Chapter 5
Smoke, Obscurants, Non-Lethal, and Flame

> "Major Murphy told me that he could not add smoke in the plan since the stencil had already been cut. That was one of the most foolish remarks that I heard during World War I."
>
> General George S. Patton, Jr.,
> Patton's Diary, Sep 8, 1918

Smoke and obscurants are used on the battlefield to enhance friendly operations and degrade enemy operations. All forces on the battlefield use smoke and battle-induced obscurants, such as HE artillery-generated dust. When coupled with naturally occurring obscurants, such as rain, snow, or fog, limited visibility becomes the normal battlefield operating condition.

Friendly and enemy surveillance and weapon systems use visual, infrared, or radar sensors to see the battlefield. Smoke and obscurants provide low-cost countermeasures to these systems. Smoke and obscurants can change the relative combat power of opposing forces by changing the effectiveness of their weapon systems. In addition, smoke and obscurants increase survivability and enhance force effectiveness by—

● Degrading the enemy's ability to see.
● Disrupting the enemy's ability to send visual signals.
● Concealing friendly forces.
● Deceiving the enemy.
● Sending friendly signals, including identification of forces and targets.
● Attenuating energy weapons.
● Enhancing the effectiveness of friendy weapon systems.

OPERATIONAL AND TACTICAL LEVELS OF WAR

At the operational level of war, corps and echelons above corps use smoke to conceal the location or size of mobile forces. Smoke can be used to conceal logistics over the shore (LOTS) operations, dams, locks, and critical areas on MSRs. Large, obscurant clouds and dummy smoke can support deception plans at the operational level. Large-area smoke increases survivability of key logistics and transportation assets by degrading missile and air attack guidance systems. Smoke can conceal facilities necessary to sustain the force, such as ports, terminals, and critical rail facilities.

At the tactical level of war smoke supports the movement and positioning of forces on the battlefield. It covers the logistical support of forces before, during, and after engagements. Friendly forces use smoke to support the commander's concept of operations or counter an immediate enemy threat. Smoke disrupts enemy command and control. It degrades enemy reconnaissance, intelligence, surveillance, and target acquisition. It counters antitank guided missiles (ATGMs), directed-energy

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weapons, and laser range-finding and designating systems. It supports battlefield deception operations. FM 3-50 provides detailed guidance on conducting smoke operations.

SMOKE SOURCES

Forces tailor a variety of delivery means and munitions to produce smoke screens. These sources include—

- Projected smoke. Artillery, mortars, and multifunction rockets can deliver a dense, white smoke using white phosphorus (WP), red phosphorus (RP), and hexachloroethane (HC).
- Generated smoke. Smoke generators, smoke pots, and screening smoke hand grenades produce white smoke using fog oil (for generators) or HC (for pots and grenades). Signaling grenades produce colored smoke for identifying and marking.
- Self-defense smoke. Some US vehicles have vehicle engine exhaust smoke systems (VEESSs) that use diesel fuel to create a smoke screen. However, JP8 fuel will limit VEESS effectiveness as little smoke is produced at temperatures above 32°F. Many vehicles also mount smoke grenade launchers that can create a self-protection screen within seconds. Units predetermine whether to load the launcher with a grenade that will screen unaided or unenhanced vision only (L8A3 RP grenade) or a grenade that will screen thermal imagery (M76 bispectral grenade). Friendly and enemy sensor and weapon system capabilities guide this decision.

When bispectral grenades are used, the screen can break weapons lock on thermally-guided missiles. However, the screen will also obscure the vehicle's own thermal viewer.

DELlBERATE AND HASTY SMOKE

Units at every level should plan deliberate smoke operations to support the commander's concept of operations using any available smoke source. Deliberate smoke operations are characterized by—

- Extensive planning at the command level that controls the affected area.
- Extensive coordination (including coordination with units adjacent to the areas being smoked).
- Extended periods of operation (typically hours to days).
- Significant logistics support.
- Significant support for mobility (deliberate smoke with deliberate breach and hasty smoke with in-stride

breach), countermobility, and survivability operations.
- Extensive and redundant communication.
- Alternate (back up) plans.
- Deception plans.

