algae, and bacterial poisons.

b. Many biological agents are living, require moisture, food, and certain temperature limits for life and growth. They are killed by simple acts such as boiling water, adding purification tablets to water, cooking food, exposing them to sunlight, and (or) using germicides. Biological agents enter the body through the nose, mouth, or skin; however, most will not penetrate intact skin. By preventing their entry into the body, a survivor is safe from biological agents.

30-2. Detection. There is no simple method of detecting biological agents. A person cannot see, feel, or taste these agents in a biological attack whether spread through conventional means or sabotage. Additionally, a person cannot taste the toxins in food. The basic methods of disseminating the agents are through the generation of an aerosol, the use of disease-carrying vectors, and food and water.

a. Aerosols are particles composed of many organisms, or a single organism, which are dispersed into the air and transported by air currents. Effective transmission as an aerosal requires that biological agents reach the target area with an effective percentage remaining alive and capable of causing disease. The appearance of certain clues may warn a survivor of an aerosol biological attack. They are:

(1) Aircraft dropping objects or spraying. Both enemy aircraft or friendly aircraft could be engaged in neutralizing or destroying opposing forces.

(2) Breakable containers or new and unusual types of shells and bombs, particularly those which burst with little or no blast.

(3) Smokes and mists of unknown origin.

(4) Unusual substances on the ground or on vegetation. Sick, dead, or dying animals.

b. Vectors, such as mosquitoes and ticks which carry disease, can be delivered to the target area in containers

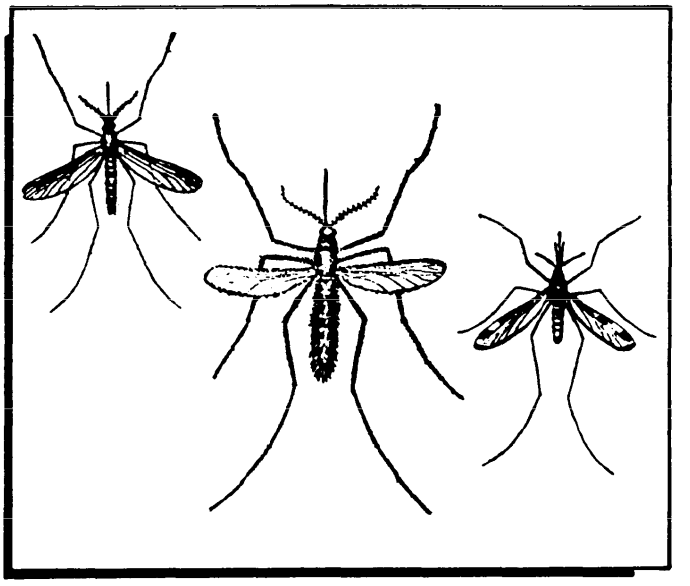

Figure 30-1. Vectors.

by aircraft or missiles. The containers rupture on impact and release the vectors. Some vectors need a "host" or carrier that can transmit the disease organism through the skin; others may be inanimate objects, such as contaminated food and water. Because disease organisms can infect personnel, the use of a "protective" mask may not help protect against viruses. The vectors can produce disease throughout their entire life spans, regardless of how far or where they travel. Furthermore, they may pass the disease to successive generations. Therefore, survivors must be extremely cautious when skinning wild game by wearing gloves and other protective clothing as the game may host fleas which carry many diseases. (NOTE: Contact with animals should be avoided unless they are to be used as food (figure 30-1).)

30-3. Climate. The various characteristics of aerosols and vectors will affect their utility in varying climates. While a survivor may encounter any form of biological agent once their use in combat occurs, the following factors may help a survivor assess the relative risk of various types of biological agents.

a. Aerosols are generally much more controllable in the area of application than are vector-borne agents. However, most aerosol agents deteriorate to some de-

gree when exposed to direct sunlight. They are more suitable for use against small area targets.

b. Strong winds are necessary to ensure maximum area coverage of both aerosols and vectors. However, the density of coverage may be decreased by extremely high winds.

c. Vectors are less controllable than aerosols in the area of application following release. They are more suited for use against broad area targets. Although vectors tend to last longer in humid climates, many potential vectors (flies, fleas, mosquitos, lice, etc.) will thrive in virtually any environmental area.

d. Generally, nighttime (1 hour before sunset to 1 hour after sunrise) is the best period to dispense vectors. Vector movement and activity is usually greater during the cooler hours of darkness.

