FM 3-100

NBC OPERATIONS

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HEADQUARTERS
DEPARTMENT OF THE ARMY

Field Manual
No 3-100

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DEPARTMENT OF THE ARMY
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NBC OPERATIONS

PREFACE

Army officers and noncommissioned officers must know how NBC weapons affect conduct of the air-land battle. They must also know how to use their chemical specialists and chemical units. This keystone manual provides leaders basic information needed to help their units survive and accomplish the mission on a battlefield where NBC weapons are used. (Technical details are found in the other 3-series manuals listed in references.)

The fundamentals of NBC defense, smoke employment, and retaliation have changed. These changes are a result of air-land battle doctrine, new Chemical Corps structure in the Army, the growing threat, and recent studies, tests, and field experience. The new, more practical doctrine emphasizes flexibility and decentralization.

The challenges of the NBC battlefield are everyone's business. Since much of the new NBC doctrine, by necessity, is general in nature, every branch of the Army and every unit must adapt and tailor NBC procedures to their applications. Their missions, organizations, and equipment will dictate how they decontaminate, change protective clothing, enter vehicles and shelters without spreading contamination, and provide continuous individual protection. Leaders must ask themselves some basic questions about their units:

- How much are we degraded in an NBC environment?
- How does the degradation vary with temperature?
- How much longer do we need to perform a given mission?
- How accurately can we fire?
- How prepared are we to avoid heat and psychological casualties?

Knowing the answers to these and related questions, leaders will be able to issue timely orders and instructions to maximize the capability of their force.

Leaders now have more choices in dealing with NBC environments. With this flexibility comes more responsibility, especially in determining mission-oriented protective posture (MOPP) levels and in conducting decontamination operations. In general, units will have to take care of themselves with the advice of their chemical specialists but without the direct assistance of a chemical unit. Therefore, every unit must train to overcome contamination and accomplish its mission in an NBC environment.

Playing volleyball, jogging, and doing physical training in a mask may be effective ways to strengthen an individual's endurance in MOPP gear. However, unit readiness is better served by practicing battle drills, doing maintenance, eating, sleeping, communicating, firing weapons, and doing other related actions in MOPP gear. You must be able to do your primary mission in MOPP gear to survive, operate, and win on the air-land battlefield.

FM 3-100 implements the intent of STANAGs 2103 and 2150. The provisions of this publication are the subject of standardized agreements (STANAGs) 210 and 215.

The proponent for this manual is the US Army Chemical School. Recommended changes may be submitted on a DA Form 2028 to :

Commandant
US Army Chemical School
ATTN: ATZN-CM-NF
Fort McClellan, Al 36205-5020

INTRODUCTION

Chemical warfare did not end with World War I. Chemicals were used again in China and in Ethiopia just before World War II. In 1945, a new weapon was added to the battlefield when the awesome power of nuclear weapons was first used against Japan. Another weapon, biologically derived toxins, has been used in Thailand, Kampuchea, and Afghanistan in this decade. This repeated use of nuclear, biological, and chemical (NBC) weapons means that all American soldiers must be prepared for them.

Despite the various circumstances in which NBC weapons have been used, each instance shares two characteristics. First use of these weapons has always been against a defender who had no defense or means to retaliate. Examples are French divisions unaware of the new secret weapon at Ypres, Japanese armed forces without a nuclear offensive or offensive capability, and poorly armed rebels in Afghanistan. History indicates that the best way to keep these weapons from being used is to have well-trained soldiers adequately equipped, techniques for defense against NBC weapons, and the capability to retaliate.

The mission of the Chemical Corps is to prepare the Army to win in an NBC environment on the air-land battlefield by:

- Developing doctrine, organizations, training products, and equipment for NBC defense, chemical retaliation, and smoke operations.
- Training the land forces.
- Minimizing the impact of enemy use of NBC weapons through contamination avoidance, protection, and decontamination techniques.
- Employing smoke to enhance combat power.

Turn to page 5-8 and read how CPT Johnson, a company commander, reacted to a chemical threat. If you do not understand everything CPT Johnson did and why, you are not ready to lead soldiers in an environment in which NBC weapons may be used. The scenario only sketches the most obvious actions against one chemical attack. Nuclear, biological, and other factors are not included in the scenario. There is much more you need to understand and apply about NBC operations than is shown by this short account. This manual will give you this information.

Leaders of combat, combat support, and combat service support units comprise the target audience of this manual. Its purpose is to inform these personnel about the many NBC-related systems they will encounter on the air-land battlefield. It also concerns the fundamentals of NBC defense.

Chapter 1 of this manual explains US policy and how NBC weapons affect the battlefield—what they can do to you or to an enemy. Included are discussions about flame, smoke, herbicides, and riot control agents, which are also integral parts of the air-land battle. This is followed by chapters on each of the three fundamentals of NBC defense—avoidance, protection, and decontamination. The last chapter deals with application and ties the manual together. It reviews the ideas previously covered and discusses the concept of deterrence. It also suggests a procedure for including NBC considerations in the decision-making process, and ends with CPT Johnson's reaction to a chemical attack.

CHAPTER 1

UNDERSTANDING NBC SYSTEMS AND THEIR APPLICATIONS

American soldiers tend to put nuclear, biological, and chemical (NBC) weapons in a special class, beyond the scope of conventional war. NBC warfare is an escalation over conventional warfare that can cause mass casualties. Other nations do not always classify these weapons in this way, and it may be dangerous for our forces to do so.

The Soviets think of chemical weapons as conventional weapons. They do make a distinction between nuclear and biological weapons and conventional weapons. However, they do not classify them in the same way we do. While we classify toxins as biological weapons, the Soviets and their allies view toxins as chemical—not biological—agents. Some insight into how Warsaw Pact members view the use of toxins may be gained from a 1977 East German military manual. It states that, since it is possible to produce various toxins synthetically (in the laboratory), they are different from biological organisms and can be considered chemical agents. Thus, we might view their use of toxins as an escalation, and may choose to retaliate with chemical weapons. Production of toxins or chemical agents is basically within the scope of almost any nation which has a basic chemical or pharmaceutical capability.

A growing number of nations can employ chemical and nuclear weapons. US forces must plan to fight in an environment where nuclear and chemical weapons present a clear and present threat.

Because we cannot control how other nations might view and use NBC weapons, we must be prepared to defend ourselves. Many American soldiers tend to refer to defensive measures under the single phrase "NBC." Nuclear, biological, and chemical warfare present different threats. We must be prepared to defend against each type. The ability to sustain operations and retaliate will help us attain our military and political objectives.

US POLICY

Nuclear—We will use first if need be.

Biological (to include toxins)—We will never use.

Chemical—We will use only after enemy first use.

Herbicides—We will use under special conditions.

Riot control agents—We will use for special conditions.

Nuclear, biological, and chemical weapons are among the most terrifying and destructive on the AirLand battlefield. These weapons have been used by nations to try to attain national objectives. The thrust of US policy is to prevent their use by any nation.

The United States may use nuclear weapons to terminate a conflict at the lowest level of hostilities acceptable to us. This means we may use nuclear weapons first. This is a warning to other nations that they cannot attack us with conventional weapons without risking nuclear war. When faced with a numerically superior enemy, we reserve the right to use nuclear weapons against them. Presidential release is required to employ nuclear weapons.

The United States will never use biological agents. Even if we are attacked with biological agents to include toxins the US will not retaliate with biological agents.

The US may use chemical weapons in retaliation to deter the enemy's use of them. We will increase the effect of both chemical and other weapons by using them together. We will also try to force the enemy into a chemical protective posture like ours.

Possession of such a retaliatory capability helps convince an enemy that no advantage can be gained from using chemicals. Once the enemy stops using chemical weapons, we will stop. Only the President may order chemical weapon retaliation.

The United States renounces first use of herbicides in war. Current US policy is that we will not use herbicides in war, unless they are first used against us and the President directs their use in retaliation.

The United States renounces, as a matter of national policy, the first use of riot control agents (RCAs) in war. An exception is the use in defensive military modes to save lives by controlling riots in areas under direct US military control. Another is that if civilians are used by the enemy to screen an attack, RCAs may be used to reduce or prevent civilian casualties. Other exceptions are rescue missions in isolated areas and against escaping prisoners. Additional exceptions include use in rear echelon areas, outside the zone of immediate combat, and to protect convoys from civil disturbances, terrorists, and paramilitary organizations. Use by US Armed Forces of any riot control agent in war is prohibited, including those instances listed above, unless such use is approved in advance by the President.

COMMON CHARACTERISTICS

Mass casualties and large area coverage

Persistent danger

Defense measures

Complementary

Nuclear, biological, and chemical weapons are more different from one another than they are similar to each other. This text explains each one in some detail. But, these weapons also share some common characteristics that make them differ from all other types of weapons.

They can kill over large areas causing mass casualties. The single atomic bomb dropped on Hiroshima by one airplane resulted in about 144,000 casualties. A chemical attack at Ypres in World War I resulted in 15,000 casualties. Biological and chemical agents can reach and find targets hidden from conventional weapons. Chemical agents find their way into bunkers and under hatch covers. Diseases caused by biological agents can easily spread among soldiers not in the battle area. Nuclear radiation may even penetrate armor. The areas of actual contamination cannot be precisely predicted. Effects of weather and terrain vary contamination patterns.

They can kill or injure long after they have been employed. How long they can produce casualties can, in part, be controlled by the user. Chemical and biological agents are especially useful in this way. Commanders can select agents and dissemination methods so the casualty-producing effects can last for a few moments or a few weeks.

NBC defensive measures can slow an army. Even the threat that NBC weapons might be used could force an army to take time-consuming defensive measures. Troops must disperse to reduce the effects of attack. A high degree of personal hygiene must be practiced by soldiers to prevent infection. Troops must take the time to check for potential NBC-contaminated areas so they can be avoided. Soldiers in protective gear find it hard to work or fight in them. The protective measures a force takes to prepare for possible attack reduce its fighting capability.

Nuclear, chemical, and conventional weapons complement one another. They can be used together to increase their effects. But, we tend to think of them as being used separately. Imagine a battlefield where these two—or all three types, including biological weapons—are used against us. Quickly exploiting the results of a nuclear strike with chemical and conventional weapons would be devastating.

NUCLEAR WEAPONS

Nuclear weapons are potentially the most powerful weapons in any army's inventory. These weapons are effective against virtually any target. FM 101-31-1 gives a more complete discussion than this manual concerning how and when these weapons may be used. If the time comes to use them, the commanders responsible will receive exact instructions from the National Command Authority (NCA). Even if you have no responsibility for employing a nuclear weapon, you must understand their effects so you can take necessary precautions.

EFFECTS

The effects of any nuclear weapon may be divided into two major categories: initial and residual. These are discussed in the following paragraphs.

The principal initial effects are thermal radiation (heat), nuclear radiation, and blast. Other initial effects are electromagnetic pulse (EMP) and transient radiation effects on electronics (TREE) which can damage a variety of electronic equipment such as radios and computer systems. Initial effects occur within the first minute after detonation.

Residual effects are fallout and induced radiation. Residual effects can last for a long time and cause death. Under certain circumstances, residual effects can have serious impact on success or failure in the immediate battle area.

INITIAL EFFECTS

Hiroshima, Japan
6 Aug 45
The bombardier aboard the Enola Gay releases the 12-kiloton uranium bomb known as "Little Boy." PFC Haru Masumoto, standing at attention in front of the Eleventh Infantry Regiment headquarters suddenly finds himself thrown 100 feet, his uniform reduced to tatters. Despite his badly burned right side, he swims the nearby Kyobashi River to safety. (Masumoto was standing just 3,000 meters from ground zero.)

If you could look at a cross section of a nuclear explosion, you would see three lethal rings of initial nuclear effects—thermal radiation, nuclear radiation, and blast. Each of these effects is very powerful near ground zero but grows progressively weaker as the rings expand.

Thermal radiation from the explosion can create fires and firestorms that spread over large areas. The brilliance of the fireball can dazzle (blind) anyone looking at it. Dazzle effects are much worse at night.

Of the three principal initial effects of nuclear detonation, nuclear radiation has the most significance to the Army. This is because it is the most difficult to defend against and, in tactical-size weapons, has the farthest reach.

The relative power of a warhead's blast compared to its nuclear radiation depends on size. Initial radiation from a small warhead reaches farther out than the blast. In warheads over 50 kilotons, blast dangers are deadly farther out than initial nuclear radiation. See figure 1-1.

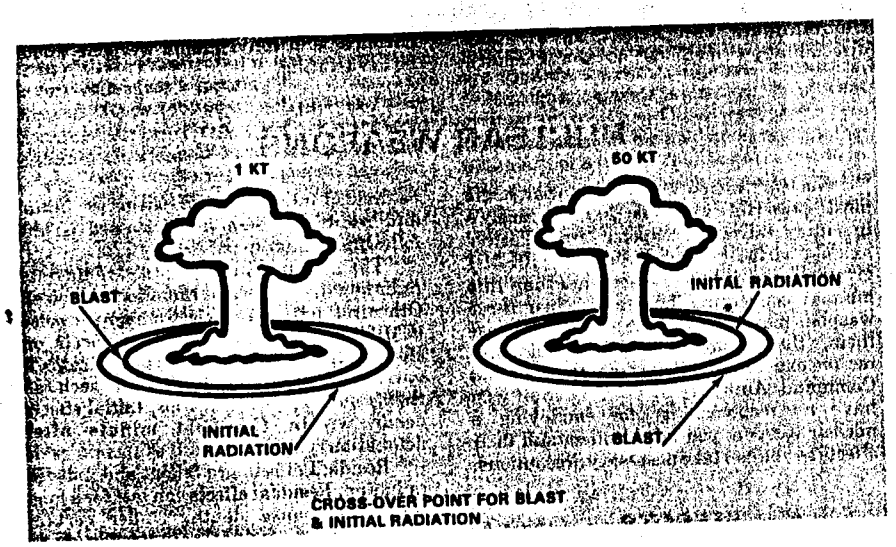


Figure 1-1. Blast in battalion operational area.

Soldiers who are not near the center of the explosion (ground zero) can survive and protect themselves from the heat and blast by staying in tanks and fighting positions. Heavy metal shielding or thick layers of earth offer protection from nuclear radiation. FM 3-3 provides data on the degree of protection.

Initial effects can damage electronic equipment. Electromagnetic pulse and transient radiation effects on electronics can burn out circuits and degrade components of equipment not designed to withstand them. They can also introduce static and other undesirable signals in both protected and unprotected electronic equipment. Similarly, computer memory may be erased, causing malfunctions and calculation errors. The radius of damage from these effects can be greater than the radiuses for radiation, blast, and thermal effects. However, the damage depends on the type of electronic equipment, height of burst of the weapon, and the precautions taken prior to the nuclear attack.

RESIDUAL EFFECTS

Suburb of Hiroshima
6 Aug 45
Satoshi Nakamuri, a reporter, jumps on his bicycle and begins pedaling toward Hiroshima. He feels an unusually strong wind followed by a heavy downpour. The raindrops are large and extremely dark, almost black. Within a few seconds, his fingers become stained with black in. He had never heard of fallout, but he lives to write about it many years later. (Nakamu miles from the city.)

The residual contamination effects caused by nuclear explosions are fallout and induced radiation (see figure 1-2). Re contamination effects produce casual

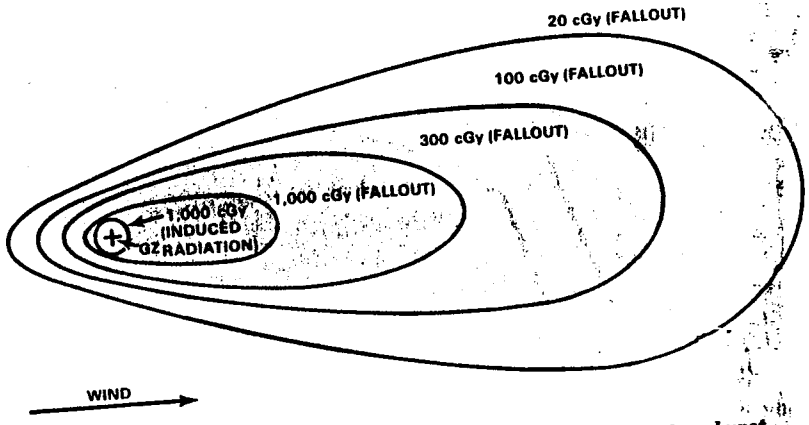


Figure 1-2. Induced and fallout radiation areas from surface burst.

much the same way as the initial radiation except that it may take longer to build up the required dosage. Radiological contamination occurs when dirt and debris are drawn into the center of the explosion and become radioactive. The radioactive debris transported downwind as a cloud gradually falls back to earth as fallout. Induced radiation occurs around ground zero. The area receives such a powerful dose of initial neutron radiation that it remains a militarily significant hazard for 2 to 5 days after the blast. Some hazards remain for a longer period. It is dangerous to cross such an area or remain in it while it is radioactive without taking precautions.

The psychological impact of tactical nuclear weapons is an effect leaders must consider. Mass destruction caused by nuclear weapons can affect soldiers' psychological and physical well-being. The sights, casualties, sounds, smells, loss of command and control, and isolation can cause shock and severe stress. Even soldiers outside the immediate target area may be affected simply by knowing such weapons are being used. Figure 1-3 shows the danger at various distances from the blast.

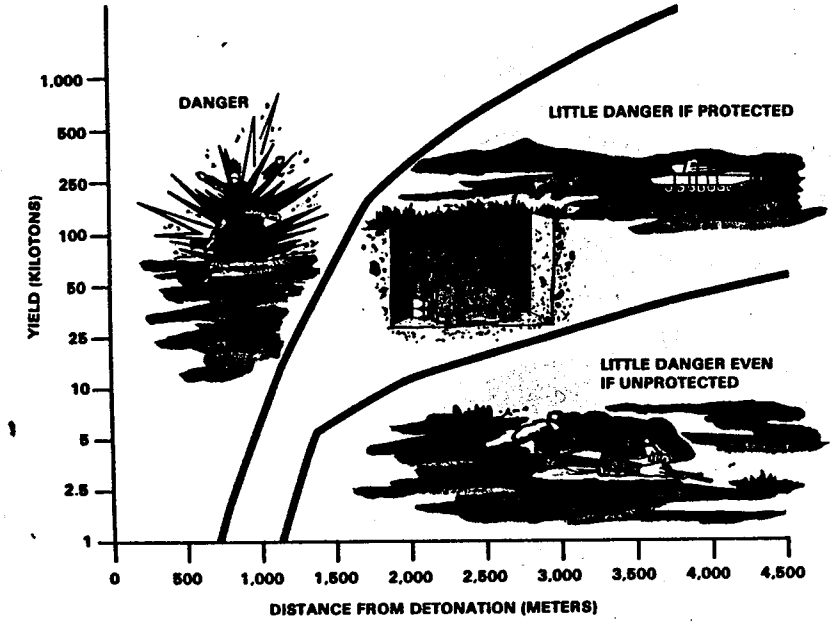


Figure 1-3. Danger from a nuclear strike.

USES

Nuclear weapons have many uses on the battlefield. They are combat multipliers. A small force with nuclear weapons may well be able to defeat a much larger force. Weapon systems are available that can be used against targets anywhere in the theater of operations. Nuclear weapons may be used effectively to destroy other nuclear weapons, troop and equipment concentrations, and command and control centers. They also can restrict the use of—or contaminate—terrain.

For maximum radiation effect, nuclear weapons are usually detonated in the air above the target. Commanders who wish to prevent residual radiological hazards choose a height of burst that prevents the fireball from coming in contact with the earth's surface. A ground burst is chosen when commanders intend to contaminate an area or destroy a very hard target such as a bridge or tunnel complex. If an enhanced radiation warhead were used, the radiation casualty radius would be greater than the material damage radius. Figure 1-4 shows how the theoretical effects of a 1-kiloton enhanced radiation weapon compare to those of a 10-kiloton standard nuclear weapon.

OTHER NUCLEAR WEAPONS

Armies place a high priority on finding and destroying enemy tactical and strategic nuclear weapons. This is an important objective for aircraft-, artillery-, and missile-delivered nuclear systems. This priority could lead one side to attempt a preemptive nuclear strike against the nuclear delivery systems of the other.

TROOP AND EQUIPMENT CONCENTRATIONS

Large masses of enemy troops and tanks are lucrative nuclear targets. To obtain a decisive victory, an attacking force must concentrate its forces. A division could be massed against one opposing battalion. Perhaps as many as 300 tanks and 10,000 soldiers would be concentrated in an area

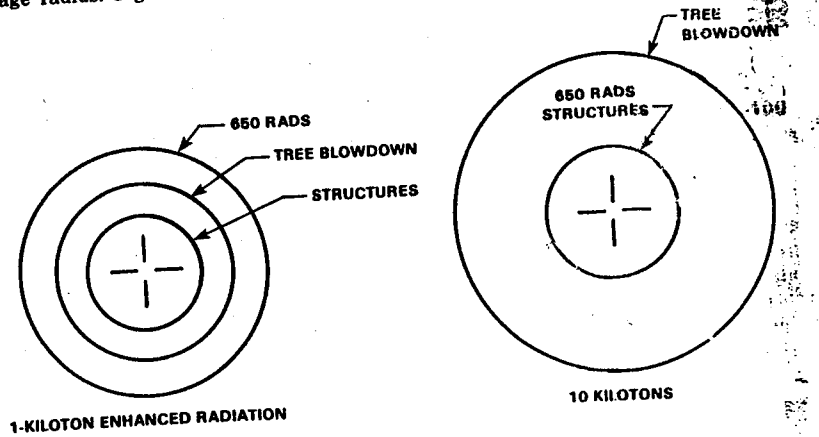


Figure 1-4. Enhanced radiation (left) versus standard nuclear weapon (right).

only 4 kilometers wide and 4 kilometers deep. A nuclear attack on such a formation would crush it before it could breach the other side's defenses. Massed formations are not the only types of concentrations vulnerable to nuclear attack. The destruction of ports, depots, and airfields significantly reduce an army's ability to sustain combat.

COMMAND AND CONTROL CENTERS

Command and control centers can be destroyed anywhere on the battlefield because of the various delivery systems available. Figure 1-5 shows this. Nuclear weapon effects such as electromagnetic pulse and transient radiation effects on electronics can obstruct communications and damage electronic systems thus isolating or degrading the command, control, and communications activity.

NATURAL AND MAN-MADE FEATURES AND TERRAIN

Nuclear weapons can blow down trees, rubble buildings, and create contaminated zones. Any nuclear weapon may be used this way, but atomic demolition munitions (ADM) are the most effective. Many nations have the technology to manufacture these low-yield nuclear weapons. ADMs can be used without elaborate delivery systems and can be literally hand-carried to the target. Properly emplaced ADMs can destroy bridges, dams, and waterways; burst dikes; flood lowlands; and block terrain.

THREAT BIOLOGICAL WEAPONS

Biological agents may be placed in two classes: germs and toxins. Germs are living microorganisms. Examples include viruses, bacteria, and fungi. Toxins are poisons produced by plants, animals, or microorganisms. Toxins can also be made in labs. Biological warfare is the intentional use, by an enemy, of germs or toxins to cause death and disease among personnel, animals, plants, or—more rarely—to deteriorate materiel. Germs can be delivered directly—such as by artillery or aircraft spray—or indirectly, through a vector such as a flea or tick. Toxins act in the field much like chemical agents. The United States has agreed to international weapons conventions outlawing biological warfare, and the destruction of biological weapons. However, the biological warfare threat to the United States is real because:

- The Soviet Union and its allies view toxins as chemical—not biological—agents.
- Soviet-backed forces have used toxins (yellow rain) in Southeast and Southwest Asia in this decade.
- Natural disease, even in modern times, has caused far more casualties than have weapons. The intentional use of toxins or disease-causing germs could cause even more casualties. Individual defensive measures for protection against biological agents are covered in chapter 3.
- Biological agents are cheap and easy to produce compared to chemical and nuclear weapon systems. Anyone with a pharmaceutical or brewing industry could produce biological agents.

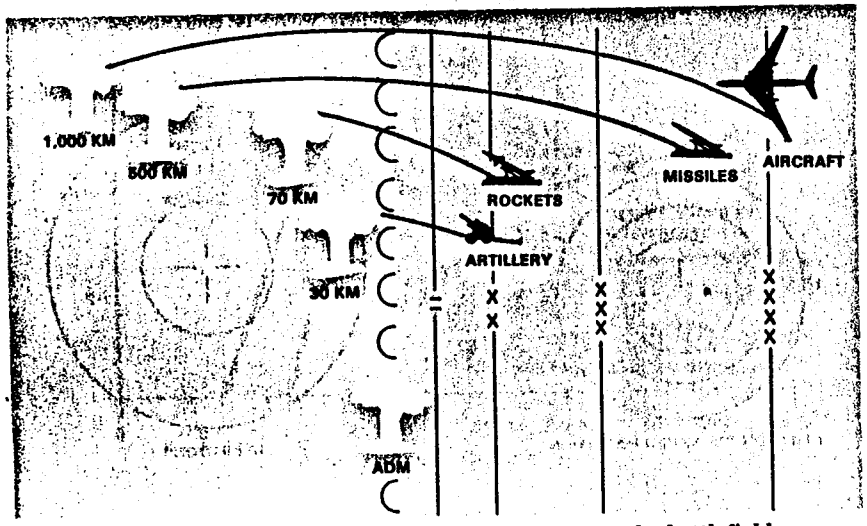


Figure 1-5. Nuclear weapons can strike anywhere on the battlefield.

Today's soldiers must know the characteristics, effects, and most likely means of employment of biological agents so they can defend themselves against them and continue their missions. Because of this, US policy permits continued efforts to develop defensive measures and detection devices.

GERMS

Germs are living organisms. In the past, armies have occasionally tried to use them as weapons. Because germs are alive, their effects are not reliable or predictable. Despite this, on occasion some have attempted to use them as weapons. Modern technology has eliminated some of the problems associated with using germs. This makes their use by an enemy all the more likely.

INFECTION

Only a few germs are needed to cause infection, especially if they are inhaled into the lungs. For example, 10 to 20 germs are required to start rabbit fever (tularemia) in man if breathed into the lungs.

SPREAD

Because live agents are so small and weigh so little, they can be spread great distances by the wind and float into unfiltered or nonairtight places. Germs can be trapped in the still air of buildings and bunkers which may then contain a higher infective dose inside than outside.

EFFECTS

A germ requires time to invade a body and multiply enough to overcome the body's defenses. This is known as the incubation period. It may vary from hours to months depending on the type of germ. An enemy wishing to weaken our forces with disease must attempt to infect our forces well before the attack.

DETECTION

Germs released into the air are usually not detectable by any of the five physical senses. No army has a monitoring device that can detect germs in a tactical situation.

LIFE CYCLE

Germs have life cycles. They grow, reproduce, age, and die. All this usually happens in hours to days. Most germs require their protection and nutrition be supplied by another living organism (host), such as your body, to survive and grow. Weathering (wind, rain, and sunlight) rapidly reduces their numbers. Some germs (certain bacteria) can form protective coats or shells (known as

spores) so they can survive longer. However, most live agents do not present a hazard much over a day if the attack misses its targeted personnel. If the targeted personnel are hit and they are vulnerable to the infection, the disease may be difficult to control because many diseases may be spread from soldier to soldier, either directly or indirectly. Likely areas for use of biological weapons are our combat service support areas. However, attacks in forward areas cannot be ruled out. Spore-forming germs are a long-lasting threat and infected areas and/or persons must be decontaminated.

TOXINS

Jalalabad, Afghanistan
Jun 80
Dutch journalist Bernd de Bruin watches helicopters drop canisters over a Muhajadin-held village. The canisters burst, expelling a dirty, yellow cloud. Five hours later, de Bruin enters the village to photograph the blackened skin and hard, fluid-filled blisters of victims. The victims vomit blood. Within a few hours, severely afflicted victims finally stop vomiting for a few minutes. This short respite comes just before death. In a final spasm, the writhing victim holds his abdomen and blood gushes from his mouth and nose. Bernd de Bruin receives a light exposure. It takes him 10 days to recover from skin lesions, diarrhea, and stomach cramps.

Toxins are substances made by plants, animals, or germs. It is these toxins that harm man, not germs themselves. Botulin is an example. In the past, the only way to deliver toxins on a large scale to humans was by using the germ. Modern science now produces large quantities of many toxins; these may be delivered without the accompanying germ. Toxins have increased the military significance of biological warfare because of the following characteristics.

CONTROL

Toxins are poisonous compounds that do not grow, reproduce, or die after they have been dispersed. On the battlefield, the enemy can control the spread of toxins better than they can control germs. Therefore, toxins could be used against our maneuver forces operating very near the enemy's own troops.

DETECTION

No field monitoring device has yet been devised that can provide prompt warning or identification of a toxin attack. Soldiers must learn to recognize attacks quickly by the means of delivery or symptoms of victims.

EFFECTS

Toxins produce similar effects to those caused by chemical agents. Toxin victims may not respond to the first aid measures that work against chemical agents. Unlike germs, some toxins can penetrate unbroken skin. They can also be mixed with chemicals that can speed their penetration. Because toxins have no incubation period as germs do, symptoms of an attack may appear very rapidly. Some toxins have cumulative effects. Repeated exposures may bring increasingly rapid and severe effects.

DANGER

Some militarily significant toxins are very deadly. Use of toxins by an enemy is an alternate to chemical use. This allows the enemy to use less ordnance and material, yet cover the same or larger areas. The strength of some toxins is such that they can produce symptoms among soldiers who contact even highly diluted doses. Slight exposure in the edges of an attack area which would produce only minor symptoms from chemical agents might produce severe symptoms or death from toxins.

WEAPON SYSTEM

A biological warfare weapon system, whether germ or toxin, consists of an agent, a container, and a delivery means. The weapon system is designed to attack the lungs, skin, or digestive tract.

The primary military advantage of germ weapons is that they are difficult to detect. In a tactical role, they could be secretly delivered prior to the outbreak of hostilities. After the incubation period, a conventional attack could be launched to coincide with the peak of the disease. Germs could be used in a strategic role to attack support troops or destroy plant and animal resources.

Toxins have nearly all the military uses of both chemical and germ weapons. Toxins may be used in the same manner chemical weapons may be used. Toxins, if used, are also not detectable by our standard detection equipment. Toxins also usually are more deadly.

The most effective protective measures against most biological weapon systems—but not toxins—are to enforce good field sanitation and personal hygiene, and keep immunizations up-to-date. The protective mask must also be readily available and properly fitted.

CHEMICAL WEAPONS

Edgewood Arsenal
(Mid-30s)
Alden Waite notices a small spot on his uniform breeches, just above the knee, and whiffs the faint odor of mustard gas. He runs to his quarters, removes his clothes, and scrubs his knee with 10 separate applications of the prescribed decontaminant. He takes two hot baths and reports to the laboratory for mustard treatment. By next morning, he has a 2-inch blister above his knee. Ironically, the spot on his breeches was caused earlier when he spilled a test tube of undiluted mustard on his hand and wrist. He quickly decontaminated his hand. As a result, his hand only slightly reddened. Yet, a tiny drop that went unnoticed on his breeches had worked its way through his clothes to cause a serious burn. (Alden H. Waite later became a brigadier general in the US Army Chemical Warfare Service.)

Chemical agents are very effective weapons against poorly trained and equipped forces. The following paragraphs explain the effects and uses of these agents/weapons.

EFFECTS

Chemical agents may be delivered in varied forms: gas, liquid, or aerosol. They can be delivered by mines, artillery, rockets, bombs, or aircraft spray. The versatility of chemical agents gives commanders flexibility. Commanders must consider how chemical agent effects such as the following may alter both offensive and defensive operations.

- Effects can be varied, depending on the agent, from incapacitation to death.
- Duration is partially controllable. For example, blood agents (nonpersistent) will remain on a target for minutes while blister agents (persistent) can remain for weeks.
- Casualties may be delayed. For example, some blister agents cause immediate pain upon contact with the skin while others cause no immediate effect.
- Agents are pervasive. Chemical agent clouds can cover large areas and drift into foxholes, hatches, and bunkers to cause casualties.