During deliberate smoke operations forces conceal or protect large areas (several square kilometers) behind the FLOT with smoke generators supplemented by smoke pots. They obscure point or small-area targets in enemy-controlled territory with projected smoke assets (for example, artillery, mortars, naval gunfire, and close air support rockets). Deliberate operations can consume large amounts of fuel, fog oil, and munitions. They require extensive use of relatively scarce smoke generator and artillery assets.

Battalion task forces and smaller units conduct hasty smoke operations to counter an immediate enemy tactical threat. Forces conducting these operations use the unit basic load of smoke- producing sources, augmented by rapidly responding assets like mortars, artillery, and smoke units if available. Hasty smoke operations are characterized by—

- Minimal time available for planning and executing the mission.
- Minimal coordination.
- Relatively short duration (typically one or two hours or less).
- Use of organic assets.
- Reliance in SOPs/battle drills.

During hasty smoke operations forces create local screens to support small unit maneuver or disengagement. Hasty smoke operations require rapid planning and execution. Units must still preplan the operational and logistical support for using hasty smoke.

LARGE-AREA SMOKE

Most deliberate smoke operations and some hasty operations require the generation of large obscurant clouds which may cover many square kilometers, Smoke units create large-area smoke clouds with stationary or mobile smoke generator systems supplemented with smoke pots.

Stationary and Mobile Smoke Generator Systems

Smoke units with stationary generators develop smoke plans using primary and alternate unit positions. Other smoke sources are added to enable the unit to cover a specific area or stationary target under different weather conditions. Mobile (motorized and mechanized) smoke generator systems

can make smoke while moving. To cover stationary or mobile targets they can quickly displace to create successive screens.

Echelons above corps normally use stationary smoke systems assigned to smoke units or fixed sites in the COMMZ. Corps and divisions use mobile smoke units forward of the corps rear boundary. They use motorized smoke in their rear and main areas and mechanized smoke forward. Projected smoke may supplement huge-area smoke by shortening time required to develop effective clouds.

Logistics Impact

Operations and logistics planners must consider the requirement to supply fog oil to smoke generators. Few substitutes exist for fog oil. Only basestock refined oil products (90, 100, or 150 neutral products), 10-weight and 75-weight motor oils, and SGF1 may substitute; diesel fuel and JP8 cannot. Logistics planners should consider push packages of POL to smoke units. In general, only unit distribution methods will sustain smoke units due to their lack of transportation assets. Therefore, the distribution scheme within a division may require extraordinary handling to sustain this valuable combat support asset .

BATTLEFIELD APPLICATIONS AND TYPES OF SMOKE

Friendly units use smoke and obscurants to attack and defeat enemy recon, intelligence, surveillance, and target acquisition efforts and to degrade the enemy's combat effectiveness. For example, we may fire obscuring smoke mixed with high explosives onto an enemy ATGM position to defeat its target acquisition efforts. We may fire or generate smoke between enemy echelons to degrade command and control and interfere with synchronization. We conceal our forces and positions with smoke. Smoke supports deception plans by drawing attention away from the main effort. It can mark targets or friendly positions. It protects friendly forces against directed-energy weapons and the thermal effects of nuclear weapons. It enhances friendly weapon systems when used to exploit specific enemy vulnerabilities.

Obscuring Smoke

Friendly units use smoke directly on enemy positions to confuse and disorient direct-fire gunners and artillery forward observers. The former Soviet Army believed that obscuring (blinding) smoke on enemy positions was more effective than concealing (camouflaging) smoke over friendly forces. Their writings stated that friendly forces can cut losses by more than 90 percent by obscuring enemy direct-fire gunners and forward observers with smoke.

Screening Smoke

Friendly forces conceal positions and activities from enemy ground or air observation by using screening smoke over their own operational areas or between friendly and enemy forces. A smoke blanket, a haze, or a curtain may be used to accomplish this mission.

A smoke blanket prevents enemy observation from the ground or the air. A blanket provides excellent concealment; however, it contains such dense smoke that it restricts friendly movement and activity. Smoke blankets are very resource-intensive and sometimes disruptive for friendly activities. As a result, blankets are seldom used unless absolute concealment is needed. Friendly forces most often use a smoke haze for screening. A haze is heavy enough to restrict accurate enemy fires but is light enough to avoid significantly hampering friendly operations. On some occasions when weather conditions do not allow a haze, friendly forces may use a smoke curtain. This vertical line of smoke between friendly and enemy positions restricts enemy ground observation of friendly positions and activities. Smoke curtains may not always restrict enemy air observation.