30-4. Terrain. Biological agent aerosols tend to follow the contour of rolling terrain and valleys very much like airborne particles, such as fog. Vegetation can slow the downwind travel of agents by removing some particles from the air. Due to a lack of sunlight, densely vegetated areas, such as a jungle (warm humid), allow some agents to thrive for extended periods of time. Because most of the biological agents are more hazardous when inhaled then when directly exposed to the skin, contamination of the ground following an attack is less dangerous to the survivor than exposure to an aerosol attack.

30-5. Protection. Defense against biological warfare is neither simple nor easy. The best defense against these agents is the natural resistance of the survivor's body, a high standard of personal cleanliness, careful attention to sanitation, good nutrition, up-to-date immunization status, proper use of drugs, and immediate self-aid to any break in the skin or a punctured wound. Germs must actually get inside the body to cause disease.

a. A protective mask, properly fitted and in good condition, will greatly reduce the danger of inhaling germs. If a mask is not available, a handkerchief or parachute material over the mouth and nose will suffice to provide protection. Since survivors cannot detect the presence of biological agents, they should wear the mask or some other protective equipment over the mouth and nose until they are rescued, if possible.

b. Cuts and sores, in addition to the nose and mouth, are open doors to germs trying to enter the body. Wounds must be kept clean and protected with a bandage. Any type of clothing will give some protection. Fasten the shirt or jacket collar, roll the sleeves down and button the cuffs, wrap the trouser legs or tuck them inside the boots, and tie down all other clothes to stop the entry of germs which may be in the air or on the ground. If the survivor has a uniform used for protection against chemical agents, it should be worn because it gives a greater degree of protection against germs than ordinary clothing.

c. Survivors should always be careful about eating and drinking during and after a biological attack. One of the easiest ways for germs to enter the body is through food and water.

30-6. Tips for a Survivor:

a. Keep the body and living quarters clean.

b. Don't neglect preventive medicine. Keep the shot record up to date.

c. Keep alert for signs of biological attack.

d. Keep the nose, mouth, and skin covered.

e. Protect food and water. Bottled or canned foods are safe if sealed. If in doubt, boil the food and water for 10 minutes.

f. Build a shelter, if possible. Shelter should be located and constructed to minimize vector and aerosol access to the survivor; for example, shelter enclosed—entrance 90 degrees to the prevailing wind.

g. If traveling, travel crosswind or upwind.

Chapter 31

CHEMICAL CONDITIONS

31-1. Introduction. Chemical agents may be solid particles, liquids, or gases which are toxic (poisonous) chemicals. These agents produce poisonous gas, fire, and smoke. The poisonous agents may produce casualties or irritating effects and render material or areas unusable. The body is attacked by chemical agents which produce specific damage depending on the type and concentration exposure of the agent used. Survivors must have a thorough knowledge of how each of these agents affects the body.

31-2. Chemical Groups. Chemical agents are divided into seven groups—nerve, blood, blister, choking, vomiting, incapacitating, and riot control. These agents can be dispersed by artillery shells, mortar shells, rockets, aircraft spraying, and bombs (figure 31-1).

a. Nerve Agents. The nerve agents are among the deadliest of all chemical agents. They directly affect the nervous system and are highly toxic in both liquid and vapor forms. Examples of G-agents are tabun (GA), sarin (GB), and soman (GD). These nerve agents may be absorbed through any body surface. When dispersed as a vapor, they are absorbed through the respiratory tract or the eyes, but as liquid nerve agents, they can be absorbed through the skin. They are usually quick-acting casualty agents. Symptoms accompanying very small doses are headaches, dizziness, dimmed vision, and nausea. Large doses of nerve agents can interfere with breathing and may cause a tightness in the chest or convulsions, paralysis, and death. Symptoms of large doses of nerve agents are unpredictable, and circulatory collapse can occur without warning. The first effect of eye exposure to agents will probably be a dimming of vision caused by contraction of the eye pupils to pinpoint size. The pinpoint pupils will more noticeably affect vision in dim light. If the nerve agent contaminates the skin only, the pupils may remain normal or be only slightly reduced in size with other symptoms being first to appear. The injuries caused by nerve agents may range from mild disability to death depending on the dose received and the adequacy and speed of self-aid treatment. Nerve agents are odorless, unlike most chemical agents. A survivor must rely on observation of living things and detection devices to identify their presence.