USES

American soldiers who ignore the fact that an enemy may be tempted to use chemical weapons are taking an unnecessary risk. They must understand how chemical agents might be used by either side on the AirLand battlefield. Figure 1-6 shows the ranges of delivery systems available to the Threat.

The uses of chemical weapons vary. Some of the most important of these uses are discussed in the following paragraphs.

CAUSE CASUALTIES

Poorly trained and equipped forces are vulnerable to chemical attack. An assaulting force could use chemical agents to breach a defense, widen a gap, and attack a rear area. The best chemical agent to use in this case would be a nonpersistent agent—one that is fast-acting and leaves the target area quickly. Wind and terrain will spread the agent. See table 1-1 for a comparison of chemical agents.

High explosives could be mixed with the chemical attack to conceal the use of chemicals and to complement their effects. Even in a diluted state, the agent poses a threat.

DEGRADE PERFORMANCE

Well-trained and well-equipped troops have an excellent chance of surviving a chemical agent attack, but they remain potential targets. Such troops can protect themselves with masks and protective clothing and be ready to fight when the assault comes. But, wearing protective gear causes performance degradation because of heat buildup, fatigue, and stress.

The threat of an NBC attack forces soldiers to wear protective masks and clothing. The heat, fatigue, and stress seriously affect soldiers who do not usually wear protective gear. Better-trained soldiers tolerate wearing protective gear better than do soldiers not so well-trained. However, soldiers in protective gear fire less proficiently, move more slowly, and must rest more often. The importance of good leadership, training, and adjustment to stress will become more obvious as the length of time spent in protective gear increases.

Table 1-1. Types and characteristics of chemical agents.

TYPES OF AGENTS	SYMBOL	PERSISTENCE		RATE OF ACTION	ENTRANCE	
		SUMMER	WINTER		VAPOR AEROSOL	LIQUID
NERVE	G-AGENTS	10 MIN TO 24 HR	2 HR TO 3 DAYS	VERY QUICK	EYES, LUNGS	EYES, SKIN, MOUTH
	V-AGENTS	2 DAYS TO 1 WEEK	2 DAYS TO WEEKS	QUICK	EYES, LUNGS	EYES, SKIN, MOUTH
CHOKING	CG, DP	1 TO 10 MIN	10 MIN TO 1 HR	IMMEDIATE	LUNGS	EYES
BLISTER	HD, HN	3 DAYS TO 1 WEEK	WEEKS	SLOW	EYES, SKIN, LUNGS	EYES,
	L	1 TO 3 DAYS	WEEKS	QUICK	EYES, SKIN, LUNGS	EYES, SKIN, MOUTH
	CX	DAYS	DAYS	VERY QUICK	LUNGS	
BLOOD	AC, CK	1 MIN TO 10 MIN	10 MIN TO 1 HR	VERY QUICK	LUNGS	EYES, INJURED SKIN

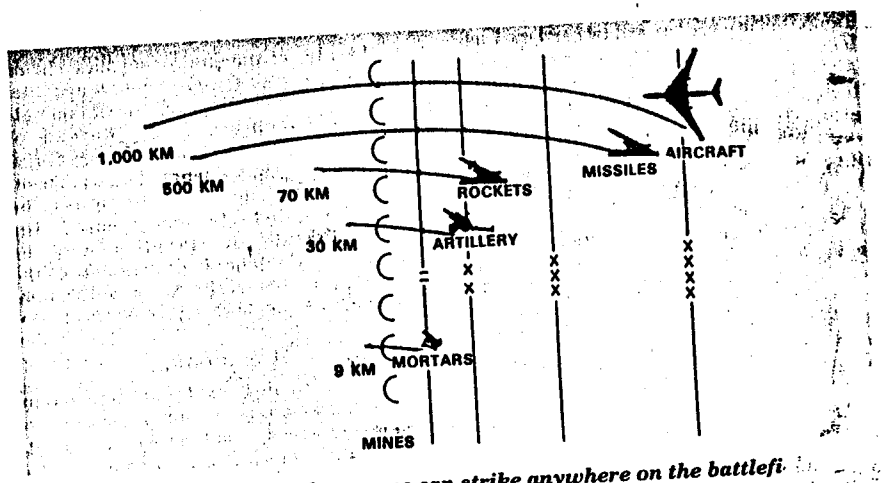


Figure 1-6. Chemical weapons can strike anywhere on the battlefi

SLOW MANEUVER

Maneuver is the dynamic element of combat. The actual or anticipated use of chemical weapons slows an army down and forces it to take extra precautions. Soldiers must carry or wear protective gear. The heat, fatigue, and stress caused by wearing this equipment reduces unit effectiveness. Generally, this effect is greater on foot soldiers than on mechanized forces. Chemical agents can be used to create contaminated areas as obstacles to maneuver.

On the AirLand battlefield, chemical agents could be used to support offensive operations. This would be done by protecting the flanks along an axis of advance, slowing reinforcements, or contaminating counterattack routes. Chemicals also can be used to slow the enemy's fire and maneuver. Thus, it would permit our forces to achieve that crucial margin of stren successful operation.

In defensive operations, the aim is to seize the initiative. Chemical agents could be used against second echelon forces, to separate and isolate follow-on forces. They could slow the enemy's advance enough to allow our main battle area (MBA) elements to defeat the first echelon enemy forces.

RESTRICT TERRAIN

Chemical agents can be used to augment more conventional obstacles or they can be used alone to restrict use of terrain. They may slow maneuver, channel attackers into kill zones, or help protect the flanks.

For example, a commander knows his opponent must pass through a crossroads or mountain pass or over a bridge. If the commander contaminates that narrow passage with a chemical agent, the enemy must either risk the contamination or avoid the route.

Using another route could take precious hours in travel time. Units might reach the battlefield late and in poor position to deliver effective fire. If the enemy risked the

contamination, the situation could be worse. Tanks and armored personnel carriers would have to button up and stay buttoned up. Assault troops would have to leave and enter their contaminated vehicles in full protective gear. Thus, if the opponent chose to risk contamination rather than use a longer route, it could take casualties or be so encumbered by protective equipment that it could not fight effectively.

Virtually any piece of key terrain can be made less desirable by contamination. For example, the advantages of clear fields of fire afforded by high ground can be reduced if that high ground is contaminated and soldiers have to wear NBC protective masks and clothing.

Consider easily defended ground behind some natural obstacle such as a bluff over a river, rising ground behind a natural line of cliffs, a swamp, or vegetation. If the overwatch site is contaminated, the troops occupying that position will have to wear protective gear. This hinders the defense.

Routes of advance, retrograde, and supply also could be contaminated. While chemical agents alone cannot stop a well-equipped, determined force, they can exact a price in casualties, loss of speed, and lost resources.

DISRUPT SUPPORT

Logistics centers are lucrative targets for chemical attacks. Since chemical weapons may be placed anywhere in the theater of war, the threat of chemical attack should loom large in the thoughts of logistics managers. Since persistent agents are good to use against logistics complexes, supplies and equipment should be covered whenever possible. Contamination can persist for hours or days. Contaminating logistics centers reduces the mobility of reinforcements and slows the delivery of supplies and equipment. Most agents are a threat to people, but some antimateriel agents may be used to deteriorate supplies and equipment as well.

Supplies

Ideally, contaminated supplies should not be forwarded for use. Support activities may have to replace or decontaminate supplies to prevent the spread of contamination to combat operations. Personnel and material-handling equipment exposed to the hazard must be decontaminated. In many cases, the contamination on supplies may be significantly reduced by removing the packaging material. As a minimum, contaminated supplies will be marked.

Ammunition

Avoid issuing contaminated ammunition. Packaging ammunition can serve to reduce the spread of contamination. Separate ammunition which has been contaminated should be decontaminated before issue to avoid spreading contamination. Contamination markers may still be required.

Maintenance

Units should decon their equipment before it is evacuated for maintenance. For a unit to do this, the assets of a chemical company may have to be used. Maintenance units must also be prepared to repair contaminated equipment. Even decontaminated equipment may have contamination inside their assemblies. Maintenance personnel must be cautioned about handling lubricated parts. Lubricants tend to absorb and hold chemical agents.

Medical

Contaminated patients should be decontaminated and treated as far forward as possible. They should be kept separate from uncontaminated patients until decontamination is complete. Medical facilities must exercise caution to prevent contamination from spreading and degrading medical personnel's capability to handle their patient load. Medical units must also be prepared to treat heat and psychological stress victims when soldiers wear protective gear.

Graves Registration

Mass casualties may occur as a result of NBC-weapons use. Mass casualties may strain an already burdened logistics system. Contaminated remains should be decontaminated as much as possible and should be kept separate from uncontaminated ones.

MILITARY SMOKE

Smoke makes it hard to see. This makes it hard to shoot, move, and communicate. It is a form of concealment as are vegetation and camouflage nets. Smoke is a combat multiplier. Smoke also is used to reduce the effectiveness of weapons that depend on line of sight. This is especially true of sophisticated electro-optical acquisition and guidance systems.

Soldiers train to use concealment where they find it. Smoke is concealment that can be placed, more often than not, just where a soldier needs it. Smoke can be moved so that soldiers can move and remain hidden. How well the smoke works depends mostly on the weather, terrain, and planning.

As in most other forms of concealment, smoke will not make you invisible, because many sighting systems are not blinded by it. Some infrared systems can reveal heat images which cannot be hidden by smoke. A hot engine moving behind a smoke screen can be spotted easily by a thermal-imaging sight. Even though smoke does not provide complete concealment, it has advantages. A gunner tracking a thermal target concealed by smoke may not be sure whether the target is an enemy tank or the tank of his platoon leader.

On the other hand, supporting smoke can hinder your operations. Your command, control, air defense, and aviation elements may be hampered by it. Weather, terrain, and the situation must also be favorable for use of smoke. To be successful, smoke must be used in sufficient amounts and over large areas. Otherwise, it will only draw enemy attention to and pinpoint you.

FORMS

Various forms of smoke can be produced to support operations. The form selected will depend on the mission, available resources, and weather. The forms we will consider here are screening, obscuring, deceiving, and identifying and signaling.

SCREENING

Screening smoke is used in friendly operational areas or between friendly units and the enemy. It reduces enemy ground and aerial observation and defeats or reduces the effectiveness of electro-optical systems. Augmented with deceiving smoke at other locations, smoke screens must be at least twice as large as the area you want to conceal. The enemy may know you are there, but he will not be able to see you to know exactly where you are and what you are doing. There are three types of screening smoke you can use to keep hidden and prevent the enemy from pinpointing your location: curtain, blanket, and haze. The type you use depends on your situation and needs.

Curtain

A smoke curtain works like a window blind. A smoke curtain is a dense vertical cloud placed between you and the enemy. It is usually placed along the leading edge of a friendly unit. Aircraft, at some risk, can fly over the curtain, but ground troops cannot. A smoke curtain works best during an unstable (lapse) air stability condition which causes ground air to rise rapidly. Hot, sunny afternoons are best for this condition. A tank

platoon might use a curtain to conceal a retrograde operation, or a mechanized battalion might use a curtain to conceal lateral movement when shifting men and equipment from one flank to another. The Soviet Union routinely uses smoke curtains in front of an advance to limit effective long-range antitank fire. The biggest limitation of a smoke curtain is that it offers little protection from air observation. A smoke curtain is difficult to maintain and requires considerable logistics support.

Blanket

A smoke blanket is a dense, horizontal layer of smoke which can all but cover up a unit. It is a heavy smoke concentration usually used over friendly areas to screen them from enemy ground or aerial observation. Special equipment is needed to penetrate it by air observation. Unless special target acquisition systems using the far infrared or microwave spectrum are used, a unit should be completely concealed. Unfortunately, a 100 percent effective blanket that stops enemy observation also may make your own observations and movement more difficult. Unprepared troops and vehicles have difficulty moving about safely, and they may be unable to keep track of enemy activity. A smoke blanket is best produced during stable (inversion) air conditions. Nighttime, early morning, and late afternoon are best for producing a smoke blanket. A blanket is useful in rear areas to prevent aerial observation of targets. Although a smoke blanket provides excellent concealment, it requires considerable logistics support.

Haze

A smoke haze—like a blanket, but not as thick—is a light concentration of smoke placed over friendly areas to restrict accurate enemy observation and fire. It does not completely hide a unit, but a haze makes it difficult for the enemy to see targets partly hidden by the smoke. Enemy ground troops can see only a short distance into the haze. Examples of how a haze can be used include concealing tanks as they move into a counterattack position and an engineer unit as it prepares alternate battle positions.

A haze, much as a blanket, is produced during stable and neutral conditions when the air does not rise. Smoke sources are spaced farther apart, to produce a thinner screen. A haze is the most versatile and often-used smoke screen. Both Soviet and US forces use hazes to conceal movement and troops. Although a haze hinders the enemy from finding targets, it also makes it difficult for friendly units to find targets.

OBSCURING

Obscuring smoke is placed on an enemy to reduce vision both at, and out from, the position. Smoke placed on an attacking force may cause it to reduce speed, change direction, or deploy prematurely. It forces attackers to rely on radio rather than visual communication. Smoke placed on defending enemy forces makes it difficult for the enemy to find and hit targets. Threat forces use obscuring or blinding smoke in the same way as do US forces. However, Threat needs to use more of it to offset our technologically superior sighting systems. One limitation on using obscuring smoke is that good intelligence is needed to locate the enemy. If you do not know where they are, you cannot obscure their vision. Another factor to consider is that artillery units must reduce the number of other rounds they carry to make room for smoke rounds. However, because smoke reduces the enemy's ability to find and hit targets, an HE-and-smoke mix may be more effective than HE alone.

DECEIVING

Deceiving smoke is used to mislead the enemy. Smoke is but one part of a good deception plan. Place it on a likely avenue of approach or on key terrain. Combine it with deliberate, but misleading, security leaks and mock fighting positions and equipment, and you may persuade the enemy that you are engaged in a course of action entirely different from what you are really doing. A deceptive smoke screen can draw enemy attention and firepower away from a smoke screen that conceals real troops and equipment. Normally, smoke is employed with at least one deceptive screen for every primary smoke screen. If assets are available, several deceptive screens are used to add to the success of the mission. Soviet forces use a lot of deceptive smoke screens to ensure success of their primary screens. The only limitation on the number of deceptive screens is the assets available.

IDENTIFYING AND SIGNALING

Identifying and signaling smoke identifies targets, supply and evacuation points, and friendly unit positions. It can also provide for preplanned battlefield communications. The use of this type of smoke is standardized throughout the unit in SOPs.

DELIVERY

Smoke sources range from those that produce limited smoke but are available immediately, to those that produce large volumes of smoke but take longer to plan for and position. When you select a source of smoke, you must consider how much, how fast, where, and for how long you want it. (See figure 1-8, page 1-18.)

GRENADES

Grenades can be used to signal or to produce small screens to cover close assa
or retrogrades. Smoke duration ranges f
50 to 150 seconds.

VEHICLE-MOUNTED SMOKE SYSTEMS

Armored and mechanized units
vehicle-mounted smoke systems (see
1-7). These include exterior-mounted
launchers (called rapid smoke syste
are for the M1-, M2-, and M60-series
vehicles and M1059 mechanized
vehicle. The M60-series main battl
and M88A1 MRV-series vehicles use a v

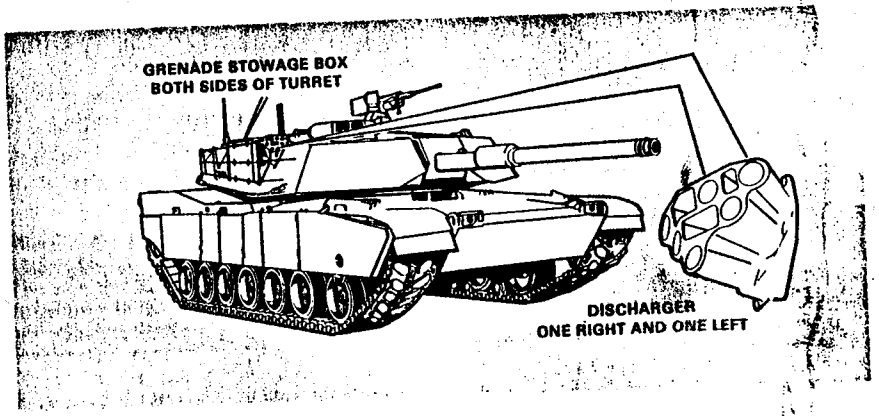


Figure 1-7. Vehicle-mounted smoke system.

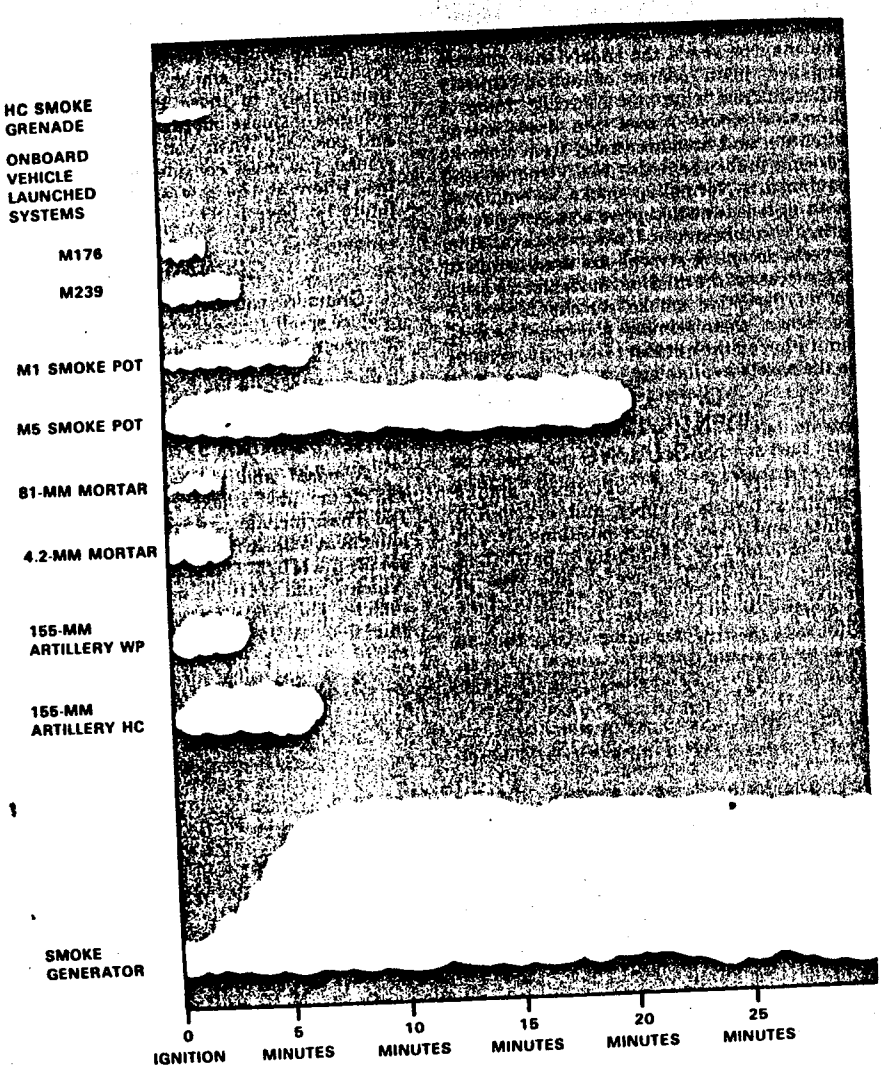


Figure 1-8. Relative volumes of smoke from various systems.

engine exhaust smoke system (VEESS). The VEESS sprays a portion of the diesel fuel supplying the engine into the hot exhaust manifold to form a thick, white smoke which billows from the vehicle exhaust. Since the fuel spray cools the manifold, the system must be used intermittently (3 minutes on, 5 minutes off). Another disadvantage is the increased vehicle fuel consumption, which reduces vehicle range. When fired on, the vehicle commander deploys the onboard smoke grenade system to immediately place smoke between his vehicle and the enemy. The VEESS is then used to cover his movement.

SMOKE POTS

Of all the smoke systems immediately available to units, the smoke pot generates the most smoke in the shortest time. Pots are the maneuver commander's primary means of producing smoke screens. They produce relatively large amounts of smoke, yet are readily available for use. Smoke pots are small and can be hand-placed or dropped from helicopters or boats. They can be ignited manually or electrically from a remote position. They also can be lit individually or sequentially in a long-burning chain. Further details on the use of smoke pots are in FM 3-50. Smoke duration ranges from 5 to 22 minutes. Figure 1-9 shows a typical smoke pot.

ARTILLERY AND MORTARS

Artillery and mortars can place large volumes of smoke on mid- to long-range targets within a short time. Mortars are the most rapid indirect smoke-delivery means available to the maneuver commander. Artillery and mortar fire are planned as part of the overall support plan and called for as needed. Average burn time ranges from 1 minute for mortar rounds to 1 to 5 minutes for field artillery-delivered smoke. It also can be used for spotting, marking, or signaling. A mix of high explosive and smoke can create confusion which can disrupt command and control. FM 3-50 and FM 6-20 contain information on artillery- and mortar-delivered smoke. Naval gunfire can also provide smoke support to ground forces.

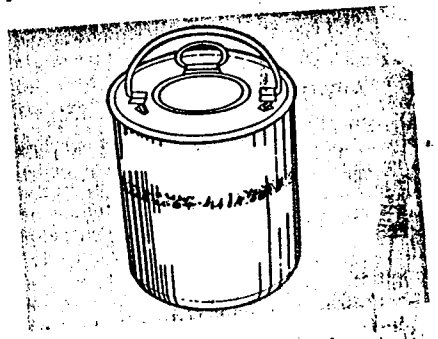


Figure 1-9. Smoke pot.

SMOKE GENERATORS

Moselle/Arnaville Crossing
11 Sep 44
The 84th Smoke Generating Company was called on to set up a smoke screen to cover a river crossing. Winds and terrain were favorable. An infantry battalion crossed under concealment, and—despite a wind change—generators in alternate positions again were able to provide needed concealment. On 11 Sep at 0900 an officer who saw no opposition made the decision, in the absence of the battalion commander, to shut down the generators. When the smoke dispersed, a fierce enemy attack stunned the Americans by its suddenness and fierceness. The resumption of smoke helped reduce casualties. The Moselle crossing showed the need for and the effectiveness of smoke to cover a river crossing.

Mechanical smoke generators produce the largest volume of smoke, but they also take longer to get into position. They are primarily used to screen large areas and to produce deceptive screens. Smoke generators are usually employed by chemical units ranging in size from a squad to a company, depending upon the mission and its priority. Smoke generators can be operated on the ground or from vehicles or boats.

Smoke pots can be used to fill gaps in existing screens or conceal smoke generators as they move into position. Or, if the area the generators must use can be observed by the enemy, obscuring artillery smoke could be placed on the enemy until the generators could establish their smoke screen. Smoke generators are best-suited to well-planned, large-area missions. FM 3-50 contains detailed information on smoke generator units and operations.

AIR-DELIVERED SYSTEMS

Air-delivered systems of other services can support your operations with smoke. They are available, but not usually under the direct command of maneuver battalions or company commanders. They generally function on call or support units directly. These systems include air-delivered smoke munitions such as bombs and rockets, or onboard, smoke-generating equipment systems.

EMPLOYMENT (COMBAT IMPERATIVES)

Commanders can plan to exploit the effects of smoke over large areas. Detailed analysis and planning are critical to mission success. FM 3-50 contains additional information on deliberate smoke operations.

If you want smoke you should plan for it. Smoke employment should be considered in all operational planning. Smoke will support success on the battlefield if you apply the following combat imperatives.

ENSURE UNITY OF EFFORT

Unity of effort is ensured when operational control of smoke assets is unified under the commander requesting support. The supported unit defines mission requirements to include:

- Type of smoke screen.
- Location of area to be screened.
- Time to make smoke.
- Duration of smoke operation.
- Immediate support available to supporting unit.

DIRECT FRIENDLY STRENGTH AGAINST ENEMY WEAKNESS

Surprise your enemy with smoke. The enemy's lack of information on your dispositions will become your strength. Your tactics should appear formless to the enemy until the last possible moment. Concealing potential avenues of approach to an objective with smoke can create conditions to surprise and hit at the weakest point.

DESIGNATE AND SUSTAIN THE MAIN EFFORT

You must disperse your force to protect it from the destructive power of nuclear and chemical weapons. Use smoke when you must concentrate your forces undetected to shock, paralyze, and overwhelm the enemy. Screening and obscuring smoke can deny the enemy needed information and create surprise for your offensive thrust.

SUSTAIN THE FIGHT

Those forces that have pressed the main effort to completion have generally been the most successful. To do this, they must endure factors such as confusion and stress. Obscuring smoke placed on the positions of a foe already pressed by noise, battle losses, and fatigue may be the additional stress needed to disrupt enemy movement, operations, and command and control and create the conditions needed for victory.

MOVE FAST, STRIKE HARD, AND FINISH RAPIDLY

Speed is important. You will be concerned about mobility and smoke coverage to prevent enemy target acquisition from zeroing in on combat vehicles. Smoke delivered on an enemy antitank guided missile (ATGM) position may prevent the system from acquiring and tracking targets. Smoke may also be placed on friendly forces. However, their speed of movement may be reduced. Of course, delivering smoke with artillery may reduce the amount of HE available.

USE TERRAIN AND WEATHER

One of the most important considerations when preparing a smoke plan is the weather. Wind direction and speed are especially important. If the wind is blowing strongly or in the wrong direction, it may be impossible to establish an effective smoke screen. The ideal weather for smoke blankets or hazes is neutral conditions. Stable conditions occur when the air at ground level is cooler than that at higher elevations. This condition usually exists from late evening until early morning. On the other hand, unstable (lapse) conditions are best when a smoke curtain is desired. This condition usually occurs during the daytime. Cloudy days with little or no wind provide neutral conditions between those extremes.

Terrain analysis is also an important aspect of smoke operations. In mountainous regions, smoke tends to drift around hills and collect in valleys. Large hills tend to break up smoke screens and create gaps. Rivers and large bodies of water have the opposite effect. Rather than disperse, smoke usually follows the course of a river. This helps conceal river-crossing sites. Open terrain allows smoke to travel further without dispersing.

PROTECT THE FORCE

You, as a successful leader, want to preserve the strength of your force. You can deny the enemy information concerning your location, strength, and movements by screening your positions with a smoke blanket or haze. To force the enemy to fire blind, several deceptive smoke screens should be used.

COUNTERMEASURES

Threat forces can use smoke effectively on the battlefield. They can be expected to employ smoke against US forces to hinder target acquisition, degrade weapon-system effectiveness, and impede movement.

There are essentially two ways to counter enemy smoke. The first is to move away from the enemy smoke. The second is to rely on optical devices and electronic detection equipment to allow operations to continue in a smoke environment. In most situations, the two countermeasures will be used together. Many techniques can be used in combat; however, the examples that follow describe the most common.

Example: An attacking US tank battalion encounters an enemy smoke screen through which it must continue to move in formation. Onboard location or navigational aids are used to help in this movement. Electro-optical sights can be used to maintain orientation and to fire on the enemy as the unit continues the attack.

Example: As we defend, an enemy force assaults from behind a smoke screen. Intelligence resources locate and confirm the main attack, negating the effectiveness of the enemy's use of false/decoy screens on other avenues of approach. While firing scatterable mines into the screen, the US defensive force can maneuver units to attack the assaulting force flanks. At the same time, the defensive force can provide overwatching fire while preparing to move to alternate positions if the enemy smokes primary positions. Electronic devices and electro-optical sights with range cards can be used to locate targets in the smoke. Laser designators, although seriously weakened by smoke, may be used to illuminate targets for attack by gun-launched

projectiles, missiles, or bombs. Ground surveillance radars and thermal imagery devices not affected by some smokes can be used to detect targets. Attack helicopters with a slant view beyond the smoke can locate and attack targets. Depending on the air defense threat, attack helicopters can fly around or above the smoke to engage targets.

RIOT CONTROL AGENTS AND HERBICIDES

Riot control agents (RCA) and herbicides are chemicals with military applications. These chemicals are used for law enforcement, agriculture, and industry. They were not classified as military chemicals. Their uses are covered by different policies than those that apply to chemical warfare. Information on US policy regarding use of riot control agents and herbicides is explained on page 1-2.

RIOT CONTROL AGENTS

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

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.

USES

Riot control agents are widely used for training, riot control, and situations in which long-term incapacitation is unacceptable. Normally, they are disseminated in CS hand grenades, 40-milli meter cartridge grenades, or bulk-agent dispersers as a particulate aerosol or smoke. When grenades are used, they usually are thrown upwind of the target so the agent can drift onto it.

Combat

In war, the US has renounced first use of riot control agents except in defensive military modes. Advance presidential approval is required to employ riot control agents. Defensive situations that riot control agents can be used in are discussed on page 1-2. However advance presidential approval is still needed.

Protection

The protective mask protects soldiers' eyes and respiratory tracts from riot control agents. Covering remaining exposed skin can help prevent skin irritation by a riot control agent. Effective decontamination can be done by both brushing and washing exposed skin or clothing.

HERBICIDES

Historically, herbicides have been used by railroads, power companies, and farmers to control unwanted vegetation. US forces used herbicides in Vietnam to clear fields of fire around base camps and along lines of communications. Using aircraft- and truck-mounted sprayers, large areas could be sprayed in a relatively short time. It usually took from several days to weeks after spraying before the herbicides were effective. Defensive perimeters containing mines, booby traps, and other munitions could then be cleared effectively. Most significant was the destruction of concealment vital to the enemy's survival. Enemy supply routes and base camps were uncovered.

TYPES

Herbicides kill or alter the growth of plants. They are classified by the way they do this.

Plant growth regulators speed up or slow down the growth rate of vegetation. Slowing down the growth can keep vegetation from blocking fields of vision such as fields of fire and avenues of approach. Speeding up 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, Desiccants kill plants by drying them up. Soil sterilants sterilize both plant 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

Herbicides can be used 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 and the advantages of concealment are reduced.

FLAME FIELD EXPEDIENTS

Flame field expedients are just what the name implies—simple, handmade devices used to produce flame or illumination. They augment conventional combat power and are primarily designed for use in a static, long-term defensive situation. However, they can also be constructed for use during hasty defensive operations to repel an attacking force. Of course, there are many types of expedient flame devices. They can be designed to explode and produce casualties or simply burn in place as a battlefield illuminator. They can even be used as signals to ground troops and tactical aircraft.

USES

Although basically designed as a defensive weapon, a flame field expedient may also be used during offensive operations. Tactical flame field expedients are used to:

- Warn of enemy approach.
- Produce casualties.
- Deter an enemy by their psychological impact.
- Illuminate the battlefield during the hours of darkness.
- Force an enemy into areas where he can be more effectively engaged.

TYPES

Expedient flame devices, regardless of their intended use, can be easily built from material readily available to the soldier in the field. The limiting factors are the imagination and ingenuity of the builder. The larger the device, the greater capacity it has for producing casualties upon detonation or providing battlefield illumination. Various types can be built to perform specific functions.

EXPLODING

Casualty-producing devices are designed to explode and throw burning fuel and metal fragments over a given area. To construct an explosive expedient, four basic components are required:

- Container.
- Fuel.
- Burster.
- Igniter.

The container can be anything that will hold the fuel, from a tin can to a 55-gallon drum. Gasoline can be used as the fuel or combined with a thickening agent such as M4 thickener. Thickener combined with gasoline makes a thick, jelly-like substance that burns longer than gas alone and sticks

to a target upon impact. The explosive charge necessary to burst the container and expel the fuel is any standard military explosive such as TNT, composition C4, or detonating cord. More specifically, M4 field incendiary bursters are designed especially for use with exploding flame devices. M4 bursters blow up the expedient and ignite it as well.

If M4 bursters are not available, trip flares or white phosphorous (WP) grenades can be used as the igniter along with one of the previously mentioned explosive charges. It is important that the builder have a working knowledge of explosives and follow the guidance contained in TM 3-366 and FMs 5-25 and 20-33 when making flame field expedients. Since expedient flame weapons have no specific design, any number of variations can easily be made. Two flame expedients that can be used effectively on a unit's perimeter are discussed in the next two paragraphs.