Marking Smoke

Forces use marking smoke to identify targets or friendly forces during close air support, attack helicopter operations, and other fire support tasks. Marking smoke also supports prearranged battlefield communications for control measures, link-up operations, and tactical cues.

Protecting Smoke

Units use protecting smoke to defeat command line of sight terminal homing ATGMs, attenuate directed-energy (DE) weapons and thermal energy effects of DE and nuclear weapons. Bispectral smoke grenades can protect armored vehicles by interfering with the enemy gunner's ability to either track the vehicle or control the missile. Large-area smoke can reflect, absorb, or scatter heat and light from nuclear

weapons. Smoke is an excellent countermeasure to low-energy lasers which damage vision or optics.

ENHANCEMENT OF FRIENDLY WEAPONS SYSTEMS

Smoke and obscurants create feelings of isolation in the enemy soldier, causing stress and reducing combat effectiveness. Smoke interferes with enemy reaction to obstacles, barriers, and minefields. It suppresses enemy flash-ranging techniques. It forces the enemy to use electronic transmissions more frequently, making him more vulnerable to electronic warfare. It supports air defense by filling valleys and defiles to deny nap-of-earth helicopter routes.

TACTICAL EMPLOYMENT OF SMOKE

Commanders use all factors of METT-T to plan smoke operations. The weather-dependent nature of smoke requires intense preparation. Time of day, humidity, and wind direction are major considerations when planning effective smoke support. FM 3-50 describes appropriate planning considerations.

Commanders must know their units' ability and that of the enemy to see and fight through smoke. IPB identifies capabilities of enemy sensors and obscurants. Planners balance the degradation caused by friendly smoke against friendly and enemy surveillance and weapon systems before using smoke.

Smoke normally favors the attacker. It is particularly effective at night and other limited-visibility conditions. Smoke is most effective when used in compartmented terrain.

Smoke compresses usable areas of the battlefield. Attacking forces may remain concealed by smoke until they are less than 1,000 meters from defender positions. Although attacking forces will silhouette themselves as they emerge from the smoke at this range, the defender will have great difficulty defending against overwhelming numbers emerging from a screen close to the defensive positions.

Units should avoid placing smoke on their own lines of sight. Dust raised by HE point-detonating artillery, projected smoke and burning debris, will degrade friendly sensors. Friendly smoke should not be allowed to thicken enemy obscurants to make friendly systems less effective.

Smoke in the Offense

Before the battle, smoke denies the enemy information about the composition and disposition of friendly forces. It screens assembly areas and defeats enemy target acquisition and surveillance. Smoke conceals maneuver and combat support forces and contributes to deception operations. Friendly forces use projected, generated, and self-defense smoke to-
- Mark targets.
- Obscure enemy gunners and surveillance.
- Degrade enemy command, control, and communications.
- Conceal passage of lines, movement to contact, and hasty and deliberate attacks.
- Conceal or restrict landing zones (LZs), drop zones (DZs), or pickup zones (PZs). (For friendly LZs, DZs, and PZs the smoke is placed to restrict enemy observation without interfering with friendly operations.)
- conceal river-crossing operations and reduction of obstacles.
- Conceal logistics operations (for example, refuel-on-the-move sites).
- Signal.
- Support deception plans.
- Degrade enemy laser designators, range finders, and weapons.
- Enhance the effectiveness of artillery-delivered minefield by concealing their visual indicators.
- Support MOUT operations.

Smoke in the Defense

In the defense, forces use smoke primarily to increase survivability and counter enemy recon, surveillance, and target acquisition. Forces use smoke in the defense to—
- Obscure enemy direct-fire gunners and artillery forward observers.
- Disrupt enemy movement and command and control.
- Conceal obstacle emplacement, preparation of battle positions, and movement to alternate positions.
- Conceal reconstitution, holding, and staging areas.
- Conceal MSR activities.
- Signal.
- Mark targets.