b. Blood Agents (Cyanides). Blood agents produce their effects by interfering with some vital process within the body. The usual route of entry is inhalation. They prevent the body cells from using oxygen. Hydrocyanic acid (AC) and cyanogen Chloride (CK) are the important agents in the group. CK also acts as a choking agent (figure 31-2).

Figure 31-1. Chemical Conditions.

(1) Symptoms associated with blood agent contamination vary. One type of blood agent causes a marked increase in the breathing rate; whereas, another type

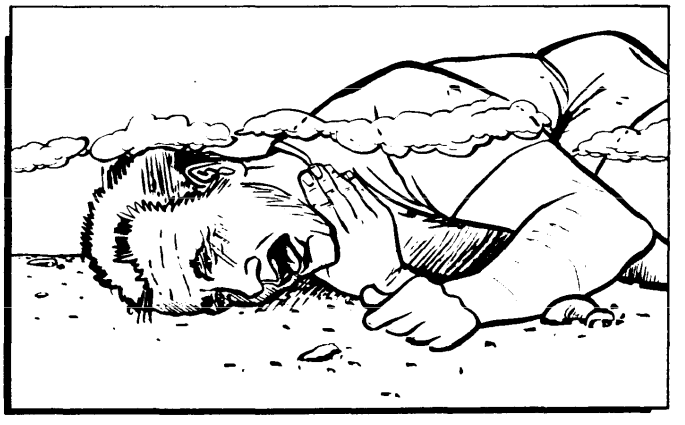

Figure 31-2. Symptoms.

causes a slow breathing rate, a choking effect, and a strong irritating effect. A slight exposure to still another type of blood agent causes headaches and uneasiness.

(2) Blood agents cause the skin to have a cherry-red color similiar to that seen in carbon monoxide poisoning. This symptom, by itself, may help identify the blood agents' poisoning. The symptoms produced by blood agents also depend upon the concentration of the

agent and the duration of exposure. If irreversible damage has not occurred, removal from the exposure to the agent may enhance recovery. Blood agents are used as quick-acting casualty agents. The speed in donning a protective mask is critical to survival in a blood agent attack.

c. Blister Agents (Vesicants). Blister agents were developed during World War I to circumvent the protective mask that had made chlorine gas obsolete. These agents are primarily designed to attack the body through the skin and eyes. They can also attack through the respiratory or digestive tracts and cause inflammation, blisters, and general destruction of tissue. Some examples of blister agents are mustard (HD), nitrogen mustards (HN), lewisite (L) and other arsenicals, mixtures of mustards and arsenicals, and phosgene oxime (CX). They are effective even in small quantities and produce delayed casualties.

(1) A drop of mustard-type agent the size of a pinhead can produce a blister the size of a quarter. Blister agents are more effective in hot weather than in cold weather. Vapors first affect the moist parts of the body (joints of arms and knees, armpits, and crotch). People who are sweating are especially sensitive to the agents. Blister agents are quickly absorbed through the skin. Reddening of the affected area may appear any time up to about 12 hours after exposure depending on the degree of contamination and the weather conditions. Blisters may appear in a day or less following the reddening. Healing time varies from about 6 days to as much as 8 weeks in severe cases. Since the damage is done during the first few minutes of exposure, speed in administering self-aid is essential.

(2) Damage to the eyes may be worse than the effects on the skin. Even as a liquid, the agent may only mildly irritate the eyes at first or there may be no pain at all. In a few hours, however, the eyes hurt, become inflamed, and are sensitive to light. Tears and great pain follow, and permanent injury can result. Some blister agents cause immediate pain in the eyes.

(3) When inhaled, blister agents inflame the throat and windpipe and cause a harsh cough. Cases of serious exposure may result in pneumonia and death. Immediate detection of blister agents and prompt protection against entry into the eyes and lungs and on the skin is vital.