Flame Mine

This device provides 360-degree coverage upon detonation and scatters burning fuel and shrapnel from 20 to 80 meters in all directions depending upon its size. Flame mines can be as small as an ammunition box or as large as a 55-gallon drum. They can be emplaced around a defensive perimeter, dug in along a road, or even suspended in the tops of tall trees. Also, they can be exploded electrically or with trip wires by enemy soldiers. Figure 1-10 shows a typical flame mine.

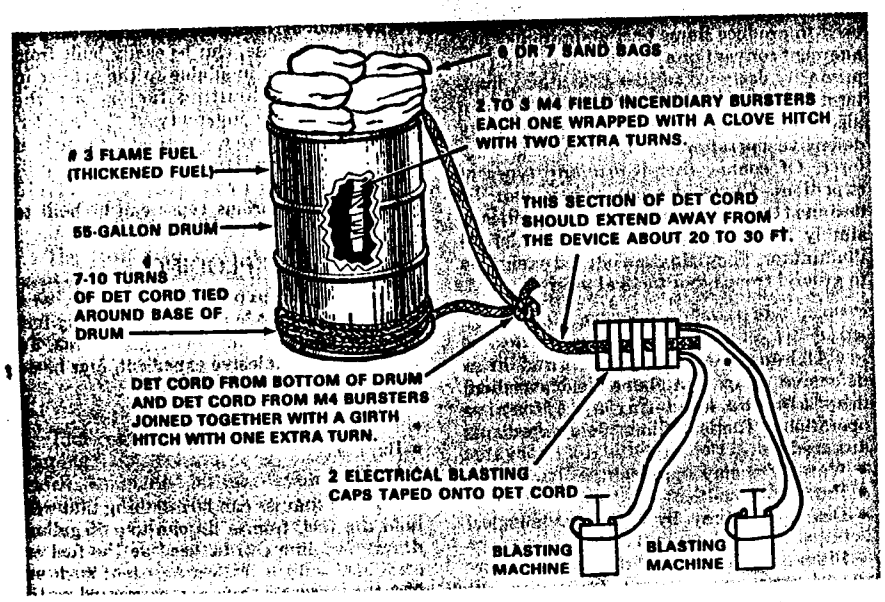


Figure 1-10. Flame mines (nondirectional flame devices).

Flame Fougasse

The fougasse is a simple flame field expedient that can be set up to fire in a given direction. The parts are the same as in any other explosive device. The only difference is that the explosive charge is placed behind the drum to project the fuel out over the area to be covered. Normally, a fougasse consists of a 55-gallon drum placed in a vee-shaped trench. It is then sandbagged in place so upon detonation the desired effects can be achieved. Likely avenues of approach into an area as well as dead spaces not protected by conventional fires can be covered with such directional flame weapons. The range of a fougasse varies depending on the thickness of the fuel, size of the device, and the direction and speed of the prevailing wind. A 55-gallon fougasse can project flame a distance of 100 meters or more. Figure 1-11 shows a typical directional flame device.

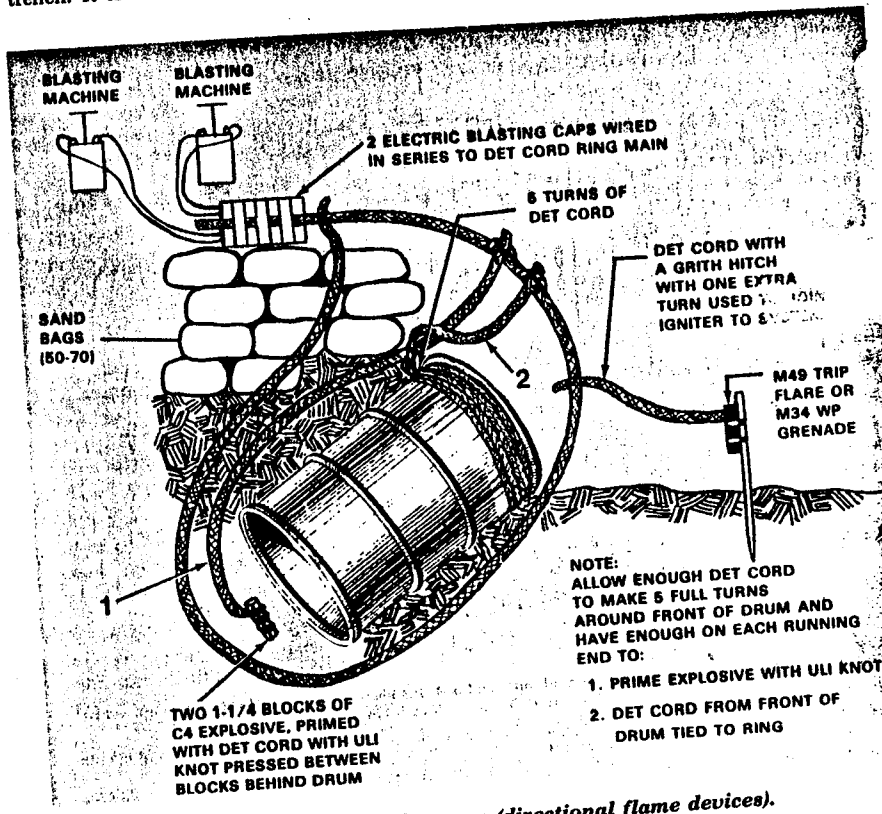
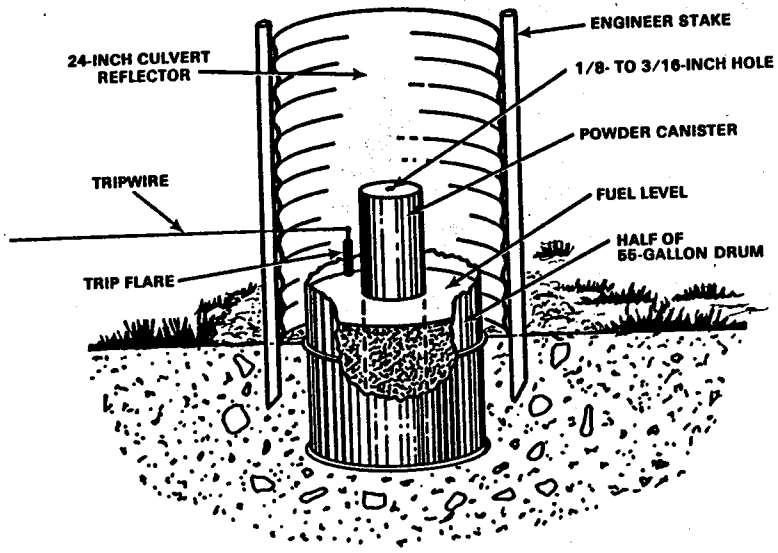


Figure 1-11. Flame fougasse (directional flame devices).

ILLUMINATING

Illumination devices do not explode. They simply ignite and burn brightly giving long-term light to the battlefield during hours of darkness. Although all flame expedients provide some light, specific types of flame devices can be constructed for this purpose alone. One such device is the Husch flare. (See figure 1-12.) Essentially, illuminating expedients are constructed in much the same manner as exploding devices with the exception of exploding charges. Once ignited, flame illuminators burn from 4 to 24 hours, depending upon the size of the device and the amount of fuel it contains. Illuminators placed tactically around a unit's perimeter can provide early warning of an attack and silhouette enemy soldiers making them vulnerable to conventional fires. Additionally, flame illuminators can be used for signaling. A board or log with cans attached and filled with dirt and gasoline can be ignited in the shape of an arrow. This device has been used effectively to bring aircraft into isolated landing zones at night.



1. The Husch flare uses the burning vapor of thickened fuel. The illuminator is ignited with a trip flare and will illuminate an area within a radius of 50 meters for about 4 to 5 hours.

2. Time of burning can be controlled to some extent by the size of the container, by the thickness of the fuel mixture, and by the addition of straw or dirt.

Figure 1-12. Husch flare.

CHAPTER 2

AVOIDING NBC ATTACKS OR THEIR EFFECTS

Avoidance is the most important fundamental of NBC defense. In addition to the casualties an attack can cause, the contamination that may come with an attack also causes casualties and produces long-term hazards that can interfere with the mission. Overcoming these hazards can tie up tremendous amounts of labor and equipment. Finding the clean areas when the mission allows reduces casualties and saves resources.

TAKING PASSIVE MEASURES

Passive avoidance measures are those that are not a direct reaction to enemy NBC activity. They are always taken regardless of enemy activity even before the outbreak of war. Passive measures include operations and communications security, dispersion, and hardening units by proper training, equipment, and position improvement. These measures are not unique to NBC warfare but are essential parts of conventional combat. However, the power and the lethality of NBC weapons make the consequences of failing to take these measures much more grave.

TRAIN AND EQUIP

Every individual and unit must be prepared and trained to operate under the worst possible conditions on the AirLand battlefield. The enemy can, and will, find targets and attack them with NBC weapons. Our mission is to win the war, not just to survive. Training must be realistic, reinforced continually, and integrated into every aspect of unit exercises.

Confusion, stress, and the ever-present danger of the AirLand battlefield place a heavy burden on soldiers' endurance, courage, and will to win. Improve readiness and combat performance by doing the following:

- Provide soldiers with accurate information about the often overstated or misunderstood aspects of NBC weapons.
- Provide realistic training with assigned equipment.
- Encourage teamwork.
- Ensure soldiers know and understand the unit SOP.

Soldiers readying for combat on the AirLand battlefield must prepare as though NBC operations were the norm. Individuals and units start their planning early. The entire operation is thought through. Strengths and weaknesses are identified. All work is keyed toward conducting a win[illegible] effort.

Through this whole process, the impact of NBC weapons is being assessed. A soldier's NBC equipment and weapon are equally important during a chemical or biological attack. Mission-essential NBC equipment must be maintained properly.

The criticality to readiness of NBC supplies is also recognized. Some NBC supplies must be replaced periodically. When contaminated, the need for this replacement increases. Large quantities of decontaminants and decontamination (decon) equipment are required to clean up and continue operations. Provisions must be made to stock and haul these supplies.

CAMOUFLAGE AND CONCEAL

The enemy can observe deployed divisions, brigades, and regiments 24 hours a day. Any movement or communication is likely to be seen or heard. Good operational security (OPSEC) is needed to prevent this. From the outset, operations must be conducted as if you were already in an NBC environment. Through good OPSEC the enemy can be deceived.

Pay strict attention to communications security (COMSEC) and electronic security (ELSEC). Hold radio communications traffic to a minimum to make communications direction-finding by the enemy as difficult as possible. The type and amount of communications traffic (signature) can be used by an enemy analyst to determine the approximate size and level of activity of your unit. Routine communications at regular intervals must also be avoided.

The enemy cannot hit a target it cannot see or find. You must counter sophisticated enemy intelligence equipment used for infrared scanning, TV viewing, night vision, radio intercept and direction-finding, and air reconnaissance. To do this, you must use all forms of natural concealment, as well as camouflage and smoke. The enemy can see in darkness with night-vision devices. Keeping hidden must be a state of mind—a skill reduced to habit. Everyone must practice camouflage, noise, light, litter, smoke, and communications discipline.

Eyes are the most responsive sensors on the battlefield. Order, shape, texture, movement, position, and shadow can be recognized by sight. They must be made confusing to the enemy by any or all of the following means:

- Proper settings—each soldier, vehicle, and combat system must be blended into natural terrain features and foliage.
- Smoke—obscure the enemy's view for brief periods with smoke readily available from various sources.
- Movement—when you move, move rapidly, preferably at night—with limited, if any, communications.

Conduct deception operations when you see an opportunity. Deception can include feints, demonstrations, dummy equipment, falsified materials, manipulated electronic signature, or distorted activities.

Fighting positions must also be continually improved and hardened to increase cover and protection. Cover is also important when you are on the move. Route recon can include locating ready-made hardened shelters such as culverts, tunnels, overpasses, caves, or built-up areas.

DISPERSE

Use the entire depth of the battlefield, because great space may be needed for disposition of forces, spreading out (dispersing), and maneuvering. Dispersion protects your force and makes your intentions unclear to the enemy. Dispersed troops and equipment are poor targets.

Although dispersion decreases destruction from an NBC attack, it can also complicate control and hinder efficiency. Units that are stationary for a long time, such as support units, are especially vulnerable to attack. Analyze present and planned dispositions continuously. Take into account the effects of nuclear and chemical weapons, and avoid positions that can be isolated by obstacles these weapons create. Do not set a pattern of unit location and you can deceive the enemy as to your true location.

Unit intelligence officers provide information on the specific NBC threat to the unit. Commanders and staffs analyze it. Decisions are then made on how to complete the mission.

FM 101-31-2 contains guidance for determining how much a unit must disperse for a nuclear attack. This publication describes the radius of vulnerability (RV), a tool for analyzing damage to friendly forces from nuclear weapons. Unit chemical officers can provide guidance on effective dispersion for defense against chemical and nuclear weapons.

Consider these concepts when planning unit dispersal:

- Dispersion decreases the probability of a single nuclear or chemical attack destroying more than one element of the force.
- Dispersion increases the chance that the enemy will not be able to identify or locate the friendly force. But remember, the more dispersed your force is, the greater the risk it may be defeated by conventional weapon systems, maneuver forces, or both. And dispersion may interfere with the unit's mission.

DETECTING CONTAMINATION

Soldiers are assigned—as an additional duty—to operate NBC detection equipment found in sections, squads, or platoons. Most teams consist of a primary and alternate operator for each piece of detection equipment assigned to the company. These teams can provide a local chemical/radiological picture for the company commander by obtaining information about contamination hazards and where clean areas are located. Collected data are forwarded to higher headquarters to become part of a larger NBC picture. If more information is required by the higher headquarters on areas of special interest, more detailed surveys may be directed. Regular recon efforts (those not committed to NBC recon) can detect and locate most NBC hazards if all recon teams include an NBC detection capability.

RECONNOITER

NBC recon is part of conventional recon; but, in addition to looking for enemy activity, recon elements check for contamination. Units check relatively small areas and routes of immediate interest to the unit commander. At times, the unit commander may require contamination information not avai[lable] through routine monitoring because of [the need] to find routes of march or alternat[e] positions. To do this, the commande[r may] direct chemical and radiological te[ams to] check the route or area of in[terest]. Radiological recon is continuous mon[itoring] on the move to detect and report radio[logical] contamination.

For example, a field artillery battery [may] send out an advance party to find pri[mary] and alternate artillery positions. Advance parties include members of the chemical detection team and the radiological monitoring and survey team. Automatic chemical agent alarms are mounted on vehicles to determine the absence or presence of chemical agents along the route. The teams periodically conduct tests using a chemical detection kit. At the same time, radiological monitoring and survey teams continously check for the presence and level of radiological contamination. In this manner, the advance party can advise the battery commander if NBC hazards are found along the route of march.

Upon arriving at a new position, detection teams survey the area to check for hazards. If contamination exists, the

commander must evaluate the type and degree of the NBC hazard and how it may affect operations. Equipment needed for reconnaissance is shown in figure 2-1.

Recon missions are also performed by specially trained personnel. NBC recon elements are organic to corps. Their missions are larger in scope than unit recon and generally provide the corps with NBC intelligence information. They do the following:

- Provide early warning of contamination.

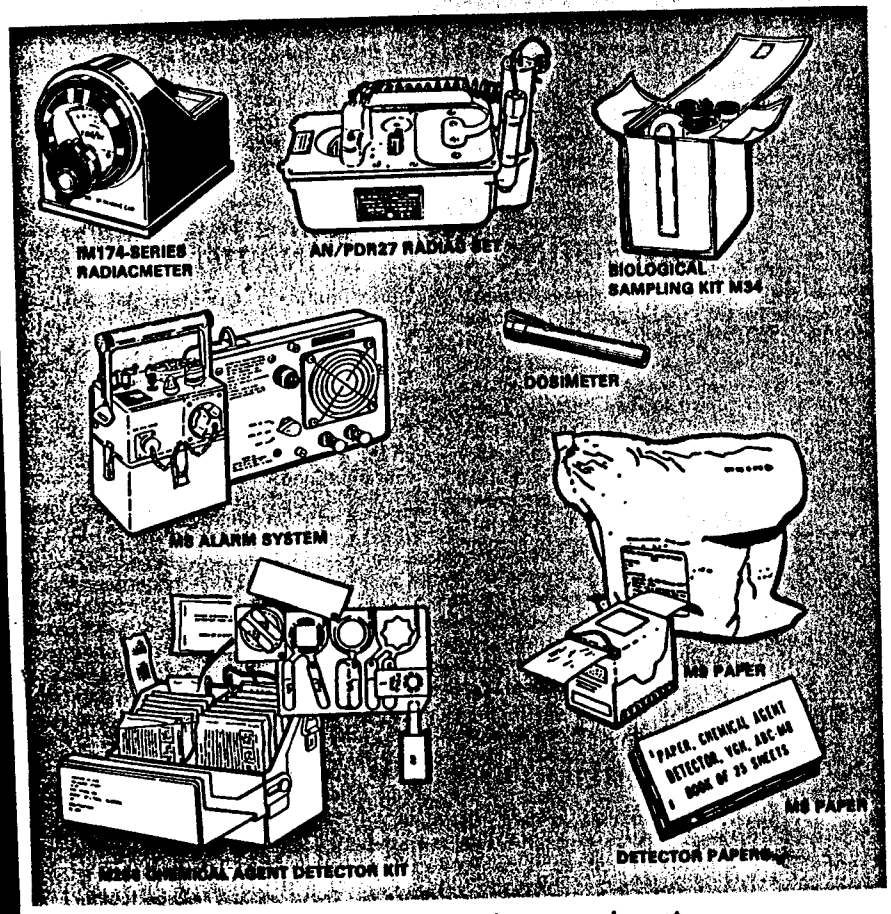


Figure 2-1. NBC reconnaissance equipment.

- Determine the extent of contamination.
- Find clear routes through or around contamination.
- Determine if contamination remains in an area.

Three methods are used in NBC recon. The following paragraphs explain each method.

ROUTE

Detailed information is collected about all terrain from which the enemy could influence movement along that route. With accurate and timely contamination plots of a route, commanders can avoid contamination or direct an appropriate MOPP posture.

AREA

When a gap exists in NBC data, missing information may be obtained by an area recon. The area location and information required must be specified. For example, a downwind hazard area may be known, but reports may indicate that weathering has reduced the contamination to safe levels. Chemical agents linger longer in buildings or woodlands than in open terrain. Therefore, a directed effort to obtain detailed information concerning the terrain or enemy activity within a prescribed area such as a town, ridge line, woods, or other feature critical to operations is essential to the planning process.

ZONE

When little is known about enemy dispositions across a wide area, a zone recon is required. It can provide detailed information concerning all routes, obstacles (including chemical or radiological contamination), terrain, and enemy forces within a zone prescribed by a boundary. This mission usually is assigned when the enemy situation is in doubt or when information concerning cross-country trafficability is needed. The commander's concept of the operation for maneuver and fire support may be influenced if known chemical or radiological obstacles are astride a prospective axis of advance.

IDENTIFY

Once an NBC hazard has been found, the next step is to identify the hazard, if possible. Biological agents require a laboratory facility for identification. Nuclear radiation is measured with the radiac instruments authorized by unit modified table of organization and equipment (MTOE). Chemical agents are identified with detector paper and chemical agent detector kit authorized at squad level.

M8/M9 chemical agent detector paper is used to detect liquid chemical agents. It is readily available to the individual soldier. Once the paper is brought into contact with the liquid hazard, the presence of blister or nerve agent is indicated by a color change in the paper. Since other substances (such as petroleum and insect repellant) may also cause a similar color change, M8/M9 paper should be used only as an indicator that chemical agent hazards may exist. Positive identification of the agent requires the use of the M256 chemical agent detector kit. This kit detects blood, blister, lewisite, and nerve agents. Operating instructions are in the kit.

MARKING CONTAMINATION

When contamination is found, it must be marked so unsuspecting personnel will not be exposed to it. Markers are shown in figure 2-2. When company detection, monitoring, or recon teams detect or suspect NBC hazards, they mark all likely entry points into the area and report the contamination to higher headquarters. The only exception to this policy is if marking the area would help the enemy. If, for example, a division were executing a retrograde operation, the enemy may bypass marked areas to avoid

contamination. If this exception is made by the commander, the hazard still must be reported to protect friendly units.

PROCEDURES

Units discovering a marked contaminated area do not have to conduct elaborate, time-consuming surveys. The new unit checks the extent of contamination and alters plans, if necessary. If the extent of the hazard is reduced, they relocate the signs. If the hazard is gone, they remove the signs. Changes are reported to higher headquarters.

The markers are placed facing away from the contamination. For example, if markers are placed on the edge of a contaminated area to mark a radiological hot spot, the markers face away from the highest contamination reading. Markers are placed at roads, trails, and other likely points of entry. When time and mission permit, additional markers should be emplaced. The distance between signs varies. In open terrain they can be placed farther apart than in hilly or wooded areas. You should be able to stand in front of a marker and see the markers to the left and right of it.

TYPES

US markers are NATO standard to make it easier for our forces and allies to recognize the hazards. These markers are in the standard NBC marking set. The colors and inscriptions on a marker indicate the type of hazard. (See figure 2-2.) Any additional information is written on the front of the sign.

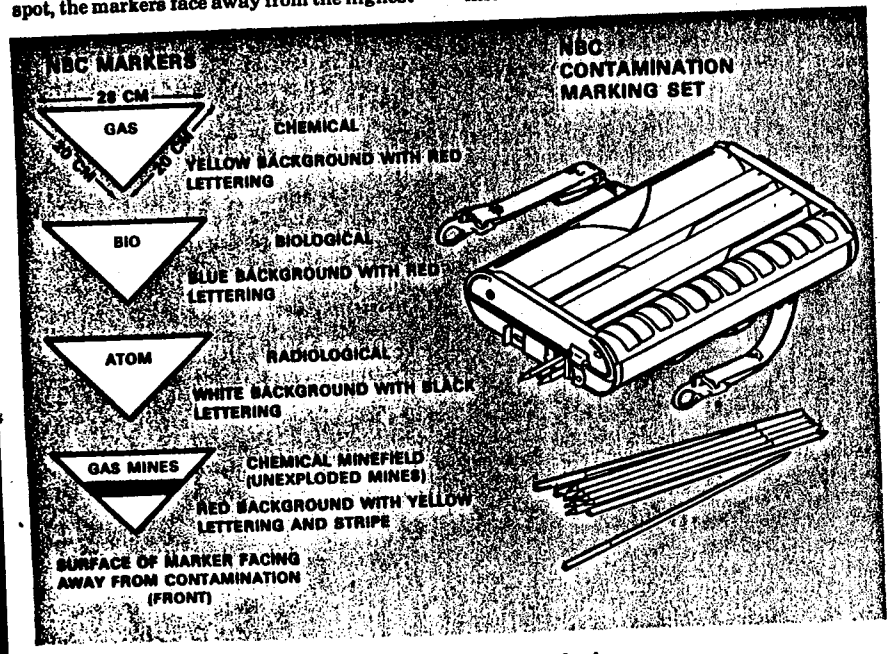


Figure 2-2. NBC marking devices.

The Warsaw Pact countries also have markers (figure 2-3). They consist of flags or signs that are automatically or manually employed as a standardized marking system. It is important that every soldier be able to recognize these markers in order to avoid contamination.

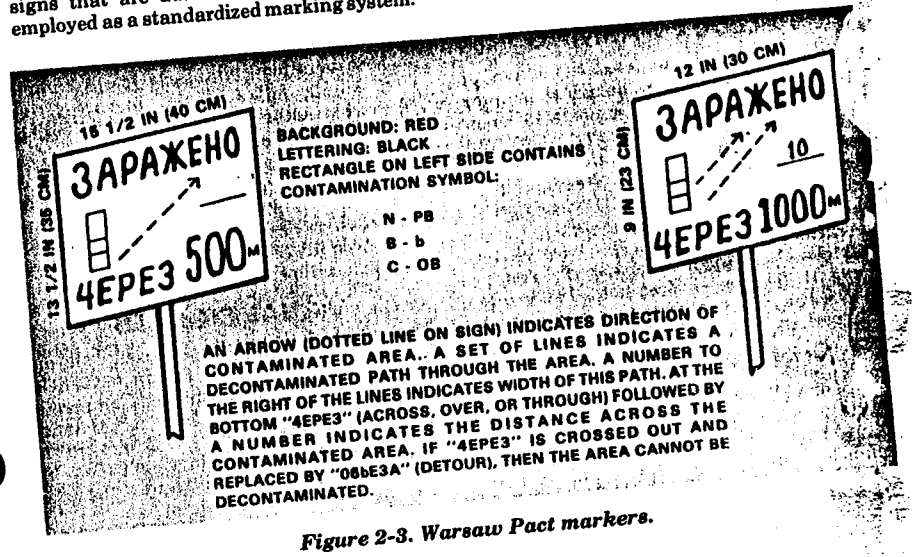


Figure 2-3. Warsaw Pact markers.

PASSING ALARMS AND SIGNALS

When an NBC attack is recognized, everyone who might be affected must be warned. Soldiers in immediate danger need warnings they can see or hear. The alarm or signal must be simple and unmistakable for quick and correct reaction. Units not immediately affected need the information to prepare for the hazard or change plans. When an NBC hazard has been located, the contaminated area should be marked so that units do not enter it. Standard alarms, the NBC warning and reporting system, and contamination markers help give orderly warning. Collecting, processing, and disseminating needed NBC hazard information also are vital.

VOCAL ALARMS

The vocal alarm for any chemical or biological hazard or attack is the word "gas." The person giving the alarm stops breathing, masks, and shouts "gas!" as loudly as possible. Everyone hearing this alarm must immediately mask, repeat the alarm, and take cover from agent contamination and fragmentation of munitions. It also may be necessary to pass the alarm over the radio or telephone. Visual signals may supplement vocal alarms.

AUTOMATIC ALARMS

If an M8 automatic chemical agent alarm

sounds or flashes, the first person to hear or see it stops breathing, masks, and yells "gas!" This alarm is relayed throughout the unit by voice, signal, and—if required—by radio.

FALLOUT WARNING

The first person to detect the arrival of fallout usually is the radiological monitor operating a radiacmeter. Immediately upon noting a dose rate of l centigray per hour (rad per hour) or higher, this monitor warns unit personnel. All personnel hearing this warning relay the warning. If the mission allows, soldiers should get in a shelter with overhead cover and stay there until given an "all clear" or when otherwise directed to move. If the mission does not allow you to take cover, decon becomes more important and perhaps more difficult.

NONVOCAL SIGNALS

Sound signals other than vocal may be used for warning personnel. Someone yelling "gas!" may not be heard over the sounds of combat. Something is needed to produce noise louder than, and not easily confused with, other sounds of combat. The NBC hazard warning alarm will be specified in the unit SOP. The following are some suggestions.

- Rapid and continuous beating together of any two metal objects to produce a loud noise. Example: The audible warning of a chemical attack is rapidly and continuously beating metal on metal.
- A succession of short blasts on a vehicle horn or other suitable device. A sample SOP entry follows: "While in convoy, five short blasts on a vehicle horn is the audible signal for a chemical attack."
- An intermittent warbling siren sound. A sample SOP entry is; "The audible alarm for impending chemical attack is the sounding of the installation siren as follows: 10 seconds on, 10 seconds off—sequence repeated for 2 minutes."

VISUAL SIGNALS

Visual signals may replace sound alarms when the sound may be lost in battlefield noises or when the situation does not permit the use of sound signals. The standard hand-and-arm signal for an NBC hazard is illustrated in figure 2-4. Signaling is done by extending both arms horizontally to the sides with fists closed and facing up, and rapidly moving the fists to the head and back to the horizontal. This is repeated until others react. Colored smoke or flares may also be designated as visual signals for an NBC hazard but must be specified in unit SOPs.

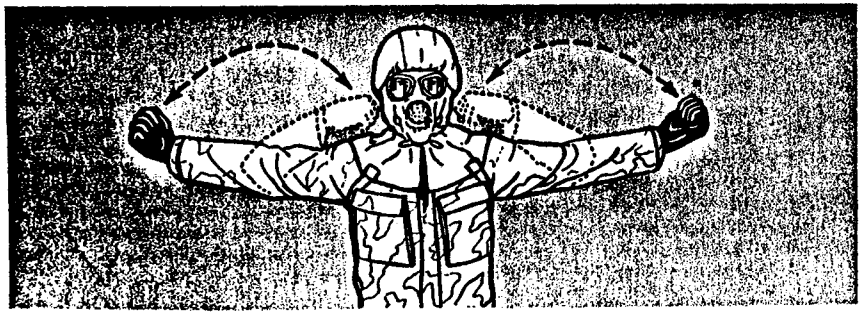


Figure 2-4. Illustration of hand-and-arm signals.

ALL-CLEAR SIGNAL

The all-clear signal is given by word of mouth through the chain of command. This signal is given by leaders after testing for contamination proves negative. If required, standard sound signals may be used, such as the continuous, sustained blast on a siren, vehicle horn, or similar instrument. When the "all clear" is announced on the radio, it must be authenticated before complying. The commander designates the specific "all clear" signal and includes it in his SOP. See FM 3-4 for unmasking procedures with and without a detector kit.

OPERATING WARNING AND REPORTING SYSTEMS

The nuclear, biological, and chemical warning and reporting system (NBCWRS) is a rapid means of sending reports of an NBC attack. These reports inform other affected units of clean areas and possible contamination.They also report contaminated areas up and down the chain of command and to adjacent units. Each report has a specific purpose and uses standard codes to shorten and simplify the reporting process. The formats and letter codes for the six standard reports (NBC 1 through 6) are explained in detail in FM 3-3, and briefly on page 2-10.

Each report is used for a specific purpose and uses standard codes to simplify the message. Specific instructions for acquiring the information and sending the reports are discussed in FM 3-3. Graphic training aids (GTAs) are available in pocket size for ready reference in combat and/or field use.

MANAGING THE SYSTEM

Managing the NBC warning and reporting system is crucial for success on the AirLand battlefield. To be useful, information must be promptly collected, reported, and evaluated. Once evaluated, it is battlefield intelligence. The process of obtaining and converting NBC information into usable NBC intelligence requires controls on handling information. Without these controls, too much unevaluated data may be passed over the communications system. Uncontrolled message traffic of this kind overloads communications and disrupts tactical operations.

COLLECTING INFORMATION

The first step in NBC warning and reporting system management is determining what information is available and who is available to collect it. There are two types of information to be collected. The first is a report by an observer of an NBC attack. The second is information obtained by monitoring, surveying, and reconnoitering to find out how much contamination there is and where it is.

Observer reports (NBC 1) provide initial information about the NBC attack. This information allows the NBCC to predict where nuclear and chemical hazards will drift. This prediction (NBC 3 report) is only an estimate of where the hazard area will be. Feedback is needed from units to determine exactly where the contamination is located.

This feedback results from monitoring, surveying, and reconnoitering (NBC 4 reports). Monitoring and reconnaissance operations give the initial location of NBC hazards to the NBCC. Initial monitoring and reconnaissance reports are forwarded to the NBCC. The NBCC then plots the information on a tactical map. If additional information is needed, the NBCC directs a unit (because of its location or capability) to obtain it. This information could be additional monitoring reports or a survey of the area in question.

Collecting NBC information is, therefore, a joint effort between units and the NBCC. The unit collects the information. The

STANDARD REPORTS

NBC 1 Observers' Initial Report.

This report is used by the observing unit to give basic initial and follow-up data about an NBC attack. It is sent by platoons and companies to battalion headquarters or by designated observers to division NBC centers (NBCC). NBC specialists and key leaders in all units must be completely familiar with the NBC 1 report and the information it contains. Battalion and higher elements must consolidate reports and decide which NBC 1 to forward. The unit NBCC is responsible for ensuring the report is in the correct format. The NBC 1 report following the first use of NBC weapons is sent with a FLASH precedence. Subsequent reports are sent with a precedence of IMMEDIATE. Only observers specifically designated by the division NBC center send NBC 1 (nuclear) reports. Nuclear attacks can be observed from great distances. Therefore, those units most capable of making accurate measurements are designated as observers (see pages 2-12 and following).

NBC 2 Evaluated Data Report.