- Deceive the enemy as to areas of main effort and battle positions.

●Reduce the effectiveness of enemy directed--energy weapons.
●Enhance air defense by degrading nap-of-earth flight patterns and forcing the enemy to fly higher.
●Silhouette targets.
●Support MOUT operations.
●Restrict LZs or DZs.

SMOKE SUPPORT FOR TACTICAL DECEPTION

Smoke draws attention. Units use smoke to enhance deception operations, drawing attention away from the main effort and misleading the enemy about friendly force intentions. The enemy may divert forces and fires to the deception, reducing capability to mass forces against actual friendly force operations.

For example, using smoke to conceal a dummy defensive preparation and support activities confuses the enemy as to the precise location of the defense. Smoke and high-explosive preparations of dummy objectives may confuse the enemy as to the actual main attack.

Smoke should never be the only deception activity. It supports other means to portray a false picture to the enemy. Smoke enhances the realism of a display, feint, or demonstration. Radio traffic, combat noises, vehicle dust, and decoys in addition to the smoke support the deception plan. Heat sources and radar reflectors concealed by smoke add to the credibility of the deception effort.

COUNTERING ENEMY USE OF SMOKE

Enemy use of smoke and obscurants may significantly degrade friendly defensive and offensive operations. Enemy forces use smoke as a control measure to synchronize the movement of attacking forces. US forces use a variety of countermeasures to defeat enemy use of smoke and obscurants. Some combat actions common to the battlefield with or without obscurants serve as countermeasures to enemy smoke use. These include—
●Offensive operations, which disrupt the enemy's ability to conduct or support smoke operations.
●Electronic warfare, which hinders enemy movement and command, control, and communications in smoke.
●Obstacles, which disrupt enemy timetables for using smoke.
  Tactical deception, which prevents the enemy from

locating (and smoking) friendly positions.
●Friendly countersmoke which may be used to confuse the enemy and prevent its effective use of smoke as a control measure.
●Counterbattery fires, which limit enemy delivery capability.

Countermeasures which enhance friendly survivability and mitigate the effects of enemy obscurants include:
●Electro-optical devices. Thermal devices will permit surveillance and target engagement through smoke. Our thermal devices will only see through visual obscurants.
●Dispersion. Dispersing forces laterally and in depth to provide multiple lines of sight (LOS) reduces the value of enemy smoke.
●FASCAM (family of scatterable mines) with smoke. Integrating smoke with FASCAM-emplaced minefield increases their effectiveness by hiding visual cues. Since minefield normally remain under direct observation and fire, friendly forces must prepare to cease smoke operations quickly and engage targets in the smoke using electro-optical devices.
●Alternate positions. Friendly forces construct alternate positions. They move to alternate positions when the primary positions become untenable. They also use these positions when LOS from the primary positions are obscured by smoke and HE-generated dust.
●Stay-behind forces. Typically the enemy will concentrate its obscurants in front of its troops. Stay-behind forces can engage an enemy from its flanks and rear after it has passed their position.
●Positioning of ground/vehicle laser locator designator (G/VLLD). Since most laser range finders and designators are susceptible to degradation caused by obscurants, units must use them in locations that offer a high probability of clear LOS. Commanders may improve fire support by placing G/VLLD in positions where the enemy is less likely to use smoke; that is, they may position G/VLLD to their front or flanks, even though LOS from these positions are more limited, to avoid obvious key terrain features that the enemy is certain to obscure.
●Positioning of observation posts (OPS). The enemy will not normally surround its forces completely with smoke. It will obscure the most likely enemy positions and LOS. Positioning OPs at extended distances to the front and flanks may provide some unobscured LOS to identify size and composition of enemy forces and support calls for fire.
●Target enemy smoke assets. Friendly forces locate and destroy enemy smoke generator units or vehicles

to strip away advantages possible with its smoke cover.

NON-LETHAL

OPERATIONS

Riot control agents (RCAs) and herbicides are non-lethal chemicals which have military application. Non-lethal materials are available to the commander under specific conditions. The Joint Strategic Capabilities Plan (JSCP) is the source document for the most current employment conditions.