(4) Blister agents may be absorbed by any material (wood, concrete, clothing, metal, plastics, or rubber). Direct skin contact with these objects can cause blistering. Liquid blister agents will eventually penetrate gloves and other garments. Immediate decontamination after exposure is essential to prevent delayed absorption.

d. Choking Agents (Lung Irritants). These agents cause irritation and inflammation of bronchial tubes and lungs but do not harm the skin or digestive system. They are usually disseminated as gases and inhaled into the body. The best known of these agents is phosgene. During and immediately after exposure, symptoms include coughing, choking, and a feeling of tightness in the chest, nausea, and occasionally vomiting, headache, and crying. If large amounts enter the lungs, they will fill with liquid causing death from lack of oxygen. A properly operating and well-fitted mask protects against all choking agents.

e. Vomiting Agents. These agents produce strong pepper-like irritation in the upper respiratory tract. Other symptoms include irritation of the eyes and uncontrollable tearing. Symptoms of these agents include a very stuffy nose, severe headache, intense burning in the throat, and tightness and pain in the chest. These are followed by uncontrollable sneezing, coughing, nausea, vomiting, and a general feeling of bodily discomfort. These agents are dispersed as aerosols and produce their effects by inhalation or by direct action on the eyes. If survivors inhale a vomiting agent before donning their masks, they may become ill after the respirator is on. As long as a vomiting agent is present, however, mask-wear is essential. The mask should be pulled away from the chin during actual vomiting, but not removed. If the survivor has vomited in the mask, caution should be taken to avoid inhaling or ingesting the vomit. Vomiting agents are not considered a major threat because of the comparative ease of protection against them and their lower toxicity unless used with other agents. Vomiting agents alone seldom produce death (figure 31-3).

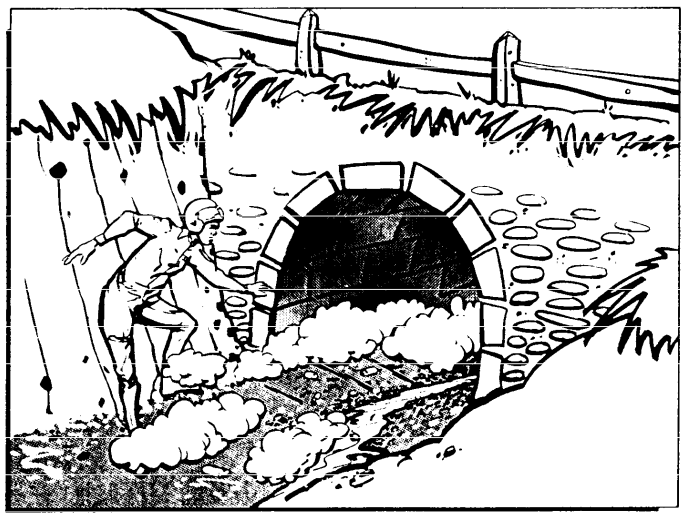

Figure 31-3. Avoiding Agents.

f. Incapacitating Agents. An incapacitating agent is any chemical which produces a temporary disabling condition which persists for hours to days after exposure to the agent has ceased (unlike that produced by riot control agents) and for which medical treatment, while not required, facilitates a more rapid recovery.

(NOTE: Symptoms of riot control agents may not be distinguished from other lethal agents; therefore, the survivor must be prepared to provide treatment for lethal agents.) In actual usage, the term "incapacitating agent" has come to refer primarily to those agents which:

(1) Produce their effects mainly by altering or disrupting the higher regulatory activity of the central nervous system (figure 31-4).

(2) Last for hours or days rather than the very short duration of riot control agents.

(3) Do not seriously endanger life (except when large doses are received) and produce no permanent injury.