The NBC 2 report is based on two or more NBC 1 reports. It is used to pass evaluated data to units. Division is usually the lowest level to prepare an NBC 2 report. However, a brigade or battalion might do so, especially during independent operations.

NBC 3 Warning of Predicted Contamination Report.

The NBCC uses NBC 1 reports and wind information to predict downwind hazard areas. This is disseminated as an NBC 3 report. Each unit evaluates the NBC 3 report, determines which of its subordinate units may be affected, and disseminates the report as required. This report warns commanders when they may be within a downwind hazard area so they may take protective measures.

NBC 4 Monitoring and Survey Report.

When a unit detects NBC hazards through monitoring, survey, or reconnaissance, this information is reported as an NBC 4. NBC 4 reports from various units are plotted on the NBCC situation map to show where hazards exist. These reports are prepared and submitted by company-level organizations.

NBC 5 Actual Contaminated Areas Report.

Once the NBC 4 reports are posted on the situation map, an NBC 5 report is prepared showing the contaminated area. NBC 5 reports usually are prepared by division. The preferred method of dissemination is by map overlay.

NBC 6 Detailed Information on Chemical/Biological Attack Report.

This report, summarizing information concerning a chemical or biological attack, is prepared at battalion. It is submitted to higher headquarters only when requested. If desired, it can be sent from higher to lower for information purposes.

NBCC plans for and directs the collection effort. The division tactical SOP should describe who collects NBC information and forwards it for evaluation.

EVALUATING INFORMATION

After NBC data has been collected, it is evaluated and used as battlefield intelligence. The NBCC is the primary evaluation center. Units and intermediate headquarters use raw data or do a quick, simplified evaluation. These results are valid until the detailed results arrive from the NBCC.

TRANSMITTING INFORMATION

The procedures used to transmit NBC information to and from the NBCC are very important to the NBC information system. (See figure 2-5.) Usually, the NBC reports flow through the chain of command. For example, company to battalion to brigade to division. There are exceptions to this. Some of these are:

- When survey information is requested by the NBCC, the unit doing the survey may report directly to division. This is generally done during aerial surveys.
- Attached units, OPCON units, or units that provide area support report information to the supported headquarters.

The method of transmitting information depends on the tactical situation and mission of the unit. It is specified in the SOP. NBC reports usually are passed through the intelligence—rather than the command—net. Admin-log nets are used by support units. Wire transmission is an alternate means. There are numerous methods to communicate NBC information. The NBCC should evaluate all possible methods and recommend those that best serve the purpose. Again, this information should be contained in the tactical SOP.

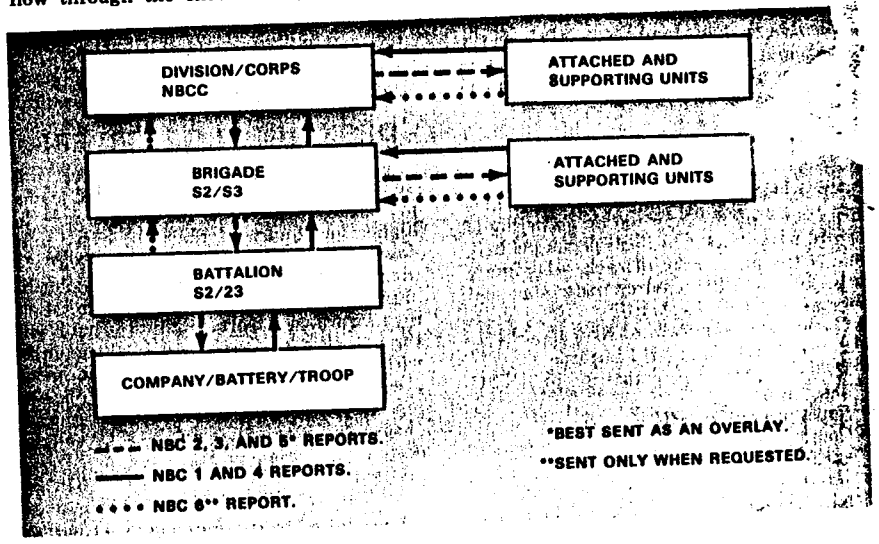


Figure 2-5. Flow of NBC reports.

RESPONSIBILITIES

Each unit and command element has specific reporting responsibilities in an NBC environment. The following paragraphs discuss these responsibilities in general terms progressing through the lower to higher echelons.

COMPANY

Most NBC information is gathered and reported by company-level units. These units must be trained and equipped to:

- Identify chemical agents.
- Monitor for chemical agents.
- Collect and forward soil and water samples.
- Conduct chemical and radiological surveys.
- Monitor for radiation.
- Report NBC attack data using the NBC warning and reporting system.
- Plot simplified downwind hazards.
- Receive, evaluate, and act on NBC reports.

Commanders must ensure his units ability to operate and maintain its assigned NBC defense equipment.

BATTALION/BRIGADE

Battalions and brigades are responsible for monitoring the information gathering of subordinate units. Chemical personnel help ensure the proficiency of each subordinate unit. In an NBC environment, chemical personnel at both levels will:

- Consolidate and forward NBC reports.
- Estimate effects of NBC hazards.
- Disseminate information on NBC activities.
- Supervise and plan NBC surveys.
- Coordinate with appropriate battalion staff for NBC recon.
- Advise the commander on how to employ NBC assets.
- Coordinate with other staff members and advise them on NBC matters.

NBC CENTER

NBCC techniques are more detailed than those at unit level. They involve more complicated procedures and are based upon the evaluation of data from many sources. In addition to making detailed analyses, the NBCC also does the following:

- Receives, evaluates, and disseminates reports of NBC attacks.
- Estimates the effects of nuclear detonations and makes fallout predictions.
- Estimates the effects of enemy chemical and biological attacks, including hazard predictions.
- Coordinates reconnaissance and survey activities with higher, lower, adjacent, and allied units.
- Maintains an NBC situation map.
- Provides advice to G2 on NBC intelligence matters.
- Provides technical assistance to all staff levels.
- Provides technical assistance for interrogating enemy prisoners of war about NBC matters.
- Selects designated observers.

DESIGNATED OBSERVERS

Every unit is responsible for observing and recording NBC attacks. Unit NBC teams prepare NBC 1 reports for transmission to higher headquarters. However, every unit does not automatically forward NBC 1 (nuclear) reports. So many units are able to observe a nuclear burst that if every unit tried to forward a report, nothing would get through. For this reason, only those units with the equipment to make the most accurate observations submit NBC 1 nuclear reports. These units are called designated observers. The division NBCC selects designated observers according to criteria given in the tactical SOP and lists them in the operation order. Different observers may be designated as the battlefield situation changes. Any unit that is aware of a chemical or biological attack promptly prepares and forwards an NBC 1 chemical or biological report.

The designated observer system provides the essential data to prepare hazard location predictions and nuclear damage assessments. It provides raw observer data using a standard report format. The NBCC specifies the precedence of the report and the primary and alternate means of communication. Observers are selected to provide total coverage. This requires both ground and aerial observers.

GROUND-BASED OBSERVERS

Ground units are selected for the system based upon many factors. Some of these factors are:

- Battlefield location.
- Organic angle-measuring equipment.
- Available communications nets.
- Mission (current and future) compatibility.
- Training and experience.
- Anticipated reliability of data.

Artillery units are best-suited to be designated ground-based observers. These units possess organic optical equipment ideal for nuclear burst surveillance. The equipment is in constant use. In order of preference, these items are:

- M2 aiming circle.
- M65 or M43 battery-command periscope.
- T16 or T2 theodolite.
- M2 compass.

See FM 101-10-1 for more information about which divisional units have this equipment. Any other type of unit (such as a mortar platoon) with this or similar-quality equipment may also be considered. One additional type of equipment which should be considered is radar. They are positioned in the division and corps areas. Their coverage areas are usually extensive.

AERIAL OBSERVERS

Large numbers of helicopters are employed over the entire battlefield. Fixed-wing aircraft provide excellent observation platforms to gather data after nuclear attack. The role of aerial observers is to provide postattack data. This data includes damage estimates, location of attack, cloud parameters, surface/airburst information. Aviators can also report data about craters and actual ground zero locations. This data is usually not obtainable from ground-based observer units.

NONDESIGNATED OBSERVERS

All units are required to record their observations concerning nuclear strikes in the prescribed format. Brigades without designated observer units hold their reports. These units do not send reports unless specifically requested by the NBCC to do so.

GIVING FRIENDLY ATTACK WARNINGS

The units affected by a friendly nuclear or chemical strike must be warned whenever possible. This is known as a nuclear attack warning (NUCWARN) or chemical attack warning (CHEMWARN). Because of the nature of the AirLand battlefield, this is not an easy thing to do. Units are vulnerable to nuclear and chemical weapons. Warnings must be delivered as soon as possible so strikes may be delivered on time. They must also be encoded or sent via secure means to avoid warning the enemy. The warning may be sent in the clear only if there is not time for the enemy to react prior to the attack.

There are several ways to speed the warning on its way. SOPs establish general procedures for passing friendly nuclear and chemical attack warnings and for reacting to them. In this way, warnings can be kept short because a lot of information is not needed.

OPLANs can add more specific instructions about a particular operation, such as code words for a preplanned attack.

A warning order may be given while a nuclear or chemical attack is being planned to alert troops in an area that may be affected. They may be cautioned to remain alert for a follow-up message that will cancel, confirm, or alter the warning. All of these (SOPs, OPLANs, and warning orders) allow commanders to react or hold a warning until the last moment in order to achieve surprise in the attack.

Only friendly forces vulnerable to the strike are warned. Sometimes this is not possible, however. While good SOPs help, the commander must weigh the effects of the strike on his own personnel versus the effects on the unwarned enemy. When low-yield weapons are employed in dynamic situations, operational requirements may dictate some relaxation of requirements for positive warning.

Target analysis determines the range of effects for whatever weapon is used. Troops in the open and aircraft are particularly vulnerable and should be warned. Blast overpressure can destroy light aircraft and dazzle effects from a nuclear blast can temporarily blind a pilot. Chemical vapors can sweep with deadly effect on unwarned troops in the open and on unwarned low-flying aircraft. The downwind vapor hazard of a chemical attack is a particular problem. Any troops or aircraft in—or likely to maneuver through—the downwind hazard area should be warned.

Deciding when to warn friendly personnel and units is similar to the decision about who gets warned. Early warning gives friendly forces time to prepare. It may also warn the enemy and give them time to prepare. It may also cause the enemy to launch a preemptive strike against us. The commander must weigh these pros and cons and give the warning at the most opportune time so friendly forces can prepare and enemy forces will be surprised.

RESPONSIBILITIES

The commander must ensure presidential release has been given before conducting a nuclear or chemical attack. The commander must also ensure such an attack will not interfere with the operations of adjacent commands. Adjacent commands that may be affected are consulted. The attack must be a coordinated effort. Conflicts are resolved by higher headquarters.

The commander who orders the attack is responsible for issuing the warning. For example, the division commander ordering the attack issues the warning even if corps assets are used. The G3 has staff responsibility for issuing warnings for friendly attacks. The division or corps airspace management element (DAME/CAME) is responsible for alerting aviation assets.

All nuclear and chemical attack warning messages are transmitted by the fastest means available but not in the clear unless troop safety makes it essential. All messages, including cancellations, must be authenticated according to usual communications-electronics operation instructions (CEOI) procedures. A false message given by the enemy over our nets could seriously disrupt our operations.

Units not affected by the attack plans are not warned. All units that might be affected should be warned. Some of these are:

- Subordinate headquarters.
- Adjacent headquarters.
- Higher headquarters, when units not under the command of the attacking commander may be affected.

Each warned headquarters notifies subordinate headquarters that might be affected.

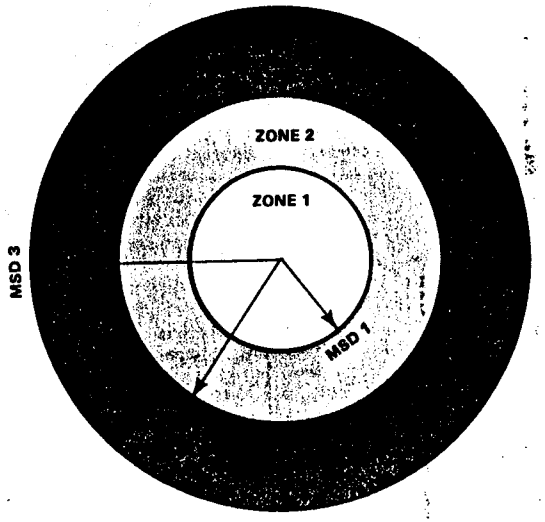
Nuclear and chemical attack warnings are not passed below battalion level. Instead, companies are given specific instructions. These instructions must be kept brief by using code words and formats written into unit SOPs. They must include code words indicating an attack and a brief prearranged message or brevity code to take specific action such as move or go into a protective posture. The SOP should include time limits for these actions and the expected time of attack.

Specific methods for passing warnings should be included in all unit SOPs. This should include easily recognized codes and formats, and procedures for passing warnings.

Specific methods for cancelling warnings should also be included in all unit SOPs. Units previously warned are notified in the clear by the fastest means by giving line ALFA from the NUCWARN followed by the word "CANCELLED."

NUCLEAR ATTACK WARNING

The closer a unit is to a nuclear strike, the greater the precautions it must take. Therefore, several minimum safe distance zones are included in the standard NUCWARN (figure 2-6).



PRECAUTIONS

Zone 1. Everyone should be evacuated. Maximum protection is needed for any unit unable to leave.
Zone 2. Everyone should take maximum precautions but need not evacuate the zone. Troops in armored vehicles should close hatches and go into hull defilade. Other soldiers should find bunkers or foxholes with overhead cover. Aircraft should not be in the area.
Zone 3. Everyone should take at least minimum precautions. Soldiers in the open should lie down and cover all exposed skin with the equivalent of two layers of cloth. Aircraft should remain outside of zone 3.

Figure 2-6. Nuclear strike zones of warning.

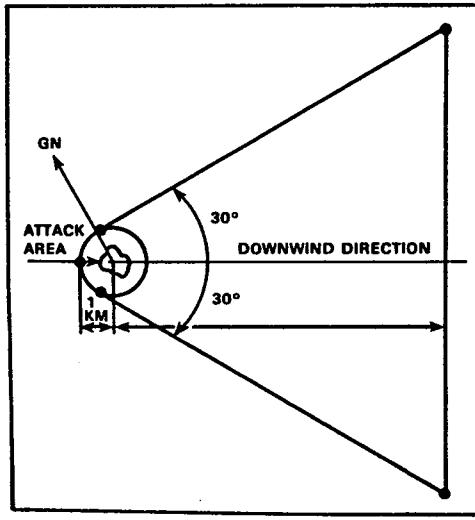
Each minimum safe distance (MSD) is computed for a specific nuclear weapon and is based on the degree of acceptable risk if all soldiers take the prescribed precautions. The degree of acceptable risk is determined by the commander.

Negligible risk is the usual, acceptable risk. It should not be exceeded unless there is a significant tactical advantage to be gained and there are no other alternatives. The three degrees of risk are:

- Negligible risk—The effects at this risk include no more than 1 percent casualties or 2.5 percent nuisance effects. These include eardrum rupture, first-degree burns, and vomiting from radiation. These effects may degrade performance temporarily but the soldier will recover without being hospitalized.
- Moderate risk—The effects of this risk include no more than 2.5 percent casualties and 5 percent nuisance effects. If moderate risk is exceeded, troops cannot be expected to operate at full efficiency after a friendly burst.
- Emergency risk—Five percent of the troops will become combat ineffective. A larger number will suffer nuisance effects. ***EMERGENCY RISK SHOULD BE ACCEPTED ONLY WHEN IT IS ABSOLUTELY NECESSARY.***

CHEMICAL ATTACK WARNING

CHEMWARNs are similar to NUCWARNs. The difference is the minimum safe distance. In a chemical attack warning there is only one zone, and it is based on the chemical downwind hazard. (See figure 2-7.) The lines in the warning are also slightly different, but these differences are minimal. The purpose of the report is the same. There are two areas of operational concern: the attack location and the downwind hazard. Units in the hazard area must take appropriate defensive measures.



POINT TARGET ATTACK (WIND ≥ 10 KMPH)

	CHEMWARN
ALFA	AFOO2CHEM
DELTA	028030Z
FOXTROT	PG 560750
GOLF	ARTILLERY BURSTING
HOTEL	NONPERSISTENT NERVE
PAPA ALFA	PG 556751
	PG 559754
	PG 559774
	PG 610694
	PG 558747
YANKEE	012 KMPH

Figure 2-7. Sample CHEMWARN message.

LIMITING CONTAMINATION

The enemy uses contamination to cause casualties, degrade performance, and restrict the use of terrain. The enemy wants you to become preoccupied with contamination, hoping you will either stop to decontaminate or avoid using terrain or facilities that are contaminated. To maintain your freedom of action, you can either bypass contamination or perform some of the following selected actions before entering a contaminated area: separate, encapsulate, and cover. If already contaminated, you must decide whether or not to relocate and how to go about it. Your mission, the type and extent of contamination, and the expected enemy course of action are considered when deciding how to best limit contamination.

BYPASSING

Bypassing a contaminated area is the preferred method of limiting contamination. You do not need to wear complete protective clothing or use time and resources for decon. But, you may need to temporarily mask if a downwind vapor hazard exists. Soldiers are more psychologically prepared to fight. They need not fear chemicals that otherwise would linger on vehicles and equipment. Bypassing contamination is simpler and safer than going through it. However, the mission may prevent selecting this option.

SEPARATING

Leave nonessential equipment and personnel behind. If you cannot protect your equipment from contamination, it may present a hazard later. If your mission includes going into a contaminated area and returning, you might consider leaving the decon team behind. They could prepare to decontaminate your unit when it returns.

ENCAPSULATING

You must prevent NBC contamination of all your equipment. Anything carried on the outside of a vehicle can become contaminated. Consider placing vital equipment inside combat vehicles or shelters or protect exposed equipment with wrappings or covers.

Encapsulate personnel in MOPP gear or collective shelter. The collective protection systems in combat vehicles need to be activated before entering a contaminated area.

Shielding reduces exposure to nuclear radiation. Anything you can place between you and the source of radiation can reduce the amount of radiation received. Some materials reduce radiation better than others. Tanks and armored personnel carriers shield better than wheeled vehicles. The shielding properties of all vehicles may be improved if sandbags can be placed on the floors or sides of vehicles.

COVERING

Tarps, plastic bags, and other containers may be used to cover equipment. Covered equipment must be carried across the contaminated area in an open truck, a camouflage tarp will reduce the amount of decon necessary later. If the equipment is left in its original containers (such as ammunition cans), this may further reduce or eliminate decon requirements. A protective coat of earth may also ease your decon work after crossing.

RELOCATING

Take immediate action to determine the type of hazard and its persistency. If the hazard is nonpersistent blood or nerve agent, the unit continues its mission. The hazard should disappear quickly. If the hazard is persistent (nuclear fallout, suspected biological agent, or liquid chemical agent), the unit maintains full protection, takes actions to limit further exposure to the hazard, and continues the mission.

Simultaneously, the commander analyzes the unit's situation to determine if

immediate relocation to a clean (uncontaminated), alternate location is necessary and possible. Primary considerations are given to the:

- Current tactical situation.
- Protection offered by present position.
- Increased exposure to the hazard that would be caused by relocation.
- Possibility of further NBC attack.
- Degree of decon required.
- Impact of continuing to fight in partial or full protection.

If the decision is made to remain in place, the contamination hazard must be lessened or avoided as much as possible.

Preparation to relocate is started as soon as possible if the contamination problem cannot be easily or quickly resolved. Movement to a clean alternate position may involve considerable movement distances depending on the unit's mission, the tactical situation, and terrain features. During relocation, every effort is made to avoid further exposure to the contamination hazard.

Select a route or path through the contaminated area that provides freedom of maneuver and minimizes contact with contamination. You must always move tactically. You will have difficulty locating snipers and booby traps, because your vision is hampered by wearing a protective mask. ***Do not abandon sound tactics because you are in a contaminated area.***

Unit recon personnel should be ahead of your unit checking for clean paths or areas. They would then direct the main body of the unit through these areas.

If required to cross a contaminated area, minimize contact by avoiding vegetation such as small trees, brush, and tall grass. The faster you can get across, the shorter will be your contact with contamination and the less chance that it will be absorbed into your equipment. Speed is particularly important when crossing radiological contamination.

Also, consider decontaminating a path. Setting fire to a path through the contamination creates an immediate vapor hazard, but will reduce the contact hazard. Engineers can reduce the contact hazard by using earthmoving equipment to clear a path. The hazard on hard surfaces can be reduced by flushing them with water or covering them with clean material such as earth. Decon units are also capable of limited decon of hard surfaces. Even with these methods, there will still be a vapor hazard near the decontaminated area. These methods have drawbacks, because they are time consuming and require equipment and supplies not organic to a unit.

CHAPTER 3

PROTECTING AGAINST NBC ATTACKS

Protecting yourself and your equipment is needed if contamination avoidance is not possible or practical. If the enemy can use NBC weapons, you must be prepared to protect yourself. You may become contaminated because you are directly engaged with NBC weapons, or your mission may require you to cross a contaminated area. Therefore, NBC protection must be an integral part of all operations.

Everything that has been said about avoidance is part of preparation for an NBC attack. If the enemy knows you are dispersed, equipped, well-trained, and practicing all the other avoidance measures, you will be considered a less lucrative target. Avoidance and protection are closely linked. In fact, they overlap. Techniques that work for avoidance can also provide protection. It is difficult to draw a distinct line between avoidance and protection techniques. However, there are four broad groups of activity that can be emphasized as protective measures. They are hardening positions and personnel, assuming mission-oriented protective posture (MOPP), reacting to attack, and using collective protection.

HARDENING POSITIONS AND PERSONNEL

Hardening includes all of the things you can do to make yourself more resistant to enemy strikes. Hardening is a form of avoidance as well as protection, because it makes you a less lucrative target. The enemy that feels NBC weapons would not be effective is less likely to use them against you. If, in spite of this, you are attacked, hardening your position and yourself will help protect you.

READY THE POSITIONS

Nearly everything you do to harden your positions against nuclear attack is also helpful against chemical or conventional attack. If your positions are hardened to withstand high explosives, you are better prepared for nuclear strikes. Of course, the reverse is also true. Because of the overhead cover, you are also prepared somewhat against persistent chemical and biological weapons strikes.

Foxholes and bunkers provide excellent protection against the effects of nuclear weapons. Tanks and armored vehicles in hull defilade are excellent NBC shelters.

Existing natural and man-made terrain features such as caves, ditches, ravines, culverts, overpasses, tunnels, and empty ammunition storage bunkers can be used as expedient shelters. Locating these features

during reconnaissance makes them easier to find during an attack.

The basements of masonry and light steel buildings can provide significantly more blast and radiation protection than wheeled vehicles. This is especially true for field command, control, and communication installations which typically consist of wheeled vehicles placed in concealed, wooded sites. Although toxic vapors from chemical attacks can enter buildings, bunkers, and covered foxholes, these positions can provide almost complete protection from liquid and particulate contamination. This protection will greatly reduce the need for decon.

In more fluid battlefield situations, establish at least one tactical (alternate or jump) command post (CP) in a protected or built-up area. It is good practice to provide maximum protective shelter for all off-duty personnel and critical replacement equipment. Use cover during troop movements and convoy operations. Route reconnaissance should locate handy shelters such as culverts, tunnels, overpasses, and built-up areas. Schedule en route stops near these shelters.

READY THE PERSONNEL

Ordinary garments offer only temporary protection from chemical contaminants and significant protection from the heat of a nuclear blast. Thermal radiation can burn exposed areas of the skin. Your face, neck, and hands are especially vulnerable. You can be burned so quickly that any attempt to cover your face and hands at the time of the burst will be too late. Therefore, just before an announced detonation, you should assume a position to protect your eyes and any exposed skin areas of the face, arms, or hands.

For example, drop face-down to the ground or as low as possible in your covered position, shelter, or vehicle. Keep your hands and arms protected under your body. Always try to keep your cap or helmet on.

The chances of becoming a thermal radiation casualty depend on the amount and severity of the skin area burned. Second- or third-degree burns over only 30 percent of the body can cause incapacitation within 24 hours (25 percent incapacitation within 2 hours). Your uniform can reduce the thermal radiation by half. Gloves can protect hands. A scarf or hood can also be used effectively to cover and protect the more vulnerable areas of your head and the back of your neck. Light-colored material is better than dark because the former reflects more thermal radiation. A few points to remember are:

- Keep clothes loosely fitted. Skin burns occur more readily where the clothing is in direct contact with or drawn tightly over the skin.
- Wear headgear at all times. Your helmet is probably the most immediately available blast and thermal protection you have. Keep chinstraps fastened.
- Sunscreen or cream can provide some skin protection.
- Wear ear protection. Ear plugs or headsets can protect you from eardrum rupture or hearing loss.

For most biological (bio) agents—but not toxins—the most effective protective measures are to enforce good field sanitation and personal hygiene, and keep immunizations up-to-date. The protective mask must also be readily available and properly fitted. Bio agents are less likely to infect healthy, immunized soldiers.

POSITION THE ALARMS AND MONITORS

The NBC warning and reporting system can warn you of many attacks, but you must also rely on your own resources. Make sure you can take advantage of the warning and reporting system by ensuring your SOPs specify means to transmit reports easily and effeciently. However, warnings will not always come, so you must rely on your own alarm system. There are no alarms or detectors that can give you early warning of an impending nuclear blast. However, you have organic systems that can detect nuclear or chemical contamination. Place M9 detector paper in positions that can give maximum exposure to chemical agents. Disperse radiacmeters among personnel for best coverage of potential radiological contamination. Position chemical agent alarms upwind of your positions.

ASSUMING MISSION-ORIENTED PROTECTIVE POSTURE

Mission-oriented protective posture (MOPP) is the flexible use of protective clothing and equipment that balances protection with performance degradation. Wearing MOPP gear can cause heat and mental stress and reduce your efficiency. The higher the MOPP level, the more protection it provides, and the more it degrades performance. The leader has to weigh the needs of individual protection against unit efficiency. MOPP is a tool for leaders to use based on the threat, temperature, work rate, and mission. Leaders must try to prevent NBC casualties on one hand and reduce heat and fatigue casualties on the other.

If the mission is so urgent and essential that it becomes a clear choice of one or the other, heat casualties will recover faster than chemical casualties. Nevertheless, commanders and leaders must guard against heat casualties when soldiers are in MOPP gear performing hard, physical work. Leaders should specify a MOPP level before the mission. This level can change if the situation changes or new intelligence is received.

Using MOPP requires judgment. It is a constant balance between the amount of protection needed and the urgency of the mission. As the MOPP level increases, mission efficiency goes down. Mission and performance degradation are unavoidable while wearing MOPP gear. The five major things degraded are:

(1) Fine motor skills—wearing protective gloves reduces ability to grasp tools and manipulate controls.
(2) Gross motor skills—wearing MOPP gear slows a soldier's overland movement.
(3) Visual skills—wearing a mask reduces visual acuity.
(4) Hearing skills—wearing the hood reduces hearing level.
(5) Stamina—wearing MOPP gear causes heat and mental stress.

Although some mission degradation is unavoidable, the amount can be reduced by acclimation and training. The better-trained the individual soldier, the less impact MOPP has on that individual's performance. Psychological stress can also be reduced by training.

LEVELS ZERO THROUGH 4

Leaders use standardized MOPP levels to easily increase or decrease their unit's level of protection. Because the levels are standardized and all soldiers understand them, leaders can order increased or decreased protection without providing long explanations. Leaders can raise or lower the degree of protection through five levels of MOPP from MOPP zero through 4. They may place all or parts of their units in different MOPP levels or authorize variations within a given level.

Protective items that take the longest to put on but degrade mission performance the least are put on as parts of the lower levels of MOPP. Protective items that can be donned quickly but degrade performance of individual tasks the most are put on as parts of higher levels of MOPP.

MOPP ZERO

The protective mask, skin decon kit, and detector paper are carried. The overgarment, overboots, chemical protective helmet cover, and gloves are carried or stowed nearby (within the work area, vehicle, fighting position, or the like). MOPP zero may be used when the enemy has an NBC employment

level commanders with the threat information they need to set the most appropriate MOPP level for their mission.

When commanders—especially commanders at high levels such as divisions and corps—set minimum MOPP levels, they should not set them so high they limit the flexibility of their subordinates. Commanders must not impose unnecessarily high MOPP levels over large areas merely as a precautionary measure.

In 1920, it was estimated that an army forced to wear protective masks at all times would suffer at least 25 percent loss of vigor and efficency. This remains true even with the improved equipment of today. Today, we must wear not only a mask but also a protective garment and accessories.

Ordering MOPP2, 3, or 4 can be the job of company commanders, platoon leaders, or squad leaders. A brigade headquarters about to launch a counterattack with chemical weapons might direct one or more of its battalions to assume MOPP4 as a precaution, especially if the chemical agent is persistent. But, a brigade or a battalion usually will be dispersed across too large an area to warrant placing the whole unit in MOPP4.

Within each level of MOPP there is also considerable room for flexibility. The overgarment may be worn with or without battledress underneath. The coat may be worn closed or open. Other variations within MOPP levels are addressed in FM 3-4. These decisions to modify MOPP should be left to leaders on the scene. NBC specialists can provide recommendations and guidance to the commander on variations within a prescribed MOPP level.

ANALYSIS

Every leader has a responsibility to go through a MOPP analysis based on the unit's particular situation. The analysis finds the balance between reducing the risk of casualties and accomplishing the mission. Leaders must also understand the increased water requirements. The use of MOPP involves risk. The better you are at analyzing the factors that control your need for protection, the lower your risk. This can better your mission performance. FM 3-4 contains a detailed discussion on water requirements and MOPP analysis.

MOPP ANALYSIS

Leaders must carefully analyze the factors of METT-T for their situation whenever MOPP is considered. Through MOPP analysis, in conjunction with METT-T, leaders can select the appropriate MOPP level. The MOPP analysis questions are listed below. (A complete explanation is in FM 3-4.)

- What is the mission?
- What is the work rate?
- How long will the work take?
- Is the unit targeted?
- What is the warning time?
- What is the weather?
- What additional protection is available?
- What is the training and physical level?
- Is it day or night?

WATER REQUIREMENT

A recommended replenishment should be based on work rate and temperature. For example, with a moderate-to-heavy work rate and the temperature at 80° Fahrenheit (27° Centigrade), 1 quart of water should be consumed every 3 hours. With the same work rate at temperatures above 80° Fahrenheit (27° Centigrade), the consumption will increase to 1 quart every 2 hours. Again, FM 3-4 contains additional guidance.

REACTING TO ATTACK

Reacting to an attack is essentially taking advantage of the hardening, MOPP, and collective protection you have prepared. In reacting to an attack, probability indicators influence your specific reaction. There are two groups of reactions: those against nuclear attacks and those against chemical/biological attacks.

ATTACK INDICATORS

There are two types of indicators of an NBC attack. The first type indicates a high probability of attack, the second a possible attack. The bright flash, enormous explosion, high winds, and mushroom-shaped cloud clearly indicate a nuclear attack. Positive readings on radiacmeters indicate a radiation hazard.

HIGH PROBABILITY/ POSSIBILITY INDICATORS

High-probability indicators of a chemical hazard are a sounding chemical alarm, a positive reading on chemical agent detector paper, and individuals exhibiting symptoms of chemical-agent poisoning.

Indicators of a possible chemical attack include:

- Artillery shells that explode less powerfully than HE rounds.
- Aircraft- or rocket-delivered bombs or containers that contain bomblets that pop rather than explode.
- Aircraft that are spraying a mist or fog.

Indicators of biological attack can include the indicators previously listed. Indicators also may be more subtle and include mysterious illness, many people sick for no known reason, or large numbers of insects.

AUTOMATIC MASKING

Commanders must guard against overreacting to NBC warfare. The degradation caused by wearing MOPP gear can be just as serious in many situations as the NBC hazard. Commanders should use the MOPP analysis discussed earlier in this chapter to make MOPP decisions.