RCAs and herbicides are used for law enforcement, agriculture, and industry. They are not classified as military chemical agents. Their uses are covered by different policies than those that govern chemical warfare. Information on US policy regarding use of RCAs and herbicides is covered in Chapter 1.

Riot Control Agents

RCAs are compounds that produce temporary irritating or incapacitating effects when used in field concentrations. They include tearing (crying), sneezing, and vomiting agents. Tearing agents are the most frequently used RCAs.

Types

The most commonly used riot control agent, CS, is a white solid that causes a blinding flow of tears and involuntary closing of the eyes. In greater concentrations, it irritates moist skin and the respiratory tract. Other agents in the US Army inventory include CSX, CS1, CS2, and CR. One of the more recent additions to the RCA inventory is oleoresin capsicum (OC) or pepper spray. It behaves much like CS with respect to the affects on the upper respiratory system. However, OC is an inflammatory rather than an irritant as is CS. The physiological effects desired and the dissemination means available determine the choice of RCA.

Uses

RCAs are widely used for training, riot control, noncombatant evacuation operations (NEOs), and situations in which long-term affects are unacceptable. US forces disseminate RCAs in hand grenades, ring airfoil projectiles, 40-millimeter cartridge grenades, or bulk agent aerial and ground dispersers.

Protection

The protective mask protects soldiers' eyes and respiratory tracts from RCAs. Normal clothing over exposed skin can help prevent skin irritation. Personnel decontaminate RCAs by both brushing and washing exposed skin or clothing.

Employment Operations

US forces may conduct tactical RCA operations across the range of military operations after Presidential approval.

In peacetime, the Secretary of Defense may authorize use of RCAs. Specifically, RCAs may be used on US bases, posts, embassy grounds, and installations for protection and security purposes such as riot control and evacuation of US noncombatants. The US-controlled portions of foreign installations are considered US installations. Authority for use of RCAs in peacetime situations not addressed above is covered in operations plans that are submitted for Secretary of Defense approval.

Low-Intensity Conflict

In a low-intensity conflict unsophisticated forces could use chemical agents or RCAs. In most cases these forces will have only limited protective equipment. Many units may be completely unprotected. As a result, retaliation with RCAs will be highly effective and will mitigate any advantages achieved by the enemy.

Following Presidential approval, forces can use RCAs to—
- Protect installations and bases.
- Reduce insurgent capacity for offensive operations.
- Support attack of fortified and unfortified enemy positions.
- Restrict insurgent entry into an area.
- Aid in destroying or trapping insurgent forces.
- Draw the enemy into an unfavorable situation.
- Develop more favorable conditions for offensive operations.
- Gain time without fighting a decisive engagement.
- Avoid combat under undesirable conditions.
- Aid in disengaging from combat.
- Support relocation of friendly forces.
- Supplement security along extended lines of communications.
- Assist bunker and tunnel clearing operations.

RCAs can also be effective psychological weapons in areas where superstition or fear of the unknown can

be exploited among insurgents unfamiliar with these agents.

Mid-Intensity Conflict

RCAs could be effectively used against relatively sophisticated enemy forces in mid-intensity conflicts. Some elements of these enemy forces will have the training and equipment to withstand RCA use. Nevertheless, RCAs will still degrade enemy operations by forcing the use of that protective equipment. Protective masking will reduce the effectiveness of enemy fire and interfere with its command and control.

High-Intensity Conflict

When approved for use in a high-intensity conflict against sophisticated and well-equipped forces, RCAs provide the commander a measured degree of force to influence the outcome of military operations. In general, RCAs would be used in high-intensity conflicts in the same manner as they are used in low- and mid-intensity conflicts. However, they will seldom be used alone.

RCAs can be used any time serious injury or death is not the primary objective of the operation. RCAs offer commanders an opportunity to inflict temporary incapacitation, degradation, and terrain restriction.

Herbicides

Historically, herbicides have enabled railroads, power companies, and farmers to control unwanted vegetation. However, the United States no longer maintains herbicides in its inventory. US forces used herbicides in Southeast Asia to clear fields of fire around base camps and along lines of communications. Using aircraft- and truck-mounted sprayers, they could spray large areas in a relatively short time. Herbicides effects usually begin to occur within several days to weeks after spraying. Friendly forces could then clear defensive perimeters containing mines, booby traps, and other munitions. US forces also used herbicides to destroy concealment vital to the enemy's survival. Herbicides uncovered enemy supply routes and base camps.