Figure 31-4. Effects.

g. Riot Control (RC) Agents (Irritant Agents). RC agents are the least poisonous of the seven groups of chemical agents. They act primarily on the eyes, causing intense pain and tearing. Higher concentrations irritate the upper respiratory tract and the skin and sometimes cause nausea and vomiting. These agents may be dispersed as smoke or in solutions as droplet aerosols. Although they are used primarily in training and in riot control, some agents may be used in combat. When an unmasked person comes in contact with riot control agents, the effects are felt almost immediately. The effects begin in 20 to 60 seconds, depending upon agent concentration. Duration of effects lasts 5 to 10 minutes after removal to fresh air. There is usually no permanent damage to the eyes. For a short time (minutes), a person may be unable to see. If the mask is used before RC agents enter the eyes, increased protection is afforded.

31-3. Detection:

a. General Indications. Detection of a chemical agent requires the recognition of evidence gathered by direct or indirect means. Therefore, every survivor must be alert and able to detect any clues indicating chemical warfare is being used. General symptoms of chemical agents are tears, difficult breathing, choking, itching, coughing, and dizziness. In the presence of agents that are very hard to detect without the use of detection devices, survivors must watch their fellow aircrew members constantly for symptoms. Additionally, a survivor's surroundings may provide valuable clues to the presence of chemical agents; for example, dead animals, sick people, or people displaying abnormal behavior.

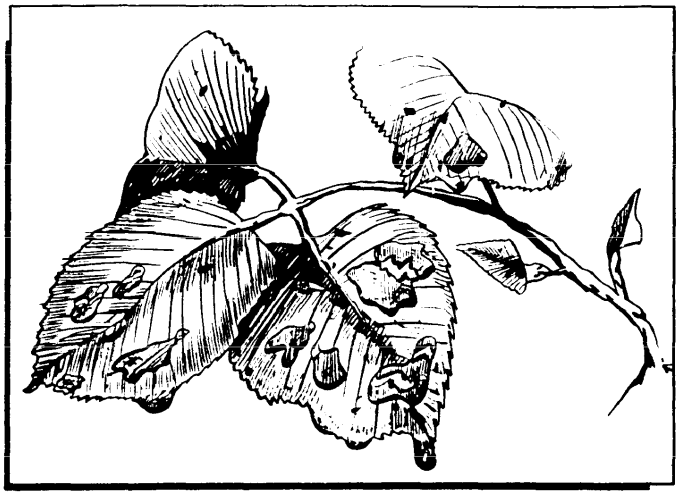

Figure 31-5. Detection.

b. Smell. Survivors cannot rely on the nose as a foolproof means of detecting chemical agents. Although some agents do have a characteristic odor, many others have little or no odor at all. An agent may smell quite differently to different individuals. A mixture of agents will have a different smell than any one agent by itself.

c. Sight. Since chemical agents are in one of three physical states—solid, liquid, or vapors—the sense of sight may help detect their presence. Most chemical agents in the solid or liquid state have some color. In the vapor state, some chemical agents can be seen as mist or thin fog immediately after bomb or shell bursts. Nerve agents are either a colorless liquid or a colorless vapor. Although survivors can't see nerve agents, their eyes may help by detecting the methods used to dispense the agents. Mustard gas, unless purified, is dark brown in its liquid state. As a liquid, it is easy to detect and would appear as oily, dark patches on leaves and buildings. However, liquid mustard changes slowly to a colorless gas. As a gas, it is still very toxic, but now the eyes will not be an effective aid to detection (figure 31-5).

d. Hearing. If survivors know the methods being used by the enemy to spread chemical agents, they can detect the sounds of the enemy's chemical munitions. For example, a bomb filled with an agent would probably cause only a muffled explosion; however, aircrew mem-

bers untrained in ordnance may have difficulty in making this distinction.

e. Feel and Taste. Irritation in the nose or eyes or on the skin is an urgent warning to protect the body from chemical agents. Additionally, a strange taste in food, water, or cigarettes may serve as a warning they have been contaminated.

31-4. Protection:

a. Protective Actions. Survivors should use the following steps, listed in the order of importance, to protect themselves from chemical attack:

(1) Use protective equipment.

(2) Give quick and correct self-aid when contaminated.

(3) Avoid the areas where chemical agents exist.