Prior to the initiation of chemical warfare, the only time individuals in a unit automatically mask is when there are indicators of a high probability of chemical attack. Some of these indicators are chemical alarm sounds, a positive reading obtained on detector paper or chemical agent monitor, or exhibition by individuals of chemical agent symptoms.

Upon initiation of chemical warfare, commanders at all echelons must decide by using the MOPP analysis process whether or not individuals should automatically mask. The command masking policy will then be disseminated by the most timely means available. When automatic masking is ordered, soldiers must mask immediately when any of the listed chemical attack indicators occur. Commanders should reassess the masking policy as the situation or mission changes.

If individuals find themselves alone and there are indicators that a chemical/biological attack has occurred, they should mask and assume MOPP4. They should seek command guidance to determine if it is safe to unmask.

NUCLEAR ATTACK

An enemy nuclear attack rarely is preceded by a warning. The first indication you will have will be a flash of intense light and heat. Initial radiation comes with the light. Blast and hurricane-like winds follow within seconds. There will be a short time to take action. Initial actions must, therefore, be automatic and instinctive. Post strike actions must include damage control and actions to restore combat power.

INITIAL ACTIONS

Assure your unit's readiness before a nuclear attack. The individual actions described in the following paragraphs are important for leaders to understand. The use of nuclear weapons will dramatically affect the control of units. Leaders will have to cope with the additional burden of protective gear. The following paragraphs describe actions individuals should take in the event of a nuclear strike.

Drop down immediately. The chances of your being thrown about or displaced by a blast wave depend on the exposed cross-

capability but chemical warfare has not begun or when troops are first deployed from outside the theater of operations.

MOPP1

The overgarment is worn. It is a two-piece uniform that takes about 4 minutes to put on. By going into MOPP1, the reaction time needed to go into MOPP4 is cut in half, from 8 minutes down to 4. In hot weather, it can be worn with the coat left open for ventilation. The overgarment trousers remain closed. M9 paper is affixed to the overgarment, and the chemical protective helmet cover is worn.

MOPP2

Add the overboots to MOPP1. The overboots take about 3 or 4 minutes to put on. Once troops are in MOPP2, they can go to the higher MOPP levels in a matter of seconds. In hot weather, the overgarment coat can be left open for ventilation. The overgarment trousers remain closed.

MOPP3

The protective mask and hood are added. This makes protection almost complete, but its interference with work becomes noticeable. Vision is restricted and heat stress poses a greater risk. In hot weather, the overgarment coat and hood to the protective mask may be left open for ventilation. The overgarment trousers remain closed.

MOPP4

A pair of rubber gloves and cotton liners are put on to protect the hands. The overgarment is then closed and the hood is pulled down and adjusted. This makes protection complete, but efficiency decreases rapidly.

MASK ONLY

This is not a MOPP level. Only the mask with hood is worn. In a contaminated environment with no blister agent vapors present, soldiers do not need to wear protective overgarments or rubber gloves. This is true as long as they are protected from transfer hazards such as direct skin exposure to liquid or solid contamination. Tanks, some vans, and buildings are examples of shelter that provide this kind of partial protection from contamination. Inside these shelters, soldiers can be exposed to vapor hazards but not transfer hazards.

In Mask Only, all exposed skin must be covered with ordinary clothing. If the shelter is penetrated, these garments can provide brief protection from the transfer hazards of nerve agent. Ordinary garments will probably provide no protection from blister-agent vapor. Commanders must balance the value of increased efficiency that Mask Only can give against the increased risk it presents. If the shelter is penetrated, occupants may be exposed to transfer hazards or blister vapors.

Soldiers in Mask Only must assume the appropriate MOPP level before leaving shelter. To maintain Mask Only, returning soldiers must not be allowed to carry transfer hazards into the shelter. Ultimately, the decision to go to Mask Only rests with the commander. Figure 3-1 shows the five MOPP levels.

FLEXIBILITY

MOPP is not a rigid procedure that puts everyone into lockstep. To maintain the balance between protection and efficiency, MOPP must be applied with common sense. Theater and corps commanders are aware of the strategic and tactical intelligence that might indicate the probable outbreak of NBC warfare. They also are aware of the operational impact and logistical burdens it would impose upon the theater of war. On the other hand, junior commanders and leaders are most aware of the difficulties MOPP can impose on the local situation.

It is a fundamental tenet of AirLand Battle doctrine to give as much responsibility as possible to as low a level as possible so that junior leaders can take the initiative. Therefore, the primary responsibility of higher level commanders is to provide junior

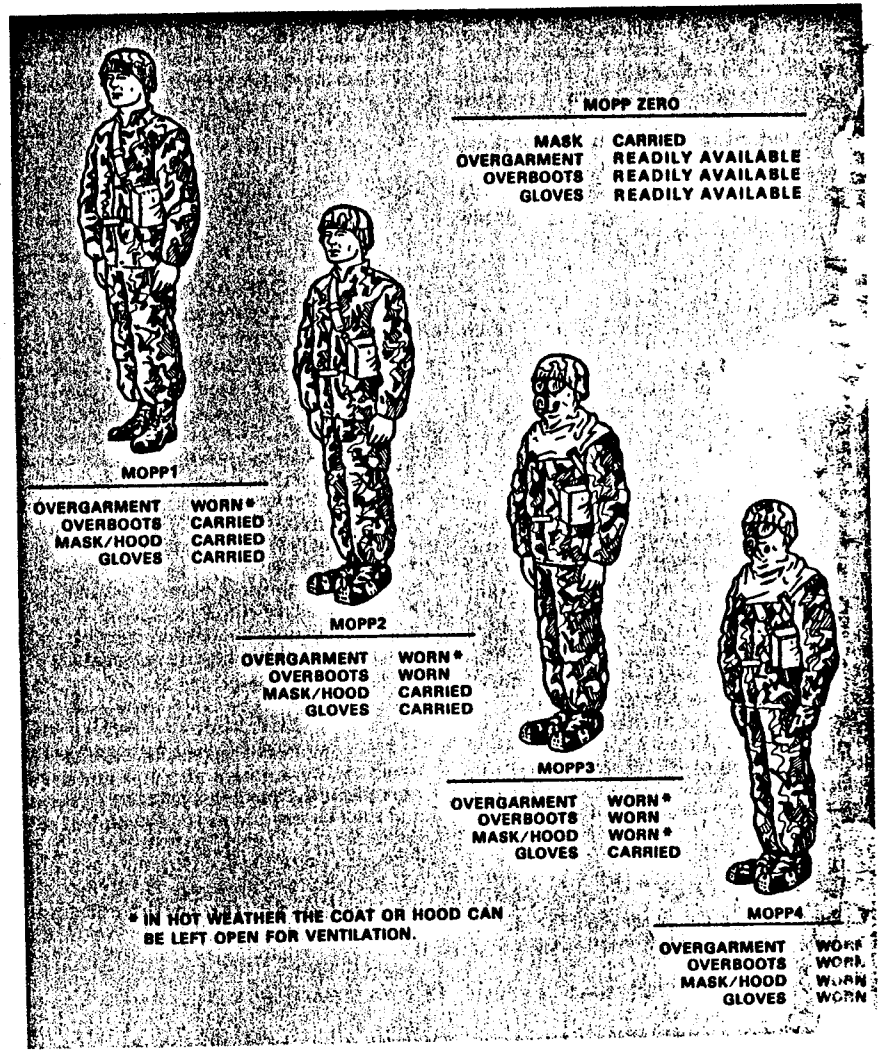


Figure 3-1. MOPP levels.

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Drop down immediately. The chances of your being thrown about or displaced by a blast wave depend on the exposed cross-

sectional area of your body. In a prone, head-on position, you will reduce this cross-sectional area to about 15 percent of that in the standing-facing posture. The chance of being hit by debris is also reduced. Dropping down is the first and most important action to take.

Protect your exposed skin areas. Your eyes, face, neck, and hands are especially vulnerable to injury from the dust, sand, and debris blown by the blast wave. Stay face down and cover as much exposed skin as possible. Even after the initial shock wave has passed, rocks, branches, debris, dust, equipment, and barbed wire will be thrown around by the violent winds. Remember to stay down until the blast wave passes in both directions.

If you are in a shelter or building, drop to the floor. Get under a desk or table to take advantage of the best cover available. Keep out of the way of any windows or doors. Broken-glass fragments flying through the air are dangerous.

If you are in a tank or armored vehicle, brace yourself. Head and shoulder injuries from being thrown against the inside of the hull are a big problem. Bracing yourself can help. Stay buttoned up. Your tank is a good shelter.

Get out of wheeled vehicles. In most cases, you will be safer lying prone in the open than inside a wheeled vehicle when the blast wave hits.

If flying in an aircraft, land. When flying at terrain flight altitude, land the aircraft in the first suitable landing area. The nose of the aircraft should be away from the blast.

If a suitable landing area is not available or dazzle effects prevent landing, turn the aircraft away from the blast and initiate a full-power climb while maintaining positive control of the aircraft. The aircraft will not outfly the blast wave. However, climbing will decrease the effects of secondary missile damage and increase the distance between the aircraft and the explosion.

The violence of the blast winds, personal burns or injuries, dazzle, and possible concern over radiation exposure may combine to make it difficult to stay calm. But remember:

- The blast winds usually end within 1 to 2 minutes after the burst.
- Your burns, cuts, or bruises are the same as conventional injuries.
- Dazzle is temporary, and vision will return in seconds.

POST-STRIKE ACTIONS

Assure your unit's effectiveness after a nuclear strike. Post-strike actions must include maintaining control and ensuring a clear chain of command. Leaders must also assess the damage promptly and take contingency actions quickly. They must monitor, evaluate, and supervise the follow-on actions discussed in the following paragraphs.

Assess the situation. Now is the time to reevaluate how best to secure and organize equipment, repair and reinforce your position, assist casualties, and begin to prepare or improve protection against possible fallout. The blast wave may blow down trees and displace or overturn equipment and vehicles. You should also expect some initial disorientation. Aircraft pilots flying VFR can expect terrain modification and may need to confirm their positions prior to entering a nuclear blast area.

Put out fires before they can spread. Secondary fires caused by smoldering debris or overturned stoves and heaters and damage to electrical wiring are immediate fire hazards. Extinguish these fires quickly to prevent large-area fires later.

Check the weapon systems. Weapons can become unserviceable due to sand which may be blown into gun bores and mechanisms. Field-stripping and -cleaning may be required before firing. Re-laying and registering artillery and mortars may be necessary before executing the next fire mission.

Beware of weakened structures and trees. Damaged structures and trees may remain standing after the blast. They can endanger personnel and equipment.

Right overturned vehicles. Surprisingly, much of the damage caused by overturning wheeled vehicles consists of loss of coolant, fuel, and battery fluids. Generally, from 1/2 to 2 hours of organizational maintenance will be required to restore these moderately damaged vehicles to combat use.

Improve your cover. You cannot rule out the possibility that enemy or friendly forces will employ additional nuclear weapons. The enemy may also follow the attack with conventional operations. Improved cover helps provide protection from both additional nuclear attacks and conventional operations.

Prepare for fallout. After the nuclear burst, you should prepare for fallout. As a minimum, foxholes and shelter openings should be covered (for example, by a shelter half) to help keep fallout particles out. Ensure radiacmeters are operating to determine the extent and nature of the hazard.

Minimize fallout effects. MOPP gear will keep fallout off your skin and out of your body, thus reducing the hazard. Wearing MOPP gear will help make decon easier. Where residual nuclear—but not chemical or biological—hazards are present, the wear of MOPP gear can be modified based on the leader's assessment of the situation. Leaders may decide the degradation caused by MOPP is worse than radiological contamination, and reduce MOPP levels. One method of modifying the protective posture is to cover as much exposed skin as possible and cover the mouth with a handkerchief or other material that will provide dust protection. The primary concern is to reduce the amount of radiological contamination that contacts the skin and to keep radiological particles from entering the body.

CHEMICAL OR BIOLOGICAL ATTACK

If you or your unit are attacked with chemical or biological agents, mask, give the alarm, and go immediately to MOPP4. You must keep contamination from touching your skin because it can kill you. Several actions can be taken to reduce contamination effects.

Take shelter immediately. Chemical and biological attacks may be mixed with high explosives from which you must take co[ver]. Any shelter that provides overhead cover will give you some protection from liquid or s[olid] contamination. Although vapors also [are] hazardous, they should be a short-[term] problem. Liquid and solid contamination will present a long-term problem because they continually generate vapors. If you can limit your contact with these contaminants, you greatly simplify your decon problem and reduce the time you will have to s[pend] in MOPP4.

Conduct skin decon. If your [skin] is contaminated, you must decontaminate [the] exposed areas before you go to MOPP4. This should begin within 1 minute of expo[sure]. More is said in chapter 4 about specific de[con] techniques.

Administer first aid. If you or a buddy shows symptoms of nerve-agent poisoning, nerve-agent antidote should be administered. Specific instructions for this are contained in the soldier's manuals of common tasks, [steps] 21-2 and 21-3.

Adjust MOPP levels. Use detection equipment to find the extent and nature of the hazard. Persistent contaminants may require you to begin decon. If the chemical attack is nonpersistent, it creates only a short-term hazard, and MOPP levels may be adjusted downward sooner (dewarning). Persistent agents cause a long-term hazard and must be dealt with. Individual defense measures, such as MOPP4, normally associated with a persistent chemical agent attack will protect against toxins. MOPP4 greatly simplifies decon. NBC reports should be sent as soon as possible to help commanders make protection and avoidance decisions.

Remove mask. There are two unmasking procedures to determine if personnel can remove masks. If an M256 chemical detector kit is available, use it with the unmasking

procedure. This procedure takes approximately 25 minutes. If an M256 kit is not available, the unmasking procedure takes approximately 35 minutes. FM 3-4 contains a detailed discussion of unmasking procedures.

USING COLLECTIVE PROTECTION SYSTEMS

Collective protection equipment (CPE) consists of four systems: ventilated facepiece, overpressure, hybrid, and total. Generally, collective protection reduces the degradation caused by wearing MOPP gear. It either reduces the heat and stress effects of MOPP or eliminates the need to wear MOPP gear.

Studies on the effectiveness of collective protection in the M1 tank indicate a significant increase in the life expectancy of the vehicle. This increase is due to the increased effectiveness of the crew which can operate in a lower level of MOPP. In addition, hybrid collective protection and overpressure can prevent vapor contamination of the vehicle interior, thereby increasing the amount of time a crew can remain unmasked.

VENTILATED FACEPIECE

In this system, a filter unit supplies filtered air through hoses to ventilate the individual facepiece (mask). Whole-body protection is provided by wearing MOPP gear. The forced air supplied to the mask reduces the breathing resistance caused by the mask. A ventilated facepiece system is installed in the M60 tank. Crew members wear M25A1 tankers' protective masks connected to the tank's collective protection system.

OVERPRESSURE

Overpressure systems pressurize an enclosure with air that has been filtered to remove NBC contamination. The enclosure must be shielded if it is to provide protection from radiation hazards. Pressurizing the enclosure prevents outside contaminated air from leaking in. The air is purified by forcing air through particulate and gas filters. An example of an overpressure system is the M51 shelter used by medical units as battalion aid stations.

The simplified collective protection equipment (SCPE) is a lightweight and mobile system. It converts an existing structure into a collective protection system. The system can be employed rapidly and can provide a safe environment for command and control operations.

HYBRID

Hybrid collective protection is a combination of the overpressure and the ventilated facepiece systems. In a hybrid system, the filter unit is capable of pressurizing the closed vehicle and providing filtered air directly to a ventilated facepiece. The ventilated facepiece is used when the tactical situation requires that the hatches remain open or whenever the interior has been contaminated.

TOTAL

A total system combines hybrid collective protection with air conditioning. Since internal temperatures can be controlled, heat stress casualties can be prevented. FM 3-4 provides detailed descriptions of collective protection systems. It includes operations planning and generic entry/exit procedures for collective protection.

CHAPTER 4

DECONTAMINATING AFTER AN NBC ATTACK

Decon often is needed because avoidance is not always an option. By making it possible to lower MOPP level, decon supports protection. Combat power is restored and improved—certainly over what it would have been in full MOPP gear.

How much decon you do will depend on the tactical situation and your mission, the decon resources available, and how badly you have been contaminated. As a rule of thumb, decontaminate only what you need to continue your mission. FM 3-5 provides detailed guidance on how much decon you need as well as how to plan, integrate and execute the operations. The following discussion provides an overview of that guidance.

REASONS

In general, a contaminated unit is less effective than an uncontaminated unit. Contaminated units are decontaminated to make them more effective. Decon stops the erosion of combat power and helps the unit avoid casualties.

COMBAT POWER EROSION

Combat power drops as soon as you are forced into MOPP4. It restricts everything you do. Because soldiers cannot see as clearly when in MOPP, observation and target acquisition are reduced. Fire support is less responsive because communication is more difficult and time-consuming while in protective masks. Mobility is reduced because soldiers slow down to control heat buildup in their MOPP gear. Leaders find it more difficult to inspire and motivate soldiers because everyone looks alike in MOPP4 and many feel isolated. Combat power continues to drop as long as you stay in the upper MOPP levels.

CASUALTY AVOIDANCE

After becoming contaminated with chemical agents, the protective qualities of the overgarment eventually fail. Casualties may also occur due to heat and psychological stress. Even urination and defecation become dangerous. The longer the unit stays contaminated, the greater its chances of sustaining casualties. Proper decon techniques can lower these chances.

PRINCIPLES

The more decon you do, the more expensive it is in resources—manpower, time, and materials. These are also used to fight the enemy, so commanders must expend these

resources wisely. The best way to conserve these resources and still sustain combat power is by following the four principles of speed, need, limit, and priority. These are discussed in the following paragraphs.

SPEED

The most important principle of the four is to decontaminate as soon as possible. Consider this principle before you consider any other. Contamination hazards force you into higher levels of MOPP and immediately begin to degrade your combat power. The sooner the contamination is removed, the sooner you can reduce MOPP and begin restoring combat power.

NEED

If you expect to survive and win on the AirLand battlefield, do not waste precious resources decontaminating everything. Decontaminate only what is necessary to continue your mission. This will help you sustain your combat power. Consider the following factors when you decide whether decon will interfere or help with the mission:

- Mission.
- Time available.
- Extent of contamination.
- Length of time you have been in MOPP4.
- Decon assets available.

LIMIT

Decontaminate as far forward as possible and limit the spread of contamination. Do not move contaminated personnel and equipment away from your operational area if you can bring decon assets forward safely. This will keep your equipment on location where it is needed, allow decon to begin early, and limit or prevent the spread of contamination to other areas.

PRIORITY

Decontaminate the most important things first and the least important things last. For instance, weapon systems should be cleaned before the support vehicles. Commanders decide which of their systems is most important to their mission.

METHODS

When a force is attacked with NBC weapons, its combat power drops. An important reason for this is the drop in performance caused by operating in high levels of MOPP.

Various methods of decon allow units to lessen the adverse impact of an NBC attack. The following paragraphs are about these methods.

These methods are discussed in terms of types and techniques. The first of these is types.

TYPES

Three types of decon allow units to lessen the impact of an NBC attack on combat power. These types are basic skills, hasty decon operations, and deliberate decon operations.

The tactical situation dictates which type of decon is possible. The following paragraphs discuss the three types, beginning with the basic skills type.

BASIC SKILLS

The basic skills type of decon is just what the name implies—simple skills basic to soldier survival. Decon of this type is conducted using supplies and equipment carried by each individual or unit vehicle (decon apparatus). Soldier's manual of common tasks (see FM 21-2) provides further information on basic skills decon.

HASTY DECON

Hasty decon operations are the actions of teams or squads using equipment found within battalion-size units. Hasty decon reduces the spread of contamination on people or equipment and allows temporary relief from MOPP4. By speeding the weathering process for chemical and biological contamination, it makes deliberate decon easier. This makes its hazards only a negligible risk to unprotected soldiers. Also, hasty decon requires little preplanning. A hasty decon operation is shown in figure 4-1.

DELIBERATE DECON

Deliberate decon operations require detailed planning. More manpower and resources are needed than in hasty decon. Generally, company-sized or larger units conduct this type of decon. Two techniques are used in deliberate decon—detailed troop decon and detailed equipment decon.

Figure 4-1. Hasty decon.

External support is required for deliberate decon. Figure 4-2 shows how a deliberate decon operation could be situated.

TECHNIQUES

Seven decon techniques are used to support the three types of decon. These techniques are shown in figure 4-3. They are discussed in the following paragraphs. Table 4-1 (page 4-6) shows their relationship to each decon type.

SKIN DECON

This technique helps preserve combat power by aiding individual soldier survival. It is a basic soldier-survival skill. Soldiers stop contamination from harming them by removing it from their skin. They use their individual decon kits to do this.

PERSONAL WIPEDOWN

Every soldier wipes down his or her mask, hood, gloves, and other essential gear. For chemical and biological decon, they use their skin decon kits. Radiological contamination may be brushed away.

Do not attempt to remove chemical contamination from your protective overgarment. The garment's special protective properties minimize hazards from chemical agents. However, brush off radiological or biological contamination from your overgarment.

Figure 4-2. Deliberate decon.

Figure 4-3. The seven standard decon techniques.

OPERATOR SPRAYDOWN

Operators and crew remove contamination from all equipment surfaces that must be frequently touched to do the mission. For chemical and biological contamination, they use their onboard decon apparatuses (M11 and/or M13). They spray the important surfaces, then wipe off the decontaminant. If time allows, they brush the decontaminant into these surfaces and let it remain for 30 minutes before wiping it off. Radiological contamination may be removed with rags or brushed off with brushes and even branches. Remember to discard the items used to brush off radiological contamination as they remain a hazard.

Table 4-1. Decontamination techniques.

TYPE	BEST* START TIME	DONE BY	TECHNIQUE	GAINS MADE
BASIC SKILLS	BEFORE 1 MINUTE	INDIVIDUAL	SKIN DECON	STOPS AGENT FROM PENETRATING
	WITHIN 15 MINUTES	INDIVIDUAL OR CREW	PERSONAL WIPEDOWN	
			OPERATOR SPRAYDOWN	
HASTY DECON OPERATION	WITHIN 6 HOURS	UNIT	MOPP-GEAR EXCHANGE	POSSIBLE TEMPORARY RELIEF FROM MOPP4. LIMIT LIQUID AGENT SPREAD
		BN CREW OR DECON SQUAD	VEHICLE WASHDOWN	
DELIBERATE DECON OPERATION	WHEN MISSION ALLOWS RECONSTITUTION	UNIT	DETAILED TROOP DECON	PROBABLE LONG-TERM MOPP REDUCTION WITH MINIMUM RISKS
		DECON PLATOON	DETAILED EQUIPMENT DECON	

*THE TECHNIQUES BECOME INCREASINGLY LESS EFFECTIVE THE LONGER THEY ARE DELAYED. VEHICLE WASHDOWN IS MOST EFFECTIVE IF STARTED WITHIN 1 HOUR BUT WILL OFTEN HAVE TO BE DELAYED FOR LOGISTICAL REASONS.

MOPP-GEAR EXCHANGE

Overgarments need to be exchanged after becoming contaminated. The MOPP-gear exchange is a safe method for removing overgarments and all gross contamination from individual soldiers. As few as two soldiers may conduct a MOPP-gear exchange as long as they use the buddy system. This is mandatory when entering collective protection facilities. Keep in mind that quantities of MOPP gear are limited. You must keep track of how much MOPP gear your unit needs and uses. Therefore, leaders should supervise these techniques to ensure accountability of MOPP gear stockage levels.

VEHICLE WASHDOWN

Gross contamination can be removed from vehicles with the vehicle washdown technique. Battalion-level, lightweight decon system (LDS) and crew supervised by a 54E decon specialist rendezvous with the contaminated elements as they move between fighting positions. They spray the vehicles with hot, soapy water. This speeds the weathering process which allows MOPP reduction sooner. This process also limits the spread of contamination so it does not get worse.

DETAILED TROOP DECON

This technique provides individual soldiers the best probability of long-term relief from MOPP4. A more structured technique than MOPP-gear exchange, it requires approximately 13 personnel from the contaminated unit to ensure smooth operation. Upon completion, soldiers can safely go to a lower MOPP level.

DETAILED EQUIPMENT DECON

As in detailed troop decon, this technique is a more involved procedure than its counterpart, vehicle washdown. Vehicles and equipment are processed through series of stations, resulting in a great reduction of contamination hazards. Chemical units generally conduct detailed equipment decon.

EFFECTS

Conducting decon has two main effects on unit effectiveness. The overriding plus effect and ultimate goal of decon is to restore combat power lost when assuming MOPP. A minus—somewhat offsetting—effect is a reduction in resources (supplies and time). The seven standard decon techniques progressively restore lost combat power. The more techniques you use, the more return you get in combat power but, necessarily, the more time and supplies you use. Therefore, a trade-off exists between restored power and consumed resources. Commanders must determine the overall effect of reduced resources, especially if follow-up NBC attacks occur.

RESOURCE DEPLETION

All decon techniques use some valuable resources, including time. From basic skills through the deliberate decon operation, the types and quantities of resources expended increase. Staff estimates and considerations must include time requirements and resupply plans. Logistical and chemical personnel work together to ensure this. FM 3-5 contains a chapter on logistics to aid in planning.

COMBAT POWER RESTORATION

As previously stated, each decon technique helps restore combat power. Refer to figure 4-4 as we discuss each type of decon in terms of how this power is restored.

Basic skills techniques allow soldiers to survive and continue to fight on the battlefield. All unit personnel must be proficient in these skills. These techniques must be conducted automatically following an NBC attack. Basic skills techniques help stop agent penetration. Figure 4-4 shows how the drop in combat power is slowed after basic skills techniques are completed.

Hasty decon techniques allow the unit to fight longer while contaminated. Under controlled conditions, soldiers temporarily unmask to eat, drink, and rest. These controlled conditions exist when soldiers have very little, if any, vapor hazards on themselves and they have moved to a vapor-hazard-free area, such as a collective shelter or clean, upwind area. Continuous contamination checks and monitoring have to be conducted to find these clean, upwind areas. Proper unmasking procedures must be followed. Figure 4-4 shows how combat power temporarily increases each time you conduct hasty decon. However, notice how hasty decon is less effective the second and third times it is conducted.

Deliberate decon techniques are the best techniques for restoring the combat power lost when the contaminated force had to operate in MOPP3 or 4. These two techniques remove nearly all contamination from unit and individual equipment. Troops can operate equipment safely for extended periods at reduced MOPP levels. Since there is a small risk from residual contamination, periodic contamination checks must be made. During deliberate decon operations, combat power is reduced. However, it is greatly increased when decon is complete.

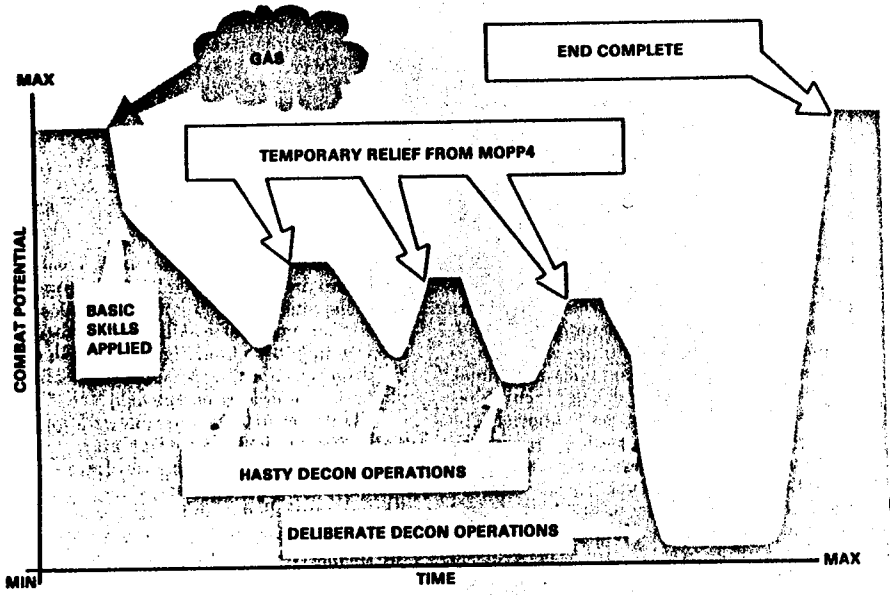


Figure 4-4. Combat power.

Any unit (combat, combat support, or combat service support) may modify the techniques for obtaining relief from MOPP4, based on its own equipment and missions. Conduct training on those techniques as often as possible and publish them in unit field standing operating procedures (FSOPs). Even when techniques have been standardized, every operation is unique. Use on-the-spot judgment that combines all three fundamental measures of NBC defense—avoidance, protection, and decon. Generally, consider the following points if you plan to modify decon procedures:

- Understand contamination hazards and avoid contamination when possible.
- Protect yourself and your equipment when contaminated.
- Know how to neutralize or remove the hazards of contamination.
- Do only as much decon as you need to continue your mission until you are relieved in place for reconstitution and more thorough decon.
- Leave as much combat power forward as possible. Conduct decon operations in small numbers and/or groups.

COMBAT APPLICATION

Now that we know the principles, methods, and effects of decon, let us look at how they might be applied in combat. Each decon type is discussed in the following paragraphs. There follows a combat example tying them together.

BASIC SKILLS

Again, basic skills techniques must be automatic. As soon as the tactical situation permits, these actions must be carried out. The quicker these techniques can be done after the initial contamination, the more effective they are.

HASTY DECON

MOPP-gear exchange and vehicle washdown are best done simultaneously as part of a unit hasty decon operation. The operation is done at a forward position normally located near the contaminated squad or platoon in an area called a hasty decon site. As the name implies, it requires little—if any—preparation, because it is usually located between fighting or operating positions.

MOPP-gear exchange and vehicle washdown techniques are most effectively employed by squad-sized or platoon-sized elements. When larger elements try to process through a hasty decon site, they lose many of the benefits of a small, decentralized operation.

DELIBERATE DECON

The demands of battle generally dictate that deliberate decon be done during reconstitution. Units become combat ineffective because they lose combat power from the degradation of operating in higher levels of MOPP for extended periods. Detailed troop and equipment decon techniques are done as part of an extensive reconstitution effort in brigade, division, and corps support areas. Only here can the quantities of decon resources, such as water, decontaminants, and time, be gathered for such an extensive process. Chemical decon platoons set up the decon site as part of a larger reconstitution effort. Because the units undergoing this type of decon are severely depleted, they need both supervision and support from a well-organized decontamination and reconstitution team. Commanders should not rely on the immediate availability of deliberate decon; emphasis should be on hasty decon. [illegible] continually operate in a contaminated environment, deliberate decon is impractical. Hasty decon is your best means of maintaining combat power. Use good avoidance and protection measures, and conduct hasty decon until you undergo deliberate decon.

SITUATIONAL EXAMPLE

The following is an example of how a self-propelled artillery battery decontaminates while continuing its fire support mission. Read it and see if you can identify the principles, methods, and effects we have considered.

You command a 155-millimeter self-propelled howitzer battery that has just been hit with rocket-delivered persistent nerve agent. Your personnel take good defensive measures during the attack. They go to MOPP4 and take cover while conducting skin decon with their individual decon kits. You quickly and accurately return fire, destroying the enemy. Your men are well-trained, and at their first opportunity they continue basic skills decon (principle 1—decontaminate as soon as possible). They wipe themselves down and use their onboard decon apparatuses to spray down work surfaces. This takes just a few minutes. You continue providing fire support in MOPP4 and move as necessary.

The temperature is 55° Fahrenheit (13° Centigrade) and humidity is low. Your men stay in MOPP4 for several hours. Their fighting capability is growing weaker, but there have not been any heat casualties as yet. Your rigorous training in MOPP gear during the past 12 months is paying off. However, the response times from receipt of fire mission to rounds leaving the tubes is getting longer. Your men have not eaten in more than 12 hours. You know your combat power will continue to drop the longer you

stay in MOPP4. You decide to do more decon so you can get temporary relief. You want to sustain your combat power and continue your fire support mission.