Types
Herbicides kill or alter plant growth. Plant growth regulators alter the growth rate of vegetation.

Slowing growth can keep vegetation from blocking fields of vision, such as fields of fire and avenues of approach. Speeding growth can upset the natural growth cycle of a plant, causing its death. Defoliants cause plants to shed their leaves prematurely but not kill them. When selecting a defoliant for use, planners consider the effects desired and duration rate. Desiccants kill plants by dehydrating them. Soil sterilants sterilize both plants and seeds.

Herbicides can be selective or nonselective. Selective herbicides kill only certain plant species and have little or no effect on others. Nonselective herbicides kill all plant life without regard to species.

Uses
Forces use herbicides to reduce vegetation along suspected enemy routes of advance, assembly and hiding areas, and supply routes. Aerial observers can better monitor activities if these areas are treated. Herbicides neutralize the advantages of concealment.

Limited First Use of Herbicides

Upon presidential approval, herbicides may be used in areas under US control and along the FLOT to—
- Kill the vegetation bordering roads, paths, trails, railroads, and waterways. This reduces possible sites from which friendly forces may be ambushed.
- Kill the vegetation surrounding vulnerable base camps, communications complexes, pipelines, supply points, assault strips, landing zones, and air defense sites.
- Control vegetation in fields of fire and avenues of approach. The resulting fields of fire may destroy or canalize the enemy during approaches and withdrawals.
- Destroy large areas of dense vegetation for major construction projects or for health and sanitation programs.

Retaliatory Roles

Once an enemy uses herbicides, chemicals, toxins, pathogens, or RCAs against US or allied forces, retaliatory use of herbicides may be approved by the President. The standard against which such a request for release is measured is, "Will this use escalate the use of chemical compounds beyond the level already established by the enemy?" In the case of herbicides, the answer will probably be no, regardless of the chemical, biological compounds or agents the enemy

has used. Large-area spray missions, support of ground gaining operations, and anticrop applications in the enemy's rear areas are all acceptable retaliatory uses of herbicides. Political constraints and command guidance may rule out one or more of these applications, but all of them could be approved.

Herbicides may be used on enemy held terrain to support retaliatory operations by—
- Defoliating large-area targets to improve intelligence gathering. Defoliation increases vertical and horizontal visibility in densely vegetated areas.
- Killing vegetation on friendly objectives and suspected enemy positions.
- Destroying enemy food supplies and cash crops, when such objectives constitute proper military objectives.
- Destroying narcotic-producing crops in support of counternarcotic operations.

Herbicide operations, like all other actions in war, must be aggressively exploited to obtain the maximum benefits in terms of mission success and lives saved. Careful integration of herbicides with maneuver, fire support, engineer, and electronic warfare plans will net the greatest return. Careful use also reduces their potential to negatively impact concurrent and subsequent operations.

Presidential approval is always required to use herbicides in war, but host nation agreements may also require allied approval. Local civilian officials and civil affairs officers should be kept abreast of the effects of herbicide operations. When fighting as a member of an alliance, US forces must follow alliance policies regarding use.

FLAME OPERATIONS

Combatants have historically used flame in wars to kill, injure, or demoralize personnel and destroy equipment and structures. Flame was a major casualty-producer in World War II. For example, the incendiary raid on Tokyo in March 1945 killed more people (197,000) than the nuclear attacks on Hiroshima and Nagasaki. The human fear of fire, together with the physical damage it produces, accounts for the tactical success of flame in combat. FM 3-11 describes in detail flame operations and the construction and use of flame field expedients.

Tactical Use of Flame

Forces use flame weapons and flame field expedients (FFEs) during offensive and defensive operations and MOUT.