(4) Decontaminate equipment and the body as soon as possible.

b. Equipment. Survivors' masks are as vital to them as lifejackets are to sailors or as parachutes are to fliers. If properly adjusted, they protect the face, eyes, and lungs from chemical agents. Survivors are responsible for proper care of the mask and should inspect the masks frequently to ensure they are free from damage and in good condition. Aircrew members located in areas of potential contamination are issued protective clothing.

c. Self-Aid. Survivors must apply self-aid skillfully and promptly after exposure. Not only is it important for them to know what to do, but they must also know what not to do. It is evident from previous information in this chapter that each type of chemical agent produces certain conditions which require special treatment. However, there are certain essentials of self-aid which, if applied soon enough, give some relief and may prevent serious injury.

(1) Since there are definite time limits after which self-aid becomes useless, immediate self-aid or personal decontamination is all-important if survivors are exposed to liquid nerve or blister agents. Since they may not know whether the contamination is by liquid nerve agent or liquid blister agent, the following procedures are recommended:

(a) Don the mask and clear it.

(b) Contact with thickened (persistent) nerve or mustard agents requires the use of decontamination kit, or if not available, tear away the contaminated area of clothing and rinse immediately with water.

(c) Rinse contaminated areas with water (removes nerve agents).

(d) If effects of nerve agents become apparent, then and only then, use an antidote, realizing the antidote provides protection only from nerve agent (GA, GB, GD). It is also incapacitating and is not effective against V agents.

(2) Use the self-aid procedure given in the following paragraphs for specific agents if the agent has been identified.

(a) Nerve Agents. The protective mask and hood, if available, must be donned immediately at the first sign of a nerve agent in the air. Stop breathing until the mask is on and the facepiece cleared and checked. The mask should be worn constantly until the absence of the nerve agent in the air is indicated or the individual moves into a clean area (where there are live animals, etc.) If, after masking, the survivor has an unexplained runny nose, tightness of the chest, dimness of vision, or breathing difficulty, the use of the antidote should be considered. (Use of the antidote is moderately to severely incapacitating. The survivor should consider the severity of symptoms, availability of the buddy care system and requirements for rescue before injecting the antidote.) Exposure to high concentrations of a nerve agent may bring on incoordination, mental confusion, and collapse so rapidly that the survivor cannot perform self-aid. If this happens, a fellow aircrew member must administer first aid. Severe nerve agent exposure may rapidly cause unconsciousness, muscular paralysis, and breathing stoppage. Any remaining survivors should keep their masks on and move out of the area as soon as possible. The following precautions should be used when applying self-aid for nerve agents:

-1. Antidote should not be used until certain it is needed. Pinpointing of the eye pupils or blurred vision, tightness in the chest, and difficulty in breathing are signs it is needed. If certain nerve agents are inhaled, the antidote counteracts them and makes the survivor feel better.

-2. If survivors have inhaled a very large dose of nerve agent vapor, they may need more than one injection of the antidote to relieve their symptoms. If the symptoms are steadily becoming worse and the first injection does not relieve them, or if their mouth does not become dry, it may be necessary to use an extra dose. Inject the second dosage in a different muscle. (NOTE: Do not use your own combo pen to inject a victim; use theirs. Additionally, if you find a deceased aircrew member, remove the combo pens from the deceased and take them with you.)

-3. If the difficulty in breathing is not relieved by the second injection, one more dose may be administered. Dryness of the mouth is a good sign. It means they have had enough antidote to overcome the dangerous effects of the nerve agent.

-4. If a drop or splash of liquid nerve agent gets into the eye, instant action is necessary to avoid serious effects. The eye should be irrigated immediately with water by tilting the head back, looking straight upward. Slowly pour water into the contaminated eye. Hold the eye open with the finger if necessary. Pour the water slowly so that irrigation will last at least 30 seconds. Survivors must irrigate in spite of the danger of breath-

ing nerve agent vapor. Don the mask quickly after completing the irrigation. The pupil of the contaminated eye should be observed during the next minute, in a mirror if one is available or by someone nearby. If the pupil rapidly gets smaller, inject antidote intramuscularly at once. If the pupil does not get smaller, antidote is not needed.