You request decon support from your battalion. The battalion will help you conduct hasty decon en route to your alternate positions (principles 2 and 3—decontaminate only what is necessary and decontaminate as far forward as possible). You have 2-½ hours to complete this and be in your next positions ready to fire. Your alternate positions are a 20-minute road march away. The hasty decon site, en route to your positions, is 10 minutes away.

You immediately send additional battery personnel to the decon site as the advance party. They meet the battalion decon crew with the battalion lightweight decon system (LDS) and establish the site. The battalion decon specialist assigned to the LDS has trained an LDS crew that sets up and runs the vehicle washdown. Your battery personnel assists the LDS crew and prepares the MOPP-gear exchange area. A battery supply vehicle meets the advance party at the decon site.

You rotate one howitzer section at a time through the decon site so most of the battery can maintain fire support. The guns are first to be washed down. The advance party and gun crews are the first to go through the MOPP-gear exchange (principle 4—decontaminate by priority). You finish hasty decon and are in position, ready to fire, within the directed times. Of course, your men are still masked because there is still a vapor hazard from the contamination left on the guns and vehicles.

Your advance party has checked your new position and found it clear of contamination. As you move into the position, you receive orders from battalion to conduct ammunition resupply. Your sections begin improving their positions.

You direct gun crews one and two to leave only one man on each gun and send the rest of the two crews 20 meters upwind of the guns. This area is checked again and found clear of contamination. Because your battery conducted a good MOPP-gear exchange, there is little, if any, contamination on the soldiers. The senior person directs the use of appropriate unmasking techniques (exact procedures are given in FM 3-4). Two crews are directed to remove their masks, but to watch for agent-poisoning signs. The two gun crews can now eat and get relief from the mask for short periods of time. The senior person ensures the wind direction is constantly checked to be sure the unmasked soldiers remain upwind of their "vapor dirty" guns and equipment.

Soldiers remaining on the guns and in the vehicles stay masked because the equipment is still contaminated and poses a vapor hazard. Consequently, the soldiers in sections one and two remask when they return to the guns. The soldiers in the other sections are rotated through the temporary relief area in the same way. Ammunition resupply and position improvement can continue.

CHAPTER 5

APPLYING NBC CONCEPTS TO AIRLAND BATTLE

Our forces may someday meet an enemy on the air-land battlefield where use of NBC weapons presents a clear and present danger. This chapter sets forth Army doctrine on how best to apply late-developing concepts and related doctrine to this new-era battlefield.

The first chapter of this manual explains how the various NBC systems can be used on the air-land battlefield. The next three chapters discuss the three basic principles of NBC defense: avoidance (chapter 2), protection (chapter 3), and decontamination (chapter 4). This chapter focuses on an air-land battlefield on which NBC weapons have been used. It integrates information previously provided. This chapter begins with a brief review of the basic tenets of air-land battle doctrine. This is a key to the commanders' understanding of how to develop an approach to realize the potential of available forces. Next, the concept of deterrence is discussed. It then gives an analysis of the decision-making process. The chapter concludes with a descriptive scenario that illustrates how avoidance, protection, and decon fit together.

OPERATIONAL CONCEPTS

Success on the air-land battlefield depends on adherence to four basic tenets: synchronization, depth, agility, and initiative. These must be understood and emphasized in all operations. Synchronizing efforts, fighting the deep battle, reacting faster than the enemy, and seizing the initiative are essential for success.

NBC attacks on the air-land battlefield can create unfamiliar, complicated problems. However, these problems can be dealt with successfully by ensuring proper training and planning, providing enough combat power (maneuver and firepower), and exerting leadership.

SYNCHRONIZATION

Synchronization focuses combat power where it is needed. It is more than pointing guns at the right target. It means coordinated effort by all echelons of the force at the same time toward the primary goal set by the commander. Especially when NBC weapons have been used, resources cannot be wasted. Additional time, material, and personnel will be required in a contaminated environment. Any resource that does not significantly support the primary mission must not be expended. Synchronization helps conserve resources to help focus combat power at

DEPTH

Depth refers to time, distance, and resources. To employ fire and maneuver, it must be known how long it takes for both friendly and enemy forces to move. The entire depth of the battlefield is used by our forces when they attack an enemy. Commanders use depth of resources to extend their influence over large areas and also permit flexibility. NBC considerations influence time and resources. For example, additional time and resources will be needed for use if contaminated areas are crossed.

AGILITY

Agility is doing things and changing things quickly for a purpose. You can overtake enemy actions by knowing when critical events occur and acting upon them suddenly to avoid enemy strength and exploit enemy weakness. Enemy reactions may then become ineffective, uncoordinated, and piecemeal. Even in a contaminated environment, your mix of soldiers and equipment must be able to react faster than your opponent's.

Agility requires quick-minded, flexible leaders. You must act faster than the enemy. Analyze the mission, enemy, terrain, troops, and time available (METT-T). Include NBC factors in your planning.

INITIATIVE

Initiative means not always waiting to be told what to do. It is freedom to maneuver. When an obvious opportunity for hurting the enemy or accomplishing the mission presents itself, leaders act. They must act intelligently, however, and not endanger themselves or other units unnecessarily by their independent action. The opportunity must relate to the mission and higher and adjacent commands should be informed. The initiative of our leaders prior to, during, and after a conventional or NBC attack will ensure our forces are well-prepared and combat power is sustained.

DETERRENCE

Unfortunately for the battery in the example on pages 4-9 and following, deterrence had failed. Still, the best deterrents against the use of nuclear and chemical weapons are a good NBC defense and the ability and will to retaliate quickly and in strength. (See figure 5-1.) Since we have discussed defense in the previous chapters, defense will only be mentioned here and the focus will be on retaliation and planning.

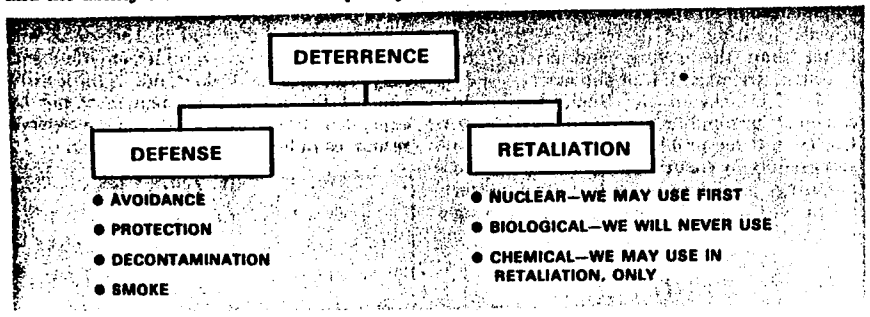


Figure 5-1. Deterrence.

DEFENSE

Throughout history, new weapons have been used against troops that had limited defensive or retaliatory capability. Chemical (gas) weapons were first used on a large scale by Germany in World War I against France and Britain. Germany maintained a technological lead in chemical warfare throughout World War I. This allowed them to repeatedly introduce new chemicals or delivery systems that sometimes proved very effective. The Allies played catch-up as the war progressed.

Nations have shown little restraint in their weapons selection when opposing an enemy that could not defend itself against certain weapons or retaliate in kind. The Italo-Abyssinian War of 1935 is but one example. Major General J.F.C. Fuller, military historian and early expert on tank warfare, reported, "It is no exaggeration to say the mustard gas sprinkled from airplanes was the decisive tactical factor in this war, because it shortened its duration by months, if not by years."

RETALIATION

Despite the capability to use these weapons, the major powers of World War II were unwilling to use them. Why? Without any doubt, both sides feared retaliation. Winston Churchill was very assertive about this in a memo to his military staff.

Why have the Germans not used it (gas)? They have not used it because it does not pay them. The greatest temptation ever offered to them was the beaches of Normandy. This they could have drenched with gas greatly to the hindrance of our troops. That they thought about it is certain and that they prepared against our use of gas is also certain. But the only reason they have not used it against us is that they fear the retaliation.

Churchill's assessment was verified after the war during the war crimes trials at Nuremburg when Herman Goering explained German fear of possible Allied chemical retaliation. In fact, the Allies had planned two 400-plane toxic-agent retaliatory attacks to take place within 48 hours of German initiation of the use of chemical weapons. Thus, it is evident that the best way to prevent the use of NBC weapons is to have a good NBC defense and chemical/nuclear retaliatory capability. The United States maintains a national policy of never using biological weapons, even in retaliation.

Our units will be affected by our use of nuclear or chemical weapons. Their impact on your future operations will be significant because these weapons have potential for large-area coverage. They can cause mass casualties (dead or injured) by residual contamination long after they have been employed. To the user, these unique characteristics provide a means of increasing combat potential with limited resources.

You may never be in a position to order the use of a nuclear or chemical weapon. However, you could easily be in a position requiring you to recommend targets, be involved in planning, or react to such weapons use. For security reasons, complete guidance on the use of these weapons cannot be given in a manual such as this. Considerably more detail is given in FM 101-31-1 and FM 3-10-1. You should know something of the criteria for employing these weapons so you may choose appropriate targets. The use of chemical or nuclear weapons is not indiscriminate. Before deciding to use such a weapon, several questions must be answered:

- Is the target worthwhile? The value of striking particular targets with nuclear or chemical weapons must be considered long before the need arises. Priority targets include fire support systems (especially when they are nuclear capable), enemy concentrations of combat power or logistical support, and key terrain that can be obstructed or destroyed by nuclear or

chemical firepower. Priorities for targets must be set in the OPLAN/OPORD which will give a list of specific types of targets. Groups of these targets may be chosen if they are appropriate for the mission.

- Can the safety of our own force be assured? Consider the effect of the weapon on our own force. The friendly attack warning tells our troops of an impending friendly strike and allows them to take actions to protect themselves. Unit boundaries cannot be violated with nuclear or chemical weapons unless coordination has been made with the other commander. For example, if downwind vapor hazard from a chemical attack may drift across a lateral boundary, it must be coordinated before the mission is fired. If effects of a nuclear detonation traverse a boundary, this must also be coordinated before the mission can be fired.
- Can the enemy recover quickly? If the enemy can quickly recover from a nuclear or chemical attack, the value of the target is much less. Therefore, you must be able to rapidly exploit the effects of the use of the weapons. Nuclear and chemical fires should be supported by conventional weapon systems.
- What is the enemy's protective posture? If the enemy is in full protective gear, an attack with a chemical agent would have little or no immediate effect. A persistent agent attack may cause only a few enemy casualties, but it may impose long-term performance degradation on the enemy. If an enemy is deeply dug-in or widely dispersed, a nuclear attack may not be effective.
- What effect will the strike have on future operations? Do not let an NBC strike disrupt your future plans. Persistent agents that can canalize an enemy force or otherwise restrict its use of terrain can do the same to you. Tree blowdown or rubble from a nuclear strike can seriously slow traffic.
- What will be the acceptable level of damage to other than military? Civilian damage will be held to lowest practical levels to achieve the mission. The level of acceptable destruction is based upon commander's planning guidance in the decision-making process. Preclusion overlays provided by the G5 must be used when performing target analysis.

Remember, following the strike you must attack quickly, before the enemy can reorganize. The deep attack of follow-on forces and reserves can disrupt the enemy's ability to add weight to the battle and can reduce those forces before they move into the main battle area. Remain dispersed to avoid being targeted, mass suddenly to attack your objective violently, and then disperse to avoid becoming a target. If you cannot coordinate and execute this kind of follow-up, using a nuclear or chemical strike may be a waste of munitions.

DECISION MAKING

When NBC weapons are used on the air-land battlefield, you will be confronted by uncertain situations, incomplete data, and alternative courses of action. The estimate of the situation is a commonly used process applicable to any situation or level of command. Information is systematically gathered and analyzed to solve a problem. The following paragraphs provide an overview of the estimate of the situation, then a more in-depth discussion of the mission and courses of action.

ESTIMATE OF SITUATION

The estimate process provides the commander or staff officer a logical five-step process. Following it helps you to collect and process information within the time limits available to reach a decision or recommendation. The following is a list of the five steps:

1. Mission. Statement of the tasks to be accomplished and purpose to be achieved.

2. Situation and courses of action. All known elements and aspects of the situation that may influence operations are considered, and feasible courses of action are identified.

3. Analysis of courses of action. Each course of action is developed far enough to determine its advantages, disadvantages, and support requirements.

4. Comparison of courses of action. The benefits and drawbacks identified in paragraph three are weighed and compared for each course of action.

5. Decision (recommendation). The decision is based on the course of action that offers the best probability of success.

MISSION

Operations planning begins when the mission is received. The mission includes specific stated tasks and others which are implied by the situation, mission, or purpose of the operation. If one of your stated tasks is to seize objective 1, some implied tasks might be to: penetrate an enemy zone of defense, seize some intermediate high ground, clear an obstacle, or cross contaminated ground.

If the NBC operations principles of avoidance, protection, and decon have been developed well in unit SOPs and training, there should be few situations in which the use of NBC weapons generate implied tasks. Such techniques as NBC reconnaissance, using the MOPP system, and unit hasty decon should be a routine part of unit operations. Well-trained units will be able to accomplish their branch-/unit-related tasks as routinely as any NBC task.

However, there may be occasions when an NBC environment may generate additional implied tasks. For example, if chemical decon assets are not available, engineer units responsible for maintaining a main supply route (MSR) must be prepared to decontaminate critical points along the MSR to ensure unrestricted traffic flow. An MP unit may have to prepare to handle contaminated enemy prisoners of war.

COURSES OF ACTION

After the mission is understood, the commander and staff must decide on how to best accomplish it. To ensure all factors are considered and evaluated, several courses of action are developed. The following paragraphs discuss in detail how the courses of action are developed. Finally, the courses of action analysis, comparison, and commander's decision are briefly discussed.

DEVELOPMENT

The information you need to develop feasible courses of action when NBC weapons have been used comes not only from the staff chemical officer but also from the other staff officers. Interaction between staff sections must be continuous. Coordination ensures that everyone is aware of the important issues. Although every NBC factor or incident will have some effect on each staff area, each subject is of primary interest to a particular officer. Primary development considerations for the S1/G1 through G5 and chemical staff officer are given in the following paragraphs.

S1/G1—Personnel

The S1/G1's key role includes estimating present and future personnel requirements in an NBC environment. Manning critical systems within a unit and closely examining their vulnerability to NBC contamination are also crucial. The S1/G1 and the medical officer must coordinate closely to ensure field medical support is available in the event of an NBC attack. The S1/G1 should coordinate with the chemical officer to determine the probability and impact of NBC-related casualties.

S2/G2—Intelligence

The S2/G2 is the major source for information about the enemy's situation and ability to use NBC weapons. The S2/G2 is responsible for producing intelligence information about the enemy's NBC equipment and activity, and reviewing air or ground reconnaissance to target NBC-capable weapons. The S2/G2 also provides a detailed review of the characteristics of an area. Weather and terrain information dramatically affect NBC weapons use. The chemical officer is on hand to help the S2/G2 interpret weather and terrain data, but the S2/G2 must have a clear idea of whether or not these environmental factors are conducive to enemy employment of NBC weapons or friendly employment of nuclear or chemical weapons. The vulnerability analysis conducted by the S2/G2 can reduce the probability of a single nuclear weapon destroying an entire organization. The chemical officer provides effects data to the S2/G2 to assist in the vulnerability analysis.

S3/G3—Operations

The S3/G3 must have a clear concept of the operation and be able to estimate the effect MOPP levels may have on unit operations. Unit training and rehearsals of battle drills in MOPP gear can provide the S3/G3 with information about whether additional time, personnel, or equipment may be needed or if certain tasks need to be modified. It is crucial for the S3/G3 to know this to recommend priorities for limited NBC defense resources, estimate the number and types of units to be used or organized, or compute movement times. The S3/G3 must understand avoidance, protection, and decon in order to include these factors in his planning. For example, the S3/G3 must be especially aware of the purpose and scope of the various kinds of decon operations, and their value to the situation at hand. A supporting unit such as an engineer or chemical unit must also ensure its operational planning complements the supported unit's mission. All of these considerations must come from the unit's previous experience, consultation with the chemical staff officer, and the S3/G3's judgment.

S4/G4—Logistics

The S4/G4 must know the logistics demands that will be placed on the unit. When NBC weapons are used, consumption rates for items such as MOPP gear and decontaminants increase. The unit's past experience will also show that other consumption rates may go up or down because of the imposition of a MOPP level. Perhaps ammunition consumption decreases because MOPP decreases the rate of fire; the use of water will also increase because of heat stress. There will be a trade-off in tonnage handled as MOPP gear and decontaminants displace other supplies. Exact predictions may not be possible, but the S4/G4 should have a general idea of these logistics considerations based on past experience, consultation with the chemical officer, and the S4/G4's judgment. The S4/G4 and chemical officer must know the rate and extent of the unit's decon capability, and decide upon a plan to decontaminate contaminated supplies or equipment.

G5—Civil-Military Operations

The G5 must consider and estimate the impact of NBC events on the civilian population. Mass population movements can occur and become uncontrollable to the detriment of mission accomplishment. Evacuation routes and refugee centers must be identified. Conversely, available local resources, facilities, and support can be identified to satisfy military requirements.

Chemical Staff Officer

The chemical staff officer continually coordinates with other staff officers—clarifying details, recommending alternative techniques, and adding missing information.

To the S3/G3, the chemical officer suggests proper MOPP level, troop safety criteria, operation exposure guidance, and the effect of a given radiation exposure status on a unit. The S4/G4 is given resupply requirements and the S2/G2 is told the effect current weather will have on NBC weapons. The chemical officer will also provide direct input to the commander on the following functions.

Target Analysis

The chemical officer must play a direct and obvious role if chemical or nuclear weapons are considered for use against the enemy. Whether or not use of these weapons is considered, the chemical officer will also interpret weather and terrain data along with the S2/G2's enemy intelligence data to forecast friendly vulnerability to enemy NBC attack.

Hazard Prediction

Closely related to target analysis is downwind hazard prediction. When NBC weapons are used, it is the chemical officer's responsibility to keep track of contamination patterns, forecast their behavior, and keep the command informed.

Readiness

Although the other staff officers should know how to use avoidance, protection, and decon and how these will affect the mission, this officer must also ensure quality control. The chemical officer must know the level of NBC readiness within subordinate units. Can soldiers mask correctly and on time? It is the chemical officer's job to evaluate the training and testing programs that will ensure soldiers are doing things correctly. It is also the chemical officer's job to let the commander know when the unit's ability to avoid, protect, and decontaminate falls short of unit's need to do so. Therefore, some courses of action may not be feasible or practical because a unit is not in a position to adequately protect itself in an NBC environment.

Technical Advice

Much as the surgeon, engineer, or signal officer does, the chemical officer provides technical advice. This officer may also advise about such matters as impact of NBC contamination on operations, NBC intelligence, or smoke and flame operations.

Control of Chemical Units

The chemical officer provides input on the employment of chemical units supporting the operation. It is this officer's responsibility to recommend how best to use the chemical assets assigned to, attached to, or under operational control of the organization.

Recommending Priorities

The chemical officer recommends priorities for support of operations. Some examples are priorities for decon support, smoke operations, and resupply of MOPP gear.

ANALYSIS

Each course of action is analyzed to [illegible] advantages, disadvantages, and [illegible] requirements. Enemy capabilities [illegible] action) will have been considered. The possible friendly courses of action. The operation is visualized from start to finish. Each staff officer adds information about NBC operations as appropriate.

COMPARISON

The courses of action are compared to determine which promises to be the most likely to accomplish the mission. This comparison must include advantages and disadvantages for each course of action.

COMMANDER'S DECISION

The commander chooses the course of action with the best probability of success. With each staff officer's contribution included, the commander can make the best choice with confidence. The decision process in an NBC environment is similar to that in a conventional one. However, there are additional factors that complicate the decision-making process.

PUTTING IT ALL TOGETHER
A COMBAT SIMULATION

CPT Johnson (commander of company B) reflected on his unit's situation as he left battalion headquarters. Enemy forces were massed at the international border near company B's location and had an NBC weapons capability. The battalion S2 expected them to mix persistent and nonpersistent chemical agents with conventional fire. Such a mix had already decimated two infantry brigades along the southern frontier.

Over the previous 2 weeks, reconnaissance information revealed the enemy had given ammunition movement unusually heavy security and decon vehicles were located at suspected storage points. Prevailing winds favored enemy use of chemical or biological weapons. Early mist and fog made early morning hours the best time for their use.

The battalion commander had assigned missions to each company. He hammered home the point that he wanted NBC defense preparations to be a high priority and to receive each commander's personal attention.

CPT Johnson knew his company could fight successfully. Company performance on last quarter's external ARTEP had yielded good results.

The chief evaluator had used the NBC defense module in the ARTEP scenario. The ARTEP had shown that basic skills decon was too slow and leaders were not taking steps to provide their troops with temporary relief from MOPP4. After the ARTEP, CPT Johnson had briefed platoon, squad, and team leaders about the purpose of the various MOPP levels and the need to continuously make adjustments. They had voiced understanding of the need to temporarily reduce MOPP levels for the whole team or for selected members performing critical tasks.

Platoon and squad drills had been practiced in MOPP4 until they had become second nature to every soldier. Any additional time, personnel, or changes in procedure needed to do a drill or task had been noted. Changes that made drills easier in MOPP4 usually simplified the drill when not in MOPP4, so the changes were made permanent. This approach had helped to standardize the drills. As a result, the battalion commander had told Johnson that his company was the best-prepared and -conditioned in the battalion.

An FTX 6 weeks before had included 24 continuous hours in MOPP gear. Platoon leaders had rotated their squads periodically so soldiers could obtain temporary relief from MOPP4. Training had also been emphasized to correct weaknesses noted in the ARTEP. Four weeks before, a tactical exercise without troops for the battalion's leaders and staff had proved rewarding but frustrating. Message traffic while wearing protective masks had taken much longer than usual.

CPT Johnson and the first sergeant had spot-checked job books for several E2s and E3s in their unit and found several incomplete entries. After the first sergeant had fired up his NCOs, they conducted and evaluated refresher MOS training. Refresher OPSEC and NBC training were integrated into platoon and squad exercises over the next 2 weeks. Based on all available indicators, CPT Johnson had rated the unit readiness report training status as high.

The company supply sergeant had provided a revised listing of equipment and supply shortages to the battalion S4. Chemical equipment shortages, including M256 chemical detection kits and M258A1 skin decon kits, had been filled from contingency stocks. Equipment in maintenance and radiacmeters at calibration had also been given priority and issued. Based on the high intensity environment foreseen, the need for additional consumables had also been verified and forecasted.

CPT Johnson had checked 1st and 2nd platoon's use of rad-monitoring and chemical-detection equipment and found them proficient. Platoon leaders further verified NBC-team proficiency. Vehicles had been loaded and staged, but the newly reported supply sergeant had to ask on what vehicle the additional overgarments should be stowed. The supply sergeant had been squared away. The company executive officer had verified that everything was properly stored and that covers or tarps were being used on vehicle loads to limit potential contamination.

CPT Johnson reviewed with the company officers and NCOs how MOPP4 would affect their mission. More time was needed to execute various maneuver schemes. The additional engineer support required to establish needed barriers had been incorporated into their contingency planning.

MOPP level for deployment was set at MOPP2. CPT Johnson's reconnaissance teams identified potential sites for hasty decon and junior leaders selected fighting positions that made best use of available cover and concealment.

The battalion S3 tasked the staff chemical officer and S2 to look again at—and evaluate—the battalion's planned dispositions to ensure sufficient dispersion. A supporting tank unit also began checking the collective protection systems on its armored vehicles and confirmed that they were in operating condition. Entry and exit procedures for operations in a contaminated environment also were rehearsed.

Johnson's review of all preparations ended just as the company's battle position came into view. At that moment, enemy artillery fire began to fall. Some of the explosions seemed muffled and the automatic chemical agent alarms began buzzing almost as one. Hand-and-arm signals, land lines, and radio communications were used to pass the alarm. A signal flare was fired that the whole battalion knew meant gas. Leaders ensured all personnel assumed MOPP4.

Two soldiers were slow with their gloves, and their hands became contaminated with rain-like droplets. Both soldiers immediately conducted skin decon and put on their gloves. One of the soldier's breathing became laboredand his vision was blurred. The soldimmediately used an antidote injecto

Basic skills decon continued. Exposed soldiers who were not driving wiped their hoods, gloves, and personal equipment with material from their individual decon kits. The first chance they got, operators sprayed exposed controls with their onboard decon apparatuses.

When the artillery continued, vision was obscured, but the enemy's advance seemed to be slowed. CPT Johnson found the unit taking casualties but unable to see the enemy or strike back. The captain decided to move the company forward to an alternate position. The fire support team called for smoke from supporting artillery to screen the move.

Shortly after reaching the new position, first platoon sighted enemy reconnaissance elements 4,000 meters out. As guns began to roar, the NBC NCO forwarded by radio an NBC 1 (chemical) report to the battalion. Tunit medic began treating and evaluatinpersonnel showing chemical agesymptoms and/or shrapnel wounds. Tchemical detection team reported to the NFcontrol party that the attack had been witpersistent nerve agent. Johnson knew frounit ARTEP experience the unit could fightMOPP4, but the rate of fire and movemwould gradually slow. The nerve hazard made the performance degradatMOPP4 unavoidable.

Casualties would be overwhelming lower MOPP level. CPT Johnson reasonethat, since the chemical attack wapersistent, their position would probably not be receiving the full brunt of an attack.

CPT Johnson fought the battle in depth. Positions, mines, and barriers set throughout the sector canalized the enemy, otherwise

reduced mobility, and fixed the enemy unit in areas where Johnson could concentrate fire on it.

After 2 hours of hard fighting, the battle slowed. The enemy had not expected such an aggressive and effective response after the chemical attack. By this time, US artillery retaliated, and the enemy had its own contamination problems to deal with.

Priority of effort continued on the company's assigned mission. CPT Johnson—needing further information—told the first platoon leader to find out whether routes within the sector were clean and to report the extent of contamination.

The executive officer reported: ***"2nd platoon's chemical detection teams found a clean, uncontaminated area upwind. Medical personnel are using it to treat casualties prior to evacuation. They've covered the casualties with clean blankets to help keep the contamination from spreading to the inside of the ambulance."***

"That's good," replied Johnson, ***"how are our supplies?"***

"We're in pretty good shape," came the reply. ***"Nearly all of our stocks were covered and our ammunition was containerized. We'll be able to strip away the covers and have clean supplies. Maintenance may be slowed a bit, though. The contact team inspected our three disabled vehicles. They said it will take a third longer to repair the equipment, because the mechanics will have to operate in MOPP4."***

"We can live with that," said Johnson, ***"but we'll have to do something about MOPP4. Our troops are still working hard. Vasquez's whole platoon is in defilade and they're darn near invisible in that brush. I like the spirit everybody is showing. But they're going to start slowing down if we don't get them some relief from MOPP4."***

Johnson decided to take advantage of the lull in the action. Soldiers exposed to contamination must exchange their MOPP gear. Unit combat performance would improve if it could obtain temporary relief from MOPP for the troops. The battalion commander gave permission to relocate and conduct hasty decon.

The first platoon leader reported the results of the chemical reconnaissance. ***"We've found a covered route to alternate positions to the southeast. We don't have to move far to be clear of the stuff. We've marked the southeast limit of contamination."***

"Good. Have you found any place for a decon site?" asked Johnson.

"Yes. There's an abandoned cement plant that would be perfect. We can conceal vehicles in the garages, and there's controlled runoff."

"Excellent," said Johnson, then turned to the chemical NCO. ***"See if you can get the battalion decon crew to link up with us there."***

Relocation was accomplished in platoon increments. Dispersion was maintained and OPSEC measures were rigidly enforced. At the decon site, MOPP-gear exchange and vehicle washdown were conducted. The soldiers with the worst exposure exchanged their MOPP gear within 4 hours of the attack, and all equipment was washed down within 8 hours.

The brief respite in battle afforded an opportunity for supply replenishment. Soldiers were rotated to clear areas upwind of unit equipment where they could remove masks and eat. CPT Johnson no sooner reported closure at the new position and gave most of the men short relief from MOPP4, than an NBC 3 (chemical) report arrived. Second brigade had been hit by a nonpersistent agent attack. The NBCC advised CPT Johnson that company B would be in the downwind vapor hazard area. CPT Johnson ordered the chemical agent alarms be rechecked to ensure proper function after the attack. Leaders checked overgarments, detector kits, and nerve agent antidote kits. Personnel were told to be prepared to go to MOPP4. The cycle was about to begin again....

APPENDIX A
ARMY CHEMICAL ORGANIZATION

To help units operate on the AirLand battlefield, chemical personnel are assigned to company level and above. A representative listing of responsibilities and duties for the staff chemical officer/NCO is in the staff organization and operations field manual, FM 101-5, and in appendix E of this manual.

	PERSONNEL ASSIGNED	MISSION
COMPANY	CHEMICAL NCO ADDITIONAL DUTY SOLDIERS NBC defense officer NBC defense NCO Chemical agent detection team Radiological monitoring	Each company (except headquarters company) is authorized a chemical NCO (MOS 54E sergeant). This NCO is the commander's chief advisor on all aspects of NBC defense. Each separate company is authorized a 54E staff sergeant. The chemical NCO provides the commander with an organic source of chemical expertise for planning and conducting unit NBC defense operations to include decon contamination avoidance, and protection. In addition to a chemical NCO, AR 220-58 requires every company to designate an additional duty NBC officer and NCO and NBC teams. Chemical agent detection teams and radiological monitoring teams identify and report NBC hazards. Teams are assigned two operators (primary and alternate) per detection or monitoring instrument. Selected company personnel assist in hasty or deliberate decon as required, for support of unit, battalion, or division decon stations.
BATTALIONS	COMBAT BATTALIONS Chemical officer Chemical NCO NBC specialist	Chemical personnel authorized at combat battalions include a lieutenant (specialty skill identifier [SSI] 74A), a staff sergeant (MOS 54E), and an E4 NBC specialist (MOS 54E). They advise on NBC operations and use of large-area smoke. The NBC specialist E4 trains and supervises a decon crew from the battalion. This crew uses the LDS from the headquarters company.
	NONCOMBAT BATTALIONS Senior chemical NCO NBC specialist	Chemical personnel assigned to combat support and combat service support battalions (such as signal and maintenance) include an MOS 54E sergeant first class. An officer is appointed as the unit NBC defense officer on an additional duty basis. These battalions also have an MOS 54E E4 who trains and supervises a crew appointed from the battalion. This crew operates the lightweight decon system (LDS) in the headquarters company.
BRIGADE	TWO CHEMICAL OFFICERS AND A SENIOR CHEMICAL NCO	The brigade-level chemical section consists of a captain (SSI 74A), lieutenant (SSI 74A), and a sergeant first class (MOS 54E). However, the lieutenant position is not included in the brigade, division artillery, support command, or combat aviation battalion of the light infantry division. These positions provide NBC staff support, help plan employment of nuclear and chemical weapons, and advise the commander on the employment of decon and smoke assets.
ARMORED CAVALRY REGIMENT	TWO CHEMICAL OFFICERS AND FOUR ENLISTED PERSONNEL (E8, E7, E6, E4) CHEMICAL COMPANY	The armored cavalry regiment (ACR) chemical section consists of a major (SSI 74A), a captain (SSI 74A), three chemical NCOs (MOS 54E), and a clerk (MOS 71L). Their mission is to provide NBC staff support, help plan employment of nuclear and chemical weapons, and advise the commander on the employment of decon and smoke assets. The chemical section also has operational control of the ACR chemical company which is described in the following paragraphs with other corps chemical elements. The regimental chemical officer and the chemical staff section are assigned to the regimental chemical company.