Offensive Use

All combat scenarios should include flame operations. Light forces are well suited to use flame, including FFE. Therefore, training for LIC must include the construction and use of FFE. Training should not be restricted to FFE, but include packaged flame systems as well. The M202A1 66-millimeter FLASH is a conventional flame weapon with application in MOUT operations. Army standard flame weapons can produce casualties in bunkers, buildings, covered or open fighting positions. It can also damage vehicles and destroy combustible supplies, ammunition, and materiel. White phosphorus and thermite munitions can be used to damage and destroy combustibles. Offensive forces may use flame weapons as part of an ambush plan.

Small, portable FFE weapons are another method for using flame in the offense. Exploding flame devices no larger than an ammunition can may be prepared in advance and carried into the battle. Small offensive forces operating in remote or isolated areas may use FFE to seal off border crossings or attack an infiltration route. During deep operations portable FFE devices can destroy enemy stocks of fuel and weapons.

Defensive Use

Use flame weapons and FFE devices in the defense to--
- Reinforce obstacles.
- Augment final protective fires.
- Cover dead spaces and gaps in the defense.
- Illuminate critical areas of the battle.

Defending forces cover flame weapons by supporting fire to prevent removal or destruction by the enemy. Camouflage and concealment achieve surprise and prevent enemy observation. Defenders must check exploding flame devices periodically to ensure the firing systems, explosives, and fuel have not deteriorated, been tampered with, or removed.

FFE devices can easily be constructed for defensive purposes. Individual flame mines and directional fougasses are examples of two powerful weapons that can be used in a defensive fire plan. Both devices are suitable for front-line and rear-area defensive postures. A minefield of command-detonated FFE mines is ideal for a long-term static defense or to restrict LZ/DZ in rear areas. Light forces may also use flame in a defensive role.

Flame Weapons and FFE Devices in MOUT

Forces can also use flame effectively in MOUT. Defenders can use flame weapons and FFE devices to destroy attacking forces. Attackers may target such complexes of large cities as transportation terminals, multistory buildings, communications facilities, and subway facilities, to disrupt the defender's operations.

Defense Against Flame

Friendly forces can expect the enemy to use flame weapons. Surviving an attack of this nature may depend on how well soldiers are trained to defend themselves against flame.

Individual Protection

The primary objective of individual defense is to prevent burning fuel from contacting bare skin. Soldiers use available cover when a flame attack is imminent. Covered fighting positions and prepared positions offer the best protection. However, shelter halves or blankets may provide protection when soldiers are caught in the open. Even a field jacket will afford a measure of protection. It is important to note that fire requires and consumes oxygen. Protective covers should be removed quickly and discarded when the danger posed by burning particles, droplets, and fuel globs has passed.

Bare skin areas, such as the hands, neck, and face, are especially vulnerable to flame attacks. Special efforts must be made to protect and cover these areas to prevent serious or perhaps fatal burns.

Tent canvas and truck tarpaulins treated with fire-resistant substances will resist flame for a short time. Three canvas articles can be expected to hold burning particles long enough for personnel to escape from a prepared position that has been covered by this material.

The plastic or rubber-coated poncho and any nylon or thermoplastic material, such as the poncho liner, should not be used as cover material. These items will melt from intense heat, adhere to the skin, and cause serious injury.

Training

Thorough troop indoctrination in the enemy's flame capabilities and limitations is essential. Soldiers must be mentally conditioned to believe that ground flame attacks can be repulsed. Commanders responsible for the training of troops must continually emphasize the difficulties the enemy will encounter in carrying out a flame mission.

- Preparation takes a great deal of time.

- Battle command is difficult.

- Enemy flame weapons are limited in range and capacity and can be identified and destroyed before they come into firing range.

- Defenders can defeat the attack by destroying key enemy personnel or vehicles before they reach an assaulting position.

Troops must be trained to recognize enemy flame equipment and weapons and any indications the enemy intends to use flame. Training must include the combat techniques the enemy uses in flame use. Soldiers must anticipate flame attacks and defend against them.

Use of Supporting Fires

The best defense against enemy flame is to identify flame weapons and destroy them before they get into usable range. Commanders may use supporting artillery, mortars, or tactical air against enemy flame weapons. They may identify the priority for destruction of these weapons in the fire plans of direct support units. Since existing flame weapons are relatively short-range, units normally engage and destroy them through precision adjustment of organic mortars. Large-area and projected smoke may also obscure friendly forces from being targeted by flame weapons.