-5. If liquid nerve agent gets on the skin or clothing, it should be removed. The liquid should be blotted off the skin with a handkerchief, a piece of cloth torn from the outer clothing, or personal decontaminating kits. Pinch-blotting the liquid won't spread the contamination. Contaminated clothing must be quickly removed and the skin washed with soap and water. In an emergency, the contaminated portion of the clothing can be cut away and the contaminated skin area flushed with water. The muscles under the contaminated area should be observed for any signs of twitching. If none develops in the next half hour and the survivor has no tightness in the chest, the decontamination was successful. If twitching of the muscles under the area of contaminated skin does develop, the antidote should be administered at once.

-6. Food and water which may be contaminated with nerve agents must be avoided. If a survivor has swallowed contaminated food or water and all of these symptoms occur—nausea, pains in the stomach, increased flow of saliva, and a tightness in the chest—the antidote must be administered.

(b) Blood Agents. If, during any chemical attack, a sudden stimulation of breathing or an odor like bitter almonds is noticed, the survivor must don the mask as quickly as possible. Speed is absolutely essential; this agent acts so rapidly that within a few seconds its effects will make it impossible for survivors to don the mask by themselves. The breath should be held until the mask is on the face, if at all possible. This may be very difficult since the agent strongly stimulates respiration.

(c) Blister Agents. The protective mask, hood, and clothing must be worn when liquid or vaporized blister agents are known to be present. There are two groups of blister agents, one called mustards and the other called arsenicals. Self-aid against mustards and arsenicals is the same. A liquid mustard in the eye will not hurt immediately. A liquid arsenical in the eye will sting and hurt severely.

-1. To remove a liquid blister agent from the eye, the eye is irrigated using the same procedure as for removing nerve agents. Speed in decontaminating the eye is absolutely essential. The self-aid procedure is very effective for mustard within the first few seconds after exposure but is of little value after 2 minutes.

-2. Generally, for any liquid blister agent on the skin, the survivor should:

-a. Pinch-blot to prevent the liquid from spreading, using cloth or any other absorbent material at hand. The used cloth or absorbent material should then be discarded.

-b. Scrub the skin with soap and water and rinse thoroughly with clean water. When scrubbing, special attention must be paid to areas not covered by clothing (neck and ears).

-3. Survivors must decontaminate or remove any clothing which is contaminated with liquid blister agent. Small areas on the clothing can be decontaminated by using soap and water. The contaminated parts of the clothing can also be cut out, thus making the clothing safe to wear.

-4. When mustard vapor is detected, a survivor must put on the mask and leave it on until clear of the area. There is no decontamination procedure of any value when a mustard vapor agent is used. The damage is done as soon as the mustard vapor strikes the eyes, although the full extent of the injury may not appear for several hours.

(d) Choking Agents. The protective mask should be donned immediately upon detection of any choking agents in the air by odor (like cut green corn or grass), irritation of the eyes, or change in the taste of a cigarette (smoking may become tasteless or offensive in taste). Survivors should hold their breath while masking. If an agent has been inhaled, normal survival duties should be continued unless there is difficulty in breathing, nausea and vomiting, or more than the usual shortness of breath from exertion. If any of the above symptoms occur, survivors should rest.

(e) Incapacitating Agents. The mask should be donned immediately. Complete cleaning of the skin with soap and water should be done at the earliest opportunity. The eyes should be flushed with clear water only. Survivors should shake or brush clothing, and when conditions permit, change clothing and thoroughly wash the contaminated clothing.

(f) Vomiting Agents. The protective mask must be worn in spite of coughing, sneezing, salivation, and nausea. The mask can be lifted from the face briefly if necessary to permit vomiting or to drain saliva from the facepiece. Carrying on duties as vigorously as possible will help to lessen and to shorten the symptoms. Survival duties can usually be performed despite the effects of vomiting agents.

(g) Riot Control Agents. After the protective mask has been donned and cleared, the eyes should be kept open as much as possible. When vision clears, activities can continue. The eyes should not be rubbed. If drops or particles have entered the eyes, the eyes can be flushed with water. Chest discomfort can usually be relieved merely by talking.