	PERSONNEL ASSIGNED	MISSION	
DIVISION	DIVISION CHEMICAL OFFICER	The division chemical officer (lieutenant colonel, SSI 74A) is a special staff officer. This officer advises the division commander on all NBC-related matters. Additional duties include preparing NBC annexes to plans and orders, NBC estimates of the situation, and SOPs for defense against NBC attacks. The chemical officer also helps plan release procedures for the use of chemical weapons, plans employment of large area smoke, and prepares NBC training programs. In addition, this officer recommends, plans, supervises, and coordinates the mission requirements of the division chemical company and nondivisional chemical units. Some of these are smoke or decon companies assigned, attached, or OPCON to the division. Other duties include monitoring the division's NBC intelligence effort and helping to plan nuclear and chemical weapon use.	
	DIVISION CHEMICAL SECTION	The division chemical section is under the supervision of the division chemical officer. This section includes staff personnel who can provide 24-hour manning of the division NBC center (NBCC). The NBCC receives, collates, evaluates, prepares, and distributes NBC reports. The center also maintains the radiation dose status of subordinate units, prepares fallout predictions and chemical downwind hazard predictions, and NBC attack vulnerability analyses. See FM 3-101 for the detailed composition of the division chemical section.	
	HEAVY DIVISION CHEMICAL COMPANY	The division chemical officer and the chemical staff section are included in the TOE of the heavy division chemical company. The division company provides equipment decon and smoke support.	**DECONTAMINATION PLATOONS** Decon platoons provide decon support. The number of decon platoons in the chemical company may vary with the type of division it is supporting. FMs 3-101 and 3-5 provide detailed guidance on the support provided by decon elements of the division chemical company. Support to a task force must be tailored to that force's specific needs. Remaining decon platoons then support other division assets.
			SMOKE PLATOON There is one smoke platoon in the division chemical company. The platoon has 12 smoke generators. It can provide smoke support for maneuver units, a decon site, or other combat support or combat service support operations. Actual employment of smoke assets is based on support of the commander's concept of the operation. The platoon can operate independently or be attached to a corps smoke company. The platoon's maximum coverage during favorable weather conditions is 1 kilometer in width and several kilometers in depth.

	PERSONNEL ASSIGNED	MISSION
CORPS	CHEMICAL OFFICER	The corps chemical officer (colonel) is a special staff officer and advises the corps commander on all NBC-related matters.
	CHEMICAL SECTION	The corps chemical section prepares NBC annexes to plans and orders, NBC estimates of the situation, and SOPs for defense against NBC attacks. It also helps plan the use of nuclear and chemical weapons. The section performs release procedures for the use of chemical weapons and coordinates corps chemical brigade support for the divisions. In addition, the section prepares the NBC portion of training programs and operates an NBC center. Further, the center processes and distributes NBC reports from higher, adjacent, and subordinate units. The center also maintains the radiation dose status of corps units and prepares fallout predictions and chemical downwind hazard predictions.
	CHEMICAL BRIGADE	The corps chemical brigade is commanded by a brigadier general. It consists of smoke, decon, and NBC reconnaissance (recon) companies under the control of the chemical battalions. These units support the corps area as well as division units (upon request). The brigade headquarters is organized to provide operational, intelligence, administrative, and logistical support as well as command and control for two to seven chemical battalions.
	CHEMICAL BATTALION	A chemical battalion consists of two to five chemical companies. These companies conduct NBC recon, decon, and smoke operations. The battalion headquarters commands and controls these chemical companies in support of the corps or division areas. A battalion provides general support within its assigned area of operation to nondivision units and direct support to division units when tasked. The battalion is tailored with a mix of chemical companies to accomplish its assigned mission. For example, the corps might reinforce a division with two smoke companies and a chemical decon company.

SMOKE COMPANIES The two types of smoke companies are mechanized and motorized. Their mission is to screen troops or installations under all conditions through the use of smoke. Both companies are assigned to the chemical battalion at corps and are organized to support heavy divisions.

The motorized company has 48 smoke generators mounted on wheeled vehicles and trailers. The company is designed to operate from the main battle area rearward in the defense and as far forward as the line of departure in the offense. Typical missions may include screening battle positions, vital rear area installations, or assembly areas. The company can screen approximately 7 kilometers in width and several kilometers in depth.

The mechanized smoke company has 42 smoke generators mounted on 21 M113s. These provide the company with the armor protection and mobility to operate close to the enemy in support of maneuver forces. The company can produce smoke screens up to approximately 3 kilometers in width and several kilometers in depth.

DECONTAMINATION COMPANY The decon company provides equipment decon support to elements of the corps and its assigned divisions. Decon missions will be conducted as far forward as possible.

NBC RECONNAISSANCE COMPANY The NBC recon company's mission is to provide NBC recon support to elements of the corps. The company conducts motorized recon missions in the corps rear area.

ARMORED CAVALRY CHEMICAL COMPANY The corps armored cavalry regiment has a chemical company assigned for decon and recon support. The NBC recon platoon is equipped with tracked vehicles. The decon platoon can be placed in direct support of a cavalry squadron to provide equipment decon.

CORPS CHEMICAL COMPANY (SMOKE/DECON) The corps chemical company (smoke/decon) provides both smoke and decon support for the light division. This company is a corps asset designed to provide decon and smoke support for friendly maneuver forces. The company has the ability to set up decon sites for four brigades, or provides a smoke screen up to 8 kilometers wide.

APPENDIX B

EXTREME CLIMATES AND TERRAIN

Controlling NBC operations in mountains, jungles, deserts, cold climates, and urban areas is difficult because of the behavior of NBC weapons in varied environments. Weather (temperature, air stability, and wind speed and direction) directly influences the effectiveness and persistency of an agent. For example, blister agent (HD) is most effective in hot, humid weather and freezes at 58° Fahrenheit. If it were employed for its vapor effect in cold weather, it would produce only minimal effects at best. Weather also has an indirect bearing on the effectiveness of agents, by influencing the type and amount of clothing worn by troops. As the temperature increases, troops generally wear less clothing, which exposes more skin area and increases their vulnerability to chemical attack. NBC weapons effects differ based on the type of terrain.

MOUNTAINS

In mountains, the downwind hazard of NBC weapons can be unpredictable. Terrain features such as hills and canyons affect weather almost as much as the prevailing climate. Prevailing winds may blow in a given direction, but local winds usually blow up and down the mountainsides—up during the day, down at night.

On the other hand, the possible location for the use of nuclear, biological, or chemical weapons may be more predictable. The terrain is generally restrictive, and there are few places where armies can maneuver. Therefore, targets may be lucrative and easy to find.

The concentration of forces in narrow canyons and valleys makes them vulnerable to nuclear attack. The shock waves from a nuclear blast may cause avalanches as far as 30 kilometers from ground zero. Light and heat (thermal effects) from the blast can be easily projected through the clear, mountain air. Dazzle, snow blindness, and burns will cause casualties much farther from the blast. Large, hilly masses tend to increase air blast effects in some areas and decrease them in others. Although prominent terrain features may shield a particular target from heat and radiation, little reduction in blast damage to structures may be expected.

Mountains tend to trap radioactive debris as it drifts through the air. Hot spots may form along the side of a mountain far from the site of a blast. It would be difficult to detect a hot spot with a monitoring party before a unit encounters one. Units operating independently must constantly monitor dose rates.

Chemical agents may also become more persistent in the mountains. Chemical agent clouds tend to travel around hills and down valleys where they settle into depressions. However, the downwind vapor hazard distance will be reduced. More detailed information on mountain operations can be found in FM 90-6.

JUNGLE

The jungle can be a difficult place for your operations or it can be your ally. NBC defensive operations will be difficult. The jungle enhances some of the lethal characteristics of NBC weapons, and protective measures are difficult to maintain. Temperatures are high year-round. Humidity is high and rainfall frequent. There is little or no wind or sunlight below a jungle canopy.

Initial effects of nuclear detonations are not significantly influenced by the dense vegetation. The green cover of the jungle may provide some protection from the thermal energy of a nuclear detonation. However, the blast will blow the canopy down and create a jumble of splintered trees strewn across the blast area. Even dismounted infantry would be hard-pressed to move through such an area.

Fallout may be retained temporarily in a jungle canopy, because the canopy would tend to catch and hold residual radiation contamination in its upper branches. Rains will wash the radiation into low areas where it will become concentrated in hot spots.

The jungle wages a constant biological warfare against armies and equipment. Biological agents thrive in the heat, humidity, and shade. Personnel are extremely vulnerable to disease in the jungle. Close attention must also be given to the maintenance of NBC equipment, or it may not work when the need arises.

Heavy forest limits the spread of contamination. Biological attacks would be primarily limited to area targets. Delivery weapons would have to penetrate the jungle canopy. Once below the canopy, agents would tend to hang in the air and remain dangerous for long periods because of the lack of sunlight and air currents to move them about. In any case, good field sanitation, personal hygiene, and purified water supplies are your best defense.

Chemical agents tend to be more persistent in a jungle. The forest creates a protective umbrella against liquid chemical agents delivered in the air. If they work their way to the forest floor, or if they are delivered by artillery with delay fuzes, they tend to become trapped and stay in one place. Under these conditions, even nonpersistent agents can linger for long periods in the still air under the jungle canopy. Persistent agents will last even longer. The high temperatures will drive vapors from agents that usually remain liquid. MOPP gear—uncomfortable in a temperate climate—can become almost unbearable in a steamy jungle. Commanders must plan for this burden when estimating work rates and heat casualties. More detailed information on jungle operations can be found in FM 90-5.

DESERT

You will be a vulnerable target in the desert. Relatively flat terrain makes undetected advances and withdrawals extremely difficult. You can be hit with artillery-delivered nuclear weapons or chemical agents at maximum range.

Thermal radiation from nuclear radiation may be higher. There is little green vegetation to absorb it, and light and heat reflect off sand and bare earth. High temperatures during the day may limit chemical agent use because the air is very unstable. The sun penetrates the clear, dry air, heats the ground, and the dry air begins to rise. Chemical attacks will probably be limited to immediate on-target results when the terrain is hot because of the tendency for the agent to go straight up. A surprise persistent chemical attack agent may be used against a target to cause casualties, because soldiers may try to find some relief from the heat by removing parts of their clothing. The enemy will try to injure or kill these exposed personnel, and a surprise chemical attack can be very effective. In the heat, perspiration tends to open pores, and agents can penetrate easily. MOPP wear, extreme temperatures, and scarcity of water cause sweating, dehydration, and may cause heat exhaustion or heat stroke.

The most likely time of attack is anytime from early evening to morning. At that time the air is more stable, and chemical vapors linger somewhat longer. Fortunately, protective gear is more comfortable to wear after sundown. Desert air cools rapidly at night.

The need for proper field sanitation and personal hygiene is just as important in the desert as it is in anywhere else. Dysentery and other diseases must be prevented. Decon operations can be hampered due to a lack of water. However, natural weathering effects, sun, and especially sand help in decon operations. More detailed information on desert operations can be found in FM 90-3.

COLD CLIMATE

Cold weather conditions can alter NBC weapon effects. At subzero temperatures, the radius of a nuclear blast is increased. Ice and snow may amplify thermal effects as well. A nuclear burst can interfere with troop movement by breaking up ice cover or causing quick thaws. Radiological hot spots may occur in heavy snow or drifts. High winds in the arctic may make fallout prediction difficult.

The possibility of biological warfare cannot be ruled out. Commanders must be especially aware of the dangers of sabotage. Troops should conduct proper decon procedures and maintain good personal hygiene to avoid any secondary spread. A crowded area, such as a warm-up tent, provides an excellent environment for spreading infectious diseases.

In the cold, exposure to blood and choking agents will require masking. Although the hazard time may be longer, these agents remain nonpersistent. Most blister agents become solid in the cold and are easily brushed from clothing and equipment. Although vapor hazards are lower, eye irritation from blister agents can still occur at -40° Fahrenheit. Since soldiers tend to be well-covered in the cold, the possibility of skin contamination is reduced. One of the most serious dangers from blister agents occurs when they are brought into a warm area where they thaw. However, some mixtures, such as HL, remain a liquid hazard at fairly low temperatures.

Nerve agents will force troops to mask in the cold. Most liquid nerve agents do not freeze except in severe cold conditions. These agents will persist a long time in the cold. Like blister agents, they present a very serious vapor hazard when brought into warm areas.

Since NBC contamination remains a hazard in the cold, MOPP gear is still required. Wearing MOPP gear can increase perspiration—a very significant cold weather problem. Soldiers who remain wet for long periods may suffer cold-weather injuries such as hypothermia and immersion foot. Commanders need to carefully monitor work rates while soldiers are in MOPP. If necessary, inner layers of clothing may be

removed, and socks and underwear should be changed frequently.

Dehydration is another cold-weather problem. Water loss from increased respiration and perspiration may go unnoticed due to the cold and amount of clothing worn. The thirst mechanism becomes unreliable. Therefore, it is important all personnel increase fluid intake at the first signs of urine concentration (darker color).

The protective mask, M258A1 skin decon kit, and M256-series chemical detector kit should not be allowed to freeze. If the Nerve-Agent Antidote Kit, Mark 1, freezes, do not use it; replace it. Keep these items inside outer clothing during the day and in sleeping bags at night. In an extremely cold environment, MOPP gear may have to be worn under cold weather gear to ensure soldiers can stay warm.

Identification of chemical agents is more difficult in the cold. Detector paper will not work with frozen agents. The M256 chemical agent detector kit will give inaccurate readings in extreme cold (below -21° Centigrade). It can be used to check warm-up areas, however.

In freezing weather, decontamination with water or water-based solutions is difficult. DS2 is effective at temperatures above -26° Centigrade. More detailed information on cold climate operations can be found in FM 31-71.

URBAN AREAS

Urban areas may be the most defensible terrain in the world. They include villages, cities, and industrial plants. Ferreting out a defender is an infantry job. The battle becomes a series of skirmishes from door to door, a long and costly operation.

An enemy—tempted to use nuclear weapons to reduce casualties and speed up the operation—must be willing to accept the destruction of the city and its infrastructure as well as risk radiological contamination.

An enemy unwilling to accept the destruction of the city or its population might resort to the use of biological or chemical weapons. A low-grade infection introduced to a city by the attacking force could possibly weaken the defenders and make house-to-house fighting less expensive to the attackers. Defenders would also have to wear protective masks for long periods. They would have to conduct aggressive vector control and strictly enforce sanitation standards.

Chemicals can work very well to rout a city's defense. Ironically, in an urban fight, the defender has the advantage of mobility. A good defense consists of numerous strong points linked with lateral communication lanes. Tunnels, back alleys, and holes cut through interior walls, make a relatively protected network through which the defender can move his forces, concentrating them where needed. The attacker cannot use this concealed network. He finds his forces constantly constricted in narrow roads and buildings, unable to move laterally. By placing persistent chemicals into the defender's transportation network, the attacker can somewhat restrict the defender's mobility.

Certain chemical agents are heavier than air. They will seep into rooms, concentrate in alleyways, and linger in sewers and tunnels. An unprepared defense could collapse in the face of such an attack. Prepared defenders can put on their protective gear, but they may find it difficult to shift forces. Dark, narrow passages filled with chemical agents will be difficult to negotiate, with or without protective equipment. Soldiers will be reluctant to enter them. A prepared defender may include some collective protective measures in the defensive network. It may be possible, with fans, to put some overpressure into tunnels to keep some chemicals from entering.

Chemicals, lethal or nonlethal, may also cause panic among the civilian population. The movement of refugees could interfere with the defense of the city. They could block the defender's maneuver, cover enemy movements, and draw on the defender's stocks of protective equipment and decontaminants. Additional information on military operations on urbanized terrain (MOUT) is located in FM 90-10.

APPENDIX C
OPLANs AND SOPs

NBC warfare is a challenge to each staff section. The S1/G1 must coordinate with the surgeon on handling contaminated casualties. The S2/G2 must provide NBC intelligence and the S3/G3 must plan additional time for operations. The S4/G4 must resupply overgarments and decontaminants and the G5 must handle civil military operations.

The only way to stay combat effective in the face of the many complications caused by NBC operations is to plan in detail before combat. OPLANs and SOPs are the best planning tools for maintaining relatively smooth operations on the NBC active battlefield.

An OPLAN can give specific instructions for a particular contingency. SOPs can help by giving commanders a standard NBC organization and procedures that support the OPLAN. SOPs can keep your OPLANs from being too cluttered with routine tasks. They eliminate the need to put word-by-word descriptions of items like NBC warning signals, crew drills, or the warning and reporting system in the OPLAN.

This appendix offers three tools to help you develop good OPLANs and SOPs. The three tools are a list of subjects to include in subjects tactical SOPs, models of a chemical support annex, and a smoke support annex.

LIST OF NBC SUBJECTS THAT SHOULD BE INCLUDED IN TACTICAL SOPs

Each unit must have standing operating procedures (SOPs) that include NBC defense procedures tailored to its particular operations and equipment. These procedures will vary from unit to unit, depending upon their missions. The minimum areas an SOP should cover include:

- Organization for defense.
- Responsibilities for NBC personnel and specialized teams that are unique to the unit.
- Alarms and warnings (general, local, sound, and approved visual signals).
- Any unique actions before, during, and after a chemical, nuclear, or biological attack required because of the unit's equipment or mission.
- Specific decon procedures for unit equipment.
- Priorities for decon.
- Designation of who decontaminates equipment, supplies, food, and water.
- Who wears tactical dosimetry equipment and reports radiation exposure.
- Maintenance and storage of NBC supplies and equipment.
- How supplies of food and water are replenished while operating in a contaminated area.
- Unique procedures for operating in NBC contaminated areas required because of the unit's mission or equipment.
- Wear of MOPP gear.
- Coordination with supporting medical units for the distribution of nerve agent antidote.

MODEL CHEMICAL SUPPORT ANNEX

(Classification)

(Change from oral orders, if any)

Copy no ___ of ___ copies
Issuing headquarters
Place of issue (may be in code)
Date-time group of signature
Message reference number

ANNEX __ (CHEMICAL SUPPORT) TO OPERATION ORDER NO ___

References: Maps, charts, and other relevant documents.

Time zone used throughout the order: _____

1. SITUATION.

a. Enemy Forces. Information should include:

- See annex __ (Intelligence) to OPORD __.
- Capabilities of enemy NBC weapon systems (munitions/agents).
- Decontamination/reconnaissance assets.

b. Friendly Forces. Information concerning NBC decontamination, reconnaissance, and smoke assets, not covered by the operation order, that are available in higher, adjacent, supporting, and reinforcing units.

c. Attachments and Detachments. List the NBC decontamination, smoke, and reconnaissance units attached to or detached from the issuing headquarters.

d. Assumptions (OPLAN Only). Include information on the ability of friendly forces to conduct chemical operations and defend against NBC attack. Assumptions as to the probability of enemy use of NBC weapons. Assumptions of vulnerability of civilian population to NBC attack.

2. MISSION. See basic OPORD.

3. EXECUTION.

a. Concept of Operations. The concept for employment of NBC decontamination, reconnaissance, and smoke assets should be described. Priorities for NBC reconnaissance, decontamination, and smoke support established.

(Classification)

(Classification)

b. In subsequent, separate lettered subparagraphs, the specific tasks to be accomplished by NBC decontamination, smoke, and reconnaissance assets are stated.

c. Fire Support. See appendix __ (Chemical Fire Support Plan) to annex __ (Fire Support) to OPORD __.

d. Coordinating Instructions.

(1) Operational exposure guidance.
(2) Troop safety criteria.
(3) MOPP level.
(4) Location of decontamination sites.
(5) Directions for rendering assistance to local populace.
(6) Other coordination or control measures applicable to two or more elements of the command.

4. SERVICE SUPPORT.

a. General. Division installations remain in present locations. Annex H (Service Support).

b. Material and Services. Information pertaining to availability, procedure for distributing, prestock points, location of decontamination sites, and transportation of NBC defense supplies, materiel, decontaminants, and chemical munitions.

5. COMMAND AND SIGNAL.

a. Command. Location of primary and alternate NBC defense units.

b. Signal.

(1) Procedures for requesting NBC defense support.
(2) Emergency NBC attack signal, if different from that specified in the SOP.
(3) Designate NBC 1 (nuclear) observers.

Acknowledgment instructions.

Last name of commander
Rank

Authentication:
Appendixes:
Distribution:

(Classification)

MODEL SMOKE SUPPORT ANNEX

(Classification)

Copy __ of __ copies
Issuing headquarters
Date-time group
Message reference number

ANNEX __ (SMOKE SUPPORT) TO OPORD

References: Maps, charts, smoke overlays, and other relevant documents.

Time zone used throughout the order:

1. SITUATION.

a. Enemy Forces. See annex.

b. Friendly Forces. Include information containing smoke assets, not covered by the operation order, that are available in higher, adjacent, supporting, and reinforcing units.

c. Attachments and Detachments. List assets supporting the smoke mission, attached to or detached from the issuing headquarters.

2. MISSION. State the smoke mission including deceptive operations.

3. EXECUTION.

a. Concept of Operation. Describe the concept for employment of smoke assets, to include priorities.

b. In subsequent lettered subparagraphs, give the specific tasks to be accomplished by smoke assets.

c. Coordinating Instructions. State coordination or control applicable to two or more elements of the command.

4. SERVICE SUPPORT.

a. Material and Services. Include information pertaining to availability, procedure for distribution, prestock points, and transportation of smoke generator fuel, fog oil, and other supplies.

b. Miscellaneous.

(Classification)

(Classification)

5. COMMAND AND SIGNAL.

a. Command. State procedures for control of smoke assets and location of primary and alternate command posts.

b. Signal. CEOI reference.

(COMMANDER)

AUTHENTICATION

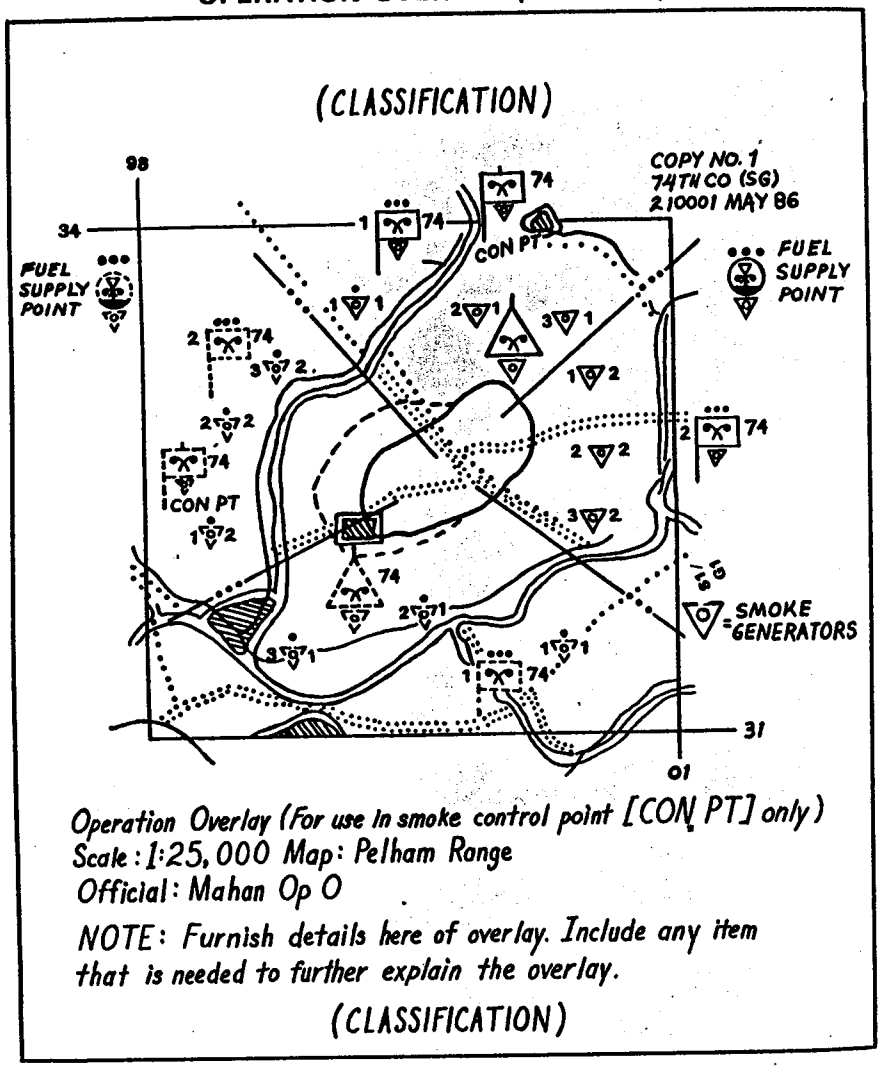
1 Enclosure

Describe enclosure.
For example: Operation Overlay.

DISTRIBUTION:

(Classification)

OPERATION OVERLAY (EXAMPLE)



Operation Overlay (For use in smoke control point [CON PT] only)
Scale: 1:25,000 Map: Pelham Range
Official: Mahan Op O

NOTE: Furnish details here of overlay. Include any item that is needed to further explain the overlay.

APPENDIX D

BATTLEFIELD TASK LIST FOR COMMANDERS AND STAFF OFFICERS

The following task list is designed to give the reader an indication of nuclear and chemical tasks that are performed by various commanders and staff officers in a division. The list is not all-inclusive. Other tasks will be identified for different staff officers and commanders based on the current factors of mission, enemy, terrain, troops, and time available (METT-T) and local standing operating procedure (SOP). The degree of involvement in each task by the different elements will depend on the stated task. In some cases, a commander will be the recipient of a stated task. In other cases, the commander will initiate the task.

	CDR	S1/ G1	S2/ G2	S3/ G3	S4/ G4	G5	OTHER STAFF
1. Identify, apply, or recommend collateral damage and troop safety constraints.	X		X	X		X	FSE & CML
2. Identify items to be included in commander's nuclear and chemical guidance.	X	X	X	X	X	X	FSE & CML
3. Predict fallout and downwind vapor hazard and their probable effects on operations.			X	X			CML
4. Maintain and report cumulative radiation dose status.		X		X			SURG & CML
5. Recommend an operation exposure guide (OEG) and mission-oriented protective posture (MOPP).				X			CML & SURG
6. Maintain discipline, law, and order. The fragmentation of units and command and control elements creates large numbers of stragglers.		X		X			PMO
7. Establish straggler-control points.		X					

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	CDR	S1/ G1	S2/ G2	S3/ G3	S4/ G4	G5	OTHER STAFF SECTIONS
8. Supervise the preparation of area damage control plans.				X	X		ENG & RAOC
9. Supervise the nuclear accident and incident control plan.					X		FSE & CML
10. Advise on the impact of our use of chemical and nuclear weapons.						X	FSE & CML
11. Advise on the impact of enemy's use of chemical, biological, and nuclear weapons on the civilian population.						X	CML
12. Develop population center overlays used to preclude damage to population centers in accordance with the commander's guidance for nuclear/ chemical weapons employment.						X	
13. Develop a radiological and chemical monitoring and surveying plan.				X			CML
14. Determine the effect of a unit's radiation-exposure status on mission assignments.		X		X			SURG & CML
15. Determine the prescribed nuclear load (PNL), authorized nuclear stockage (ANS), prescribed nuclear stockage (PNS), and prescribed chemical load (PCL).	X			X	X		CML, FSE & ENG
16. Form nuclear weapons logistical elements (NWLE) to aid in supply/ resupply of nuclear weapons.					X		
17. Supervise the management, procurement, and distribution of chemical and nuclear weapons.					X		FSE & CML
18. Responsible for resupply of nuclear and chemical weapons.					X		
19. Responsible for resupply of chemical protective clothing.					X		
20. Develop plans for handling mass casualties (such as medical evacuation, graves registration/hasty burials) and replacements.		X			X	X	SURG, AG & CML
21. Prepare area damage control plans.							Base Clusters, RAOC & ENG
22. Develop a target-engagement priority list based on commander's guidance.			X	X			FSE & CML
23. Establish procedures for rapid fire-support planning/execution within target-nominal dwell times.			X	X			FSE

	CDR	S1/ G1	S2/ G2	S3/ G3	S4/ G4	G5	OTHER STAFF SECTIONS
24. Conduct nuclear/chemical vulnerability analysis.				X			CML & FSE
25. Determine techniques for overcoming the vulnerabilities of communication systems.				X			C-E
26. Employ control measures that maintain control and coordination in spite of interruptions of electronic communications.	X			X			C-E
27. Disseminate the NUCWARN/CHEMWARN message and NBC 3 chemical message.				X			FSE & CML
28. Integrate maneuver with concurrent nuclear/nonnuclear fires.	X			X			FSE
29. Apply the appropriate fire support techniques/procedures that facilitate the integration of nuclear, chemical, and conventional fires.							FSE
30. Determine operations security (OPSEC) requirements and procedures that minimize indications of nuclear and chemical request, release, and employment intentions.				X			C-E
31. Task-organize and employ intelligence-gathering assets for timely engagement of targets.			X	X			FSE
32. Plan for the safety, physical security, emergency destruction, resupply (including aerial), movement, and storage of nuclear and chemical weapons.					X		FSE & AVN
33. Develop and maintain a personnel reliability program (PRP).	X	X	X	X			SURG & AG
34. Use the Emergency Action Procedures (EAP) system and associated subsystems.	X			X			FSE
35. Prepare nuclear/chemical situation reports.		X	X	X	X		FSE, CML & ENG
36. Prepare requests for nuclear/chemical weapons selective release.	X			X			FSE & ENG
37. Authenticate nuclear and chemical control orders.				X			FSE & ENG
38. Process emergency action messages.				X			FSE & ENG
39. Identify pertinent target analysis information.	X		X	X			FSE, CML & ENG
40. Perform fixed-target analysis using the target-oriented method.							FSE & ENG

	CDR	S1/ G1	S2/ G2	S3/ G3	S4/ G4	G5	OTHER STAFF SECTIONS
41. Perform target analysis on mobile battlefield targets using the rapid-target-analysis technique.	X			X			FSE
42. Perform chemical target analysis.							CML & FSE
43. Maintain chemical munition-requirement computation.							FSE & CML
44. Evaluate available systems versus the tactical situation, and recommend delivery system and weapon to be employed.				X			ALO, CML, ENG & FSE
45. Recommend assembly-readiness status for nuclear/delivery units.							FSE & ENG
46. Select nuclear aim points within constraints, damage/limiting factors.				X		X	FSE & ENG
47. Redistribute PNL, ANS, PNS, and PCL based on tactical situation.	X			X	X		
48. Task delivery units to fire released nuclear weapons.	X			X			FSE & ENG
49. Task appropriate agencies for poststrike analysis.	X		X	X			FSE & ENG
50. Prepare operational plans that support the AirLand battlefield (general release, selective release, and chemical release).	X	X	X	X	X	X	FSE, CML, AVN & ENG
51. Modify the administration and logistical plan, based on the operational situation.		X			X	X	
52. Determine the effect of enemy use of nuclear or chemical weapons on operational plans.	X	X	X	X	X	X	FSE & CML
53. Modify the tactical plan based on the operational situation.	X	X	X	X	X	X	FSE
54. Assist in planning the use of nuclear and chemical weapons, to include integration of chemical weapons in denial operations and obstacles.			X	X			CML, ENG & FSE
55. Plan and recommend requirements for chemical troops and their employment.							CML
56. Prepare the defense nuclear, biological, and chemical (NBC) annex to plans and orders, NBC estimates, and SOPs.							CML
57. Effective wind-message preparation and distribution.							CML

	CDR	S1/ G1	S2/ G2	S3/ G3	S4/ G4	G5	OTHER STAFF SECTIONS
58. Process nuclear, biological, and chemical strike reports and assessment of effects for all enemy strikes and friendly nuclear and chemical strikes.			X	X			CML & FSE
59. Collate, evaluate, and distribute NBC contamination data and maintain the NBC situation map.							CML
60. Advise on the impact of NBC contamination on tactical, logistical, and civil-military operations.				X	X	X	CML
61. Advise on NBC intelligence matters.							CML
62. Advise on the use of defoliants and herbicides in support of tactical operations.							CML
63. Recommend employment of atomic demolitions.				X			ENG & CML
64. Advise on clearing obstacles and hazards created by enemy nuclear and chemical weapons employment.							ENG & CML
65. Construct NBC shelters and use earthmoving equipment in NBC decontamination.							ENG & CML
66. Locate uncontaminated water supplies.							ENG
67. Maintain control on main supply routes (MSR).							PMO
68. Advise the commander on protective measures against electromagnetic pulse (EMP) effects on communications-electronics (CE) equipment.							C-E
69. Establish skip-echelon communications between the division and subordinate headquarters to ensure continuity of operations in the event a major subordinate headquarters is destroyed.							C-E
70. Ensure that division headquarters, major subordinate units, and nuclear delivery units have the proper authenticators for the control and release of nuclear and chemical weapons.				X			C-E
71. Plan for aerial resupply of nuclear and chemical weapons; use of helicopters for aerial radiation surveys and damage assessments.				X	X		AVN, CML & FSE

	CDR	S1/ G1	S2/ G2	S3/ G3	S4/ G4	G5	OTHER STAFF SECTIONS
72. Advise on in-flight danger to aircraft associated with nuclear weapons employment; such as blast danger, flashblindness, dazzle, and EMP effects on avionics.							AVN

APPENDIX E

RESPONSIBILITIES OF NBC PERSONNEL

COMPANY CHEMICAL NCO

The company chemical NCO position calls for an MOSC 54E20 who has complete[d] the Chemical NCO Basic Course. This NCO works in company operations where he is immed[iately] available to the company commander as the primary advisor for all NBC matters. The [NCO] supports combat readiness by training first-line supervisors, so they can train indivi[dual] soldiers in NBC related tasks. Chemical NCOs also monitor NBC training within the comp[any]. This NCO also demonstrates proper techniques for operation and maintenance of NBC equipment and analyzes unit training needs.