31-5. Avoiding Chemical Agents. If survivors are hit by a chemical attack, they may have to remain in a contaminated area. After an attack, they should not expose themselves to other enemy weapons and must seek ar-

eas which are less contaminated. If the attack is on a very small scale, they might seek an upwind area. Depending on the area and weather conditions, crosswind movement may be best. Chemical agent attacks may cover too large an area to permit area avoidance. Selecting routes on high ground may be advisable because gas is usually heavier than air and tends to settle in low places. Cellars, trenches, gullies, and valleys are examples of places to avoid when possible. Woods, tall grass, and bushes tend to hold chemcial agent vapors. (NOTE: Survivors have a better chance to avoid chemicals if they are familiar with the attack areas and if they know their personal location.)

31-6. Decontamination of Chemical Agents. Decontamination is removing, neutralizing, or destroying the agents. The purpose of personal decontamination is to remove agents from the body or personal equipment before serious injury occurs. An example of decontamination by removal is pinch-blotting the chemical agent from the skin. Neutralization makes the agent harmless. The contaminated cloth could also be buried. Common sense and quick thinking play a big role in personal decontamination. Survivors may have to rely on whatever they have at hand to remove chemical agents from the skin, eyes, or equipment. If liquid nerve or blister agents touch any part of the body, they must be removed as quickly as possible. If survivors are caught without soap and water, then anything which can dilute or remove the agents will have to be used; it may be mud, dirt, or urine. A crude remover may remove only two-thirds of the agent, but it is far better than leaving the agent in full concentration. It must be remembered that nerve and blister agents penetrate very rapidly. (NOTE: Use a scraping action to avoid pressing the agent into the skin.)

a. Soap is excellent for removing chemical agents. Cold water, while not as good as warm water, does dilute or weaken chemical agents. Hot, soapy water removes agents quickly. If the operational situation permits, a bath or a shower should be taken. The mask should be left on until after survivors have washed their hair and thoroughly scrubbed themselves while avoiding wetting the canister or cheek pads. Exposed areas and hairy regions of the body should be given extra attention.

b. When clothes have been exposed only to chemical agent vapors, airing usually decontaminates them (with the exception of mustard vapors which will absorb into the garment and requires washing for removal). If chemical agent droplets or liquid splashes are present, survivors will need detergent or soap and water. Wool clothes are best washed in soapy, lukewarm water. Cotton clothes can be boiled.

c. Boots or shoes can be scrubbed with soap and water and rinsed at least twice. If the survivors' choice is wearing contaminated clothes and shoes or nothing, decontamination of the material must be done the best way possible. Almost any effort will help the survival situation.

31-7. Tips for a Survivor:

a. Keep the body and living area clean.

b. Keep the nose, mouth, and skin covered.

c. If a protective mask is needed, but unavailable, improvise. The charcoal cloth from the CD suit or undergarment makes a moderately effective mask for short-term agent exposure. The use of the aircrew helmet, visor, and charcoal mask may provide a higher level of protection for the eyes and respiratory system.

d. Build a shelter or rest area in a clearing away from vegetation. Decontaminate the ground by removing the top soil. Keep the entrance closed and 90 degrees to the prevailing wind.

e. Do not use wood or vegetation from a contaminated area for a fire.

f. Look at the area around a water source and check for foreign odors (garlic, mustard, geranium, bitter almond), oily spots on the surface or nearby, and the presence of dead fish and animals. If they are present, do not use the water.

g. Keep food and water protected. Bottled or canned foods and water are safe if sealed, and the cans are decontaminated before opening.

h. If possible, obtain water from a closed source, precipitation (if there is no evidence of agent vapor in the air), and from a slow-moving stream after it has been filtered.

i. Do not use plants for food or water in a contaminated area.

j. Do not use sick animals as a food source. When skinning animals in a contaminated area, use protective clothing (gloves).

k. If traveling, travel crosswind or upwind.

BY ORDER OF THE SECRETARY OF THE AIR FORCE

OFFICIAL

CHARLES A. GABRIEL, General, USAF
Chief of Staff

JAMES H. DELANEY, Colonel, USAF
Director of Administration

SUMMARY OF CHANGES

This regulation has been rewritten to provide sufficient information for aircrew members and instructors who teach survival training. The information has been changed from environmental areas to subject-matter sections. Color illustrations have been added to provide realistic depiction of navigational aids, climatic areas, and fauna in its appropriate environment. Information has been expanded in all areas of the regulation. The following new information has been added: Weather, Geographic Principles, Chemical, and Biological Conditions.

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