The duties outlined are minimal operational duties. They are listed to help che[mical] personnel and their supervisors and commanders better understand the capabilities and use of chemical personnel. Additional duties the commander may assign should not detract from accomplishing these primary duties first.

INTELLIGENCE

- Receive, prepare, correlate, and disseminate information on enemy NBC attacks.
- Coordinate with NBC reconnaissance elements assigned or attached to the company. Recommend employment to unit commanders.
- Ensure key personnel have received an appropriate, specific NBC threat briefing pertaining to their mission. Also, make sure that all newly assigned personnel receive an unclassified NBC threat briefing.

TRAINING

- Advise on methods to integrate NBC defense into all aspects of unit training.
- Train first-line supervisors to provide proper, informed training to individual soldiers.
- Train and ensure continued proficiency of unit additional-duty NBC teams.
- Provide commander with NBC training ammunition requirements.

EVALUATION

- Conduct periodic evaluations of unit NBC preparedness through the conduct of individual and unit additional duty NBC team proficiency tests.
- Use the results of platoon drills, SQT, ARTEP, and other evaluations to improve NBC readiness.

READINESS

- Report NBC equipment status accurately, as required by higher headquarters.
- Help the company supply sergeant determine authorizations and forecast NBC equipment to support training.
- Help the company supply sergeant maintain status of shelf-life items and rotate them as required.
- Ensure all contingency NBC equipment is planned for in unit load plans.

LOGISTICS

- Supervise operator/crew maintenance of NBC equipment.
- Ensure that supply sergeant and PLL clerk requisition NBC-related items. Maintain document numbers for all requisitioned items.
- Inventory and report status of NBC equipment as required by higher headquarters.
- Help unit leaders fit, package, and issue individual chemical defense equipment.
- Recommend the use of funds to requisition shortages, expendables, and items consumed in training based upon authorizations contained in appropriate publications.
- Coordinate turn-in of unserviceable NBC equipment.
- Ensure radiacmeter calibration/certification is current.

ADMINISTRATION

- Write and update the NBC annex to the unit SOP.
- Maintain close coordination with battalion chemical officer/NCO. Keep them abreast of NBC-related activities.
- Maintain and update NBC-related publications.
- Maintain and update, as required, duty appointments concerning NBC organizational requirements outlined in appropriate publications.
- Maintain mask status chart.
- Ensure all soldiers are screened for optical inserts.
- Maintain list of personnel exempt from CS exposure.

FIELD OPERATIONS

- Supervise use of NBC equipment, including protective gear.
- Provide commander with unit operational exposure guidance.
- Receive, prepare, correlate, and disseminate information on enemy and friendly NBC attacks.
- Monitor or supervise basic skills, hasty and deliberate decon operations..
- Make recommendations to the commander on decon and smoke support.
- Maintain basic loads of NBC items in coordination with the supply sergeant.
- Supervise use of unit NBC teams.

BATTALION PERSONNEL

Combat battalion personnel consist of the assistant S3 chemical officer (lieutenant), a battalion chemical staff NCO (E6), and an NBC specialist (E4). Each noncombat battalion has a chemical staff NCO (E7) and an NBC specialist (E4). In addition, a battalion staff officer is appointed as additional-duty NBC officer. The battalion chemical section trains personnel and helps plan NBC operations. These soldiers supervise technical aspects of battalion and subordinate unit NBC operations. They also help subordinate company chemical NCOs. They recommend to the S4 use of funds for NBC equipment or supplies. They must periodically report authorizations and on-hand and on-requisition status. Also, they must know budgeting and forecasting principles.

The duties outlined here are not the only operational duties. They are listed to help chemical personnel and their supervisors and commanders to better understand the capabilities and uses of chemical personnel.

INTELLIGENCE

- Provide technical assistance to the S2 for analysis of the NBC threat and ensure the analysis is reflected in unit OPLANs and SOPs.
- Receive, relay, and disseminate information on enemy NBC attacks.
- Help the S2 coordinate activities of any attached or assigned NBC reconnaissance elements. Recommend employment to unit commanders.
- Ensure that key personnel receive an appropriate, specific NBC threat brief pertaining to their mission. Also, make sure all newly assigned personnel receive an unclassified NBC threat brief.

PERSONNEL

- Serve as the professional developers for company chemical NCOs. Train company NCOs in MOS-related subjects and monitor assignments.
- Ensure full use of subordinate unit chemical personnel. Promote integration of nonchemical personnel into chemical activities.
- Maintain the status (name, rank, and departure) of company chemical NCOs. Report to higher headquarters chemical section as required.
- Provide technical information to help the S1 prepare casualty forecasts.

TRAINING

- Coordinte and monitor battalion NBC defense training. Ensure the integration of NBC defense training in all aspects of training.
- Evaluate individual and collective NBC training. Determine training needs and recommend training required to correct deficiencies.
- Project NBC training ammunition requirements in coordination with the S3 and S4.
- Train and supervise a crew appointed from the battalion to operate the LDS.

EVALUATION

- Conduct periodic evaluations of unit NBC preparedness through the conduct of individual and unit additional duty NBC team proficiency tests.
- Use the results of platoon drills, SQT, ARTEP, and other evaluations to improve NBC readiness.

READINESS

- Report NBC equipment status accurately, as required by higher headquarters.
- Determine authorizations and forecast NBC equipment to support training and basic loads.
- Advise the S4 on shelf-life and rotation of NBC stocks.
- Ensure that all contingency NBC equipment is planned for in unit load plans.

LOGISTICS

- In coordination with the S4, account for expenditure of funds provided for NBC defense equipment (NBCDE).
- Follow up on outstanding requisitions and NBCDE maintenance.
- Forecast and monitor inventories of NBCDE, as required by higher headquarters, in coordination with company chemical NCOs.
- Recommend the use of allocated NBCDE funds early in the fiscal year. This is to requisition shortages, expendables, and items consumed in training based upon authorizations contained in appropriate publications.

- Conduct periodic NBC equipment inspections.
- Supervise the NBCDE calibration program. Integrate it with the battalion's calibration program.

ADMINISTRATION

- Write and update the NBC annex to the battalion SOP.
- Maintain and update NBC-related publications.
- Maintain close contact with subordinate units and higher headquarters. Keep them abreast of NBC activities.
- Help subordinate units update duty appointments concerning NBC organizational requirements outlined in appropriate publications.

FIELD OPERATIONS

- Receive, correlate, and disseminate information on NBC attacks.
- Consolidate subordinate unit OEG radiation status. Report to higher headquarters as required.
- Provide recommendations concerning MOPP levels appropriate for enemy threat and tactical situation.
- Organize and establish (as required) a battalion NBC center. Coordinate and supervise activities of radiological survey and monitoring teams and chemical detection teams.
- Recommend use of supporting NBC recon and smoke units.
- Coordinate decon missions conducted with or without support-level decon assets.
- Report NBC equipment and personnel shortfalls to higher headquarters.

BRIGADE PERSONNEL

The brigade, DISCOM, and division artillery chemical sections consist of the brigade chemical officer (captain), assistant brigade chemical officer (lieutenant), and a chemical operations NCO (sergeant first class). A lieutenant position is deleted in light divisions. Organization of forward-deployed brigades and corps nondivisional brigades may be somewhat different. However, their functions and duties are similar to those of a divisional brigade.

The brigade chemical officer works as a special staff officer under the staff supervision of the brigade executive officer. Through staff visits, coordination, and inspections of subordinate units, the brigade chemical section serves as a focal point for NBC evaluations. Its evaluations assist subordinate units in all NBC defense areas to improve NBC readiness. Whereas a brigade section deals almost exclusively with evaluations and readiness, other brigade-level sections may have expanded roles. The division artillery chemical section plays a large role in delivery-unit understanding and exercise of nuclear and chemical release procedures and fire missions. The DISCOM chemical section, in coordination with the G4, the division chemical officer, and the respective COSCOM, deals with stockage, unit pre-positioning, and resupply of chemical defense equipment.

The duties outlined here are minimum operational duties. They are listed to help chemical personnel and their supervisors and commanders to better understand the capabilities and uses of chemical personnel.

INTELLIGENCE

- Provide technical help to the S2 for analysis of the NBC threat and ensure that priority intelligence requirements (PIR) and threat information are reflected in unit OPLANs and SOPs.
- Help subordinate units in their threat analysis and evaluate dissemination of information to key and newly assigned personnel.

PERSONNEL

- Provide recommendations to the division chemical officer, the brigade S1, and subordinate units concerning assignment of chemical personnel.
- Help professional development of company and battalion chemical personnel.
- Ensure proper use of subordinate unit chemical personnel and promote integration of nonchemical personnel into chemical activities.

TRAINING

- Monitor and evaluate NBC defense training and integration of NBC defense tasks in all aspects of training.
- Determine training needs through staff visits and evaluations. Recommend training required to correct deficiencies.
- Project NBC training ammunition requirements in coordination with S3 and S4 representatives.
- Give technical staff help to subordinate units. Explain individual and collective training policies, procedures, and guidance.
- Plan and coordinate NBC training in local training areas, major training areas, and maneuver-rights areas.
- Make sure ARTEP/MTP NBC common module tasks are included in all mission-related training and ARTEPs.
- Ensure achievement of at least minimum standards of proficiency by all individuals and units.
- Make most use of post or area NBC defense courses. Ensure quotas are provided to units needing them most.
- Ensure medical training in a contaminated environment is included in exercises.

EVALUATION

- Use results of SQT, ARTEP, and ARTEP unit tests and field exercises to improve NBC readiness.
- Evaluate NBC readiness through the maintenance of NBCDE, use of allocated funds, use of personnel, and quality of training provided.
- Monitor and evaluate subordinate unit individual and additional duty NBC team proficiency tests.

READINESS

- Consolidate subordinate unit quarterly NBC status reports, ensure uniformity of data, and forward the reports to the division chemical section.
- Help subordinate units determine authorizations and forecast of NBC equipment to support training and war reserve stockage.
- Help the S4 cross-level NBCDE to obtain best overall NBC readiness posture possible.
- Inspect rotation of shelf-life items, load plans for NBC war reserve stocks, and deployment plans/SOPs related to NBC defense.
- Monitor and recommend input of NBC-related data into unit status reports. Correct deficiencies if possible.

LOGISTICS

- Help the S4 account for expenditure of funds provided for NBC defense equipment (NBCDE).
- Help S4 and maintenance personnel follow up outstanding requisitions and NBC equipment maintenance procedures and priorities.
- Conduct spot checks of subordinate unit NBC equipment on hand and on requisition.

- Ensure recommended NBCDE funds are used early in the fiscal year to requisition shortages, expendables, and items consumed in training. These should be based upon authorizations contained in appropriate publications.
- Help plan to rotate forward pre-positioned stocks of NBCDE and decontaminants.
- Help provide NBCDE for mission-essential civilians.

ADMINISTRATION

- Write and update the NBC annex to the brigade SOP.
- Maintain and update NBC-related publications.
- Maintain close contact with subordinate units and higher headquarters. Keep them abreast of NBC activities.

FIELD OPERATIONS

- Receive, prepare, correlate, and disseminate information on enemy NBC attacks.
- Consolidate battalion radiation status. Report to division as required.
- Provide recommendations concerning MOPP levels appropriate for enemy threat and tactical situation.
- Establish and operate the brigade NBC subcollection center. Coordinate activities and reports with appropriate host nation territorial organizations.
- Recommend employment of supporting NBC recon, smoke, and decon units.
- Report NBCDE and personnel shortfalls to the division chemical section.
- Provide NBC input to plans, orders, and SOPs.
- Plan for the brigade chemical staff personnel to assume the mission of the division NBCC should division NBCC become nonoperational.

DIVISION CHEMICAL SECTION

The division chemical section is a part of the special staff section. It usually is under the staff supervision of the division chief of staff. See FM 3-101 for the organization of the division chemical section. The section helps the commander and staff by providing information, estimates, and recommendations on NBC matters. The members of this section help the principal staff officers prepare plans, orders, and reports. The division chemical officer recommends, plans, supervises, and coordinates the mission requirements. This officer does this for the division chemical company and nondivisional chemical units (such as smoke or decon companies) assigned, attached, or OPCON to the division.

INTELLIGENCE

- Help the G2 analyze and disseminate divisional NBC threat information.
- In coordination with the staff weather officer (SWO), ensure NBC effective downwind message is passed to subordinate commands.
- Receive, prepare, correlate, and pass information on enemy NBC attacks.
- Recommend use and collection tasks to the G2 for assigned/attached NBC reconnaissance elements.
- Help G2 evaluate captured NBC-related foreign material. Recommend urgency of evacuation for further exploitation.
- Ensure countermeasures developed in threat analysis are incorporated into division plans and procedures.
- Provide technical assistance for interrogating enemy prisoners of war about NBC matters.

PERSONNEL

- In coordination with the G1, G3, and AG, ensure proper assignment of all divisional chemical personnel.
- Help professional development of subordinate command chemical personnel.
- Ensure full use of subordinate unit chemical personnel. Promote integration of nonchemical personnel into chemical activities.
- Actively participate in chemical personnel and unit force structure planning and programing.

TRAINING

- Conduct MOS and NBC defense course training for command personnel. Monitor general NBC training throughout the command.
- Promote total involvement of the chain of command in NBC training.
- Supervise and inspect subordinate command individual and unit NBC proficiency testing.
- Ensure that NBC training—to include medical aspects in a contaminated environment—is routinely integrated into all training events.
- Ensure divisional and subordinate command NBC school programs of instruction are approved and meet minimum standards and requirements.
- Obtain training support available from host nation resources.
- Plan and integrate NBC training to maximize the use of critical NBC collective tasks found in ARTEPs and ARTEP mission training plans as well as soldier's manual common tasks.
- Determine training needs through staff visits and evaluations. Recommend training required to correct deficiencies.

EVALUATION

- Use the results of SQTs, ARTEP unit tests, ARTEP formal evaluations, and informal FTXs to improve NBC readiness.
- Evaluate NBC readiness through the maintenance of NBCDE, use of allocated funds, utilization of personnel, and quality of training provided.
- Provide the divisional IG with an NBC inspector, as required, for formal unit evaluations of all NBC areas during AGIs.
- Actively participate in preparation, coordination, and conduct of formal ARTEP evaluations and ARTEP unit tests.

READINESS

- Receive, collate, and disseminate NBC readiness status as required by higher headquarters.
- Monitor NBC personnel, equipment, and training shortfalls and recommend policies and programs to improve readiness.
- Help the G4 cross-level NBCDE to obtain the best overall NBC readiness posture possible.
- Periodically inspect rotation of shelf-life items, load plans for NBC war reserve stocks, and deployment plans/SOPs related to NBC defense.
- Ensure NBC readiness is clearly shown in unit status reports. Correct faults possible.

LOGISTICS

- Request funds early in the fiscal year to requisition shortages, expendables, and items consumed in training. Monitor equipment status and make requests based upon needs of the command.
- Help the S4/G4 account for spending provided for NBC defense equipment (NBCDE).
- Recommend plans and programs for forward deployed, pre-positioned stocks of NBCDE and decontaminants.
- Help develop and effect policies and plans related to NBC matters.
- Provide, through the divisional chemical company, an adequate decon plan for all assigned or attached units.

- Ensure recommended NBCDE funds are used early in the fiscal year to requisition shortages, expendables, and items consumed in training. These should be based upon authorizations contained in appropriate publications.
- Help plan to rotate forward pre-positioned stocks of NBCDE and decontaminants.
- Help provide NBCDE for mission-essential civilians.

ADMINISTRATION

- Write and update the NBC annex to the brigade SOP.
- Maintain and update NBC-related publications.
- Maintain close contact with subordinate units and higher headquarters. Keep them abreast of NBC activities.

FIELD OPERATIONS

- Receive, prepare, correlate, and disseminate information on enemy NBC attacks.
- Consolidate battalion radiation status. Report to division as required.
- Provide recommendations concerning MOPP levels appropriate for enemy threat and tactical situation.
- Establish and operate the brigade NBC subcollection center. Coordinate activities and reports with appropriate host nation territorial organizations.
- Recommend employment of supporting NBC recon, smoke, and decon units.
- Report NBCDE and personnel shortfalls to the division chemical section.
- Provide NBC input to plans, orders, and SOPs.
- Plan for the brigade chemical staff personnel to assume the mission of the division NBCC should division NBCC become nonoperational.

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INTELLIGENCE

- Help the G2 analyze and disseminate divisional NBC threat information.
- In coordination with the staff weather officer (SWO), ensure NBC effective downwind message is passed to subordinate commands.
- Receive, prepare, correlate, and pass information on enemy NBC attacks.
- Recommend use and collection tasks to the G2 for assigned/attached NBC reconnaissance elements.
- Help G2 evaluate captured NBC-related foreign material. Recommend urgency of evacuation for further exploitation.
- Ensure countermeasures developed in threat analysis are incorporated into division plans and procedures.
- Provide technical assistance for interrogating enemy prisoners of war about NBC matters.

PERSONNEL

- In coordination with the G1, G3, and AG, ensure proper assignment of all divisional chemical personnel.
- Help professional development of subordinate command chemical personnel.
- Ensure full use of subordinate unit chemical personnel. Promote integration of nonchemical personnel into chemical activities.
- Actively participate in chemical personnel and unit force structure planning and programing.

TRAINING

- Conduct MOS and NBC defense course training for command personnel. Monitor general NBC training throughout the command.
- Promote total involvement of the chain of command in NBC training.
- Supervise and inspect subordinate command individual and unit NBC proficiency testing.
- Ensure that NBC training—to include medical aspects in a contaminated environment—is routinely integrated into all training events.
- Ensure divisional and subordinate command NBC school programs of instruction are approved and meet minimum standards and requirements.
- Obtain training support available from host nation resources.
- Plan and integrate NBC training to maximize the use of critical NBC collective tasks found in ARTEPs and ARTEP mission training plans as well as soldier's manual common tasks.
- Determine training needs through staff visits and evaluations. Recommend training required to correct deficiencies.

EVALUATION

- Use the results of SQTs, ARTEP unit tests, ARTEP formal evaluations, and informal FTXs to improve NBC readiness.
- Evaluate NBC readiness through the maintenance of NBCDE, use of allocated funds, utilization of personnel, and quality of training provided.
- Provide the divisional IG with an NBC inspector, as required, for formal unit evaluations of all NBC areas during AGIs.
- Actively participate in preparation, coordination, and conduct of formal ARTEP evaluations and ARTEP unit tests.

READINESS

- Receive, collate, and disseminate NBC reading status reports as required by higher headquarters.
- Monitor unit personnel, equipment, and training shortfalls and recommend policies and programs to improve readiness.
- Help the G4 cross-level NBCDE to obtain the best overall NBC readiness posture possible.
- Periodically inspect rotation of shelf-life items, load plans for NBC war reserve stocks, and deployment plans/SOPs related to NBC defense.
- Ensure NBC readiness is clearly shown in unit status reports. Correct faults if possible.

LOGISTICS

- Request funds early in the fiscal year to requisition shortages, expendables, and items consumed in training. Monitor equipment status and make requests based upon needs of the command.
- Help the G4/G1 account for spending provided for NBC defense equipment (NBCDE).
- Recommend plans and programs for forward deployed, pre-positioned stocks of NBCDE and decontaminants.
- Help develop and effect policies and plans related to NBC matters.
- Provide, through the divisional chemical company, an adequate decon plan for all assigned or attached units.

- Recommend improved procedures for replacement of chemical items of equipment.

ADMINISTRATION

- Ensure NBC-related publications are maintained and updated for section and IG use.
- Update NBC portions of divisional SOPs.
- Provide guidance on changes in doctrine, equipment authorizations, and new items of equipment to be fielded.

FIELD OPERATIONS

- Receive, prepare, correlate, and pass information on enemy NBC attacks, as the focal point of the division's NBC warning and reporting system (NBCWRS).
- Monitor radiation status of subordinate units as required.
- Establish and operate the division NBC center (NBCC). Coordinate activities and reports.
- Recommend, plan, supervise, and coordinate mission requirements for the divisional chemical company and other NBC units assigned, attached, or OPCON.
- In coordination with operations personnel, and logistics sections, and subordinate commands, allocate NBC equipment and personnel to those subordinate commands.
- Provide NBC estimates and input to combat plans and orders.
- Based upon tactical situations, recommend employment and release of nuclear and chemical munitions to the commander.

APPENDIX F

STANDARDS OF PROFICIENCY (STANAG 2150)

Standards of proficiency for individual soldiers, NBC teams, NBC specialists, NBC additional duty personnel, TOE units, and civilians are specified by standard NATO agreement (STANAG 2150 [annexes A through F]). Current Army regulations, field manuals, soldier training publications, and field circulars implement the intent of STANAG 2150 by establishing NBC teams, providing doctrine, and outlining tasks, conditions, and standards of proficiency by skill level, MOS, and specialty code, as shown in the following list.

INDIVIDUAL:

- Soldier's manuals of common tasks (SMCT), skill levels 1 through 4 (FMs 21-2 and 21-3).
- Military Qualification Standards I Manual (MQSM 145-1-00D).
- Military Qualification Standards II Manual of Common Tasks and Skills.

NBC SPECIALIST:

- Military Qualification Standards II SC 74 Manual.
- Soldier's manuals for MOS 54C, skill levels 1 through 4 (STPs 3-54C1-SM and 3-54C24-SM).
- Soldier's manuals for MOS 54E, skill levels 1 through 4 (STP 3-54E1-SM, and FMs 3-54E1/2, 3-54E3, and 3-54E4).
- Staff Organization and Operations (FM 101-5).

NBC TEAMS AND NBC ADDITIONAL-DUTY PERSONNEL:

- Organization and Training for Nuclear, Biological, and Chemical Defense (AR 220-58).
- SMCTs (FMs 21-2 and 21-3).
- NBC common module found in each unit's Army Training and Evaluation Program (ARTEP).

TOE/TDA UNITS:

- NBC common module found in each unit's ARTEP.
- Published NBC drills.
- Smoke operations common module found in each unit's ARTEP.

CIVILIANS:

All civilians employed in wartime posts by Department of the Army (DA) must be trained in surviving an NBC attack and in continuing to accomplish their functions in a contaminated environment. Standards of proficiency include both survival and basic operating tasks.

Changes in force structure, doctrine, and technology continually alter the standards of proficiency for particular units and individuals. The best way to keep up with these changes or understand the specific details of a standard is to consult the references given in previous paragraphs. However, the general thrust of the STANAG and all of these detailed references is summarized in the following paragraphs. This is only a summary, and it should not be used as a training guide or standard for evaluation.

TASKS FOR ALL SOLDIERS

The individual must be trained in the concepts of nuclear, biological, and chemical defense to survive an NBC attack. Individual soldiers must be able to help their units survive and operate well enough to accomplish the mission.

RECOGNIZE HAZARDS AND TAKE COVER

- Recognize nuclear, chemical, and biological attacks or hazards.
- Understand the effects of nuclear, biological, and chemical weapons.
- Recognize NBC alarms and signals.
- Recognize standard marking signs for nuclear, biological, and chemical contaminated areas.
- Take cover from the heat, blast, and radiation effects of nuclear explosions.

USE MOPP GEAR

- Properly don, seal, clear, and check the protective mask within 9 seconds and adjust the hood within 6 seconds (for a total of 15 seconds) following an alarm or recognition of a chemical or biological attack.
- Properly put on and remove protective overgarments so that contamination cannot be transferred to skin or clothing.
- Know how to pass body wastes when wearing protective clothing.
- Perform assigned mission tasks while wearing protective clothing for extended periods.
- Maintain MOPP gear.

KNOW AVOIDANCE MEASURES, FIRST AID, AND DECONTAMINATION

- Prepare for NBC attacks to reduce their effects and maintain operational efficiency during and after NBC attacks. Follow unit standard operating procedures.
- Know how to use detector paper and unit dosimeter devices.
- Cross or bypass marked contaminated areas safely.
- Maintain personal hygiene and sanitation as a protective measure against the spread of disease.
- Perform self aid and first aid for injuries caused by chemical agents or nuclear weapons.
- Know how to conduct decon operations.

STANDARDS FOR ALL OFFICERS AND NCOs AND OTHER SELECTED PERSONNEL

- All officers and NCOs take NBC actions appropriate to their rank and operational role.
- Deploy NBC observers and detection for effective NBC monitoring and chemical reconnaissance.
- Understand the significance of chemical downwind hazards.
- Ensure that unit radiation dose does not exceed set limits.
- Know how to select buildings and construct shelters for maximum protection against radiation.
- Know how unit morale and combat efficiency will be affected by staying at high MOPP levels for long periods.
- Plan operations to take into account NBC threats.

- Assess the effects of an NBC attack on operations involving their unit/subunit.
- Selected personnel require additional training so they may support their unit as part of special purpose NBC teams.

NBC MONITORING, SURVEY, AND RECONNAISSANCE TEAMS

- Recognize nuclear and chemical attacks and understand unit procedures for implementing warnings.
- Detect chemical agents and radiological hazards.
- Operate and maintain NBC special detection, monitoring, and sampling equipment.
- Conduct nuclear, chemical, and biological sampling surveys.
- Monitor the effectiveness of decon measures.
- Collect and forward samples of suspected chemical or biological contamination.
- Mark NBC contaminated areas, equipment, and supplies with standard marking signs.
- Provide data for compilation of NBC reports.

DECONTAMINATION TEAMS

- Assist in the site setup and control movement of people and equipment through unit decon sites.
- Set up and run detailed troop decon.
- Assist chemical company decon platoon as it runs detailed equipment decon.
- Battalion PDDE crew members set up and run vehicle washdown as part of hasty decon.

STANDARDS FOR UNIT NBC DEFENSE OFFICERS AND NCOs

Unit NBC defense officers advise the commander on all matters pertaining to unit NBC defense. With the help of their assistants they collect NBC attack data, analyze it, and report it.

TRAIN AND PREPARE PERSONNEL

- Provide technical assistance to their commanders and staffs on NBC defense training and operations.
- Give NBC defense instruction to achieve basic operating standards of proficiency for the unit and the individuals of the unit.
- Plan and supervise NBC defense training aspects of operational training exercises and maneuvers.
- Supervise preparation of unit NBC defense SOPs.
- Evaluate individual and unit competence in NBC defense and advise the commander on the unit's ability to survive and to continue operations in an NBC environment.

OPERATE AND MAINTAIN NBC EQUIPMENT

Supervise the operation and maintenance of NBC material.

ADVISE COMMANDER OF NBC SITUATION

- Plan NBC reconnaissance and advise commanders on best routes to cross or bypass an NBC-contaminated area.
- Analyze the vulnerability of the unit to nuclear, biological, or chemical attack.
- Calculate total dose and time of stay in radiologically contaminated areas to avoid exceeding command exposure guidance.

- Prepare fallout prediction patterns.
- Maintain records of unit radiation exposure.
- Estimate downwind hazard for chemical attacks.

DECONTAMINATE

Plan and coordinate decon within the unit and advise commander on the best techniques, time, manpower, and locations.

REPORT

Report NBC attack data to next higher headquarters.

GLOSSARY

absorbed dose—the amount of energy imparted by nuclear (or ionizing) radiation to unit mass of absorbing material. The unit is the centigray, formerly called rad.

AC—hydrogen cyanide, a blood agent.

actual ground zero—the point on the surface of the earth at or directly below or above the center of an actual nuclear detonation. Also known as AGZ.

acute radiation dose—total ionizing radiation dose received at one time and over a period so short that biological recovery cannot occur.

aerosol—a suspension of small particles (solids or liquids) in a gaseous medium. Examples are mist, fog, and smoke.

airburst—an explosion of a bomb or projectile above the surface as distinguished from an explosion on contact with the surface or after penetration.

AirLand Battle—an approach to military operations that realizes the full potential of US forces. It does this by extending the depth of the battlefield and integrating conventional, nuclear, chemical, and electronic means to describe the battlefield where the enemy is attacked to the full depth of his formations. AirLand Battle seeks, through early initiative of offensive action by air and land forces, to bring about the conclusion of battle on our terms.

allocation (nuclear)—the specific numbers and types of nuclear weapons allocated to a commander for a stated period as a planning factor for use in developing war plans. Expenditures of these weapons are not authorized until released by national command authority (NCA).

alpha particle—a charged particle emitted from the nucleus of an atom having a mass and a charge equal in magnitude to a helium nucleus. Examples are two protons and two neutrons. Alpha particles have a range of only about 10 centimeters in still air. Alpha radiation is primarily considered an internal hazard. Alpha particles are sometimes referred to simply as alpha.

anticrop agent—a living organism or chemical used to cause disease or damage to selected food or industrial crops.

antimateriel agent—a living organism or chemical used to cause deterioration of, or damage to, selected materiel.

antiplant agent—a microorganism or chemical that can kill, disease, or damage plants.

atomic demolition munition—a nuclear device designed to be detonated on or below the ground surface. Or, it may be exploded under water as a demolition munition against material-type targets to block, deny, and/or canalize the enemy.

background radiation—nuclear (or ionizing) radiation arising from within the body and from the surroundings in which individuals are always exposed.

bacteria—single-celled microscopic organisms, various species of which are concerned with the production of disease.

basic load (ammunition)—that quantity of nonnuclear ammunition, authorized and required by each service to be on hand within a unit or formation at all times. It is expressed in rounds, units, or units of weight as appropriate.

basic skills decontamination—the immediate neutralization or removal of contamination from exposed portions of the skin. Each individual must be able to perform this decon without supervision.

BDO—battledress overgarment.

beta particle—a form of radiation referred to in skin burns called "beta burns" and sometimes called "beta." These particles have a range of approximately 10 to 15 meters in still air. Beta particles are emitted from the nucleus of an atom with a mass and charge equal in magnitude to that of an electron. The primary hazard from this radiation is through prolonged contact with the skin, resulting in beta burns.

bio—shortened form of biological.

biological agent—a microorganism that causes disease in man, plants, or animals or deterioration of materiel.

biological defense—the methods, plans, and procedures involved in establishing and executing defensive measures against attack using biological agents.

biological operation—employment of biological agents to produce casualties in humans or animals and damage to plants or material, or defense against such employment.

biological warfare—the intentional use of germs, toxins, or novel compounds to cause death and disease among personnel, animals, or plants or to deteriorate materiel.

biological weapon—an item of materiel that projects, disperses, or disseminates a biological agent including arthropod vectors.

blanket (smoke)—A smoke blanket is a dense, horizontal development of smoke. It is a heavy concentration used primarily over friendly areas to screen them from enemy ground and aerial observation. A smoke blanket may restrict movement and activity within the screen, thus hampering operations of friendly troops. Smoke blankets are produced by smoke generators.

blast—1. The brief and rapid movement of air vapor or fluid away from a center of outward pressure, as in an explosion or in the combustion of rocket fuel. 2. The pressure accompanying this movement. This term is commonly used to mean explosion, but the two terms may be distinguished.

blast effect—destruction of, or damage to, structures and personnel by the force of an explosion on or above the surface of the ground. Blast effect may be contrasted with the cratering and ground-shock effects of a projectile or charge which goes off beneath the surface.

blast wave—a sharply defined wave of increased pressure rapidly propagated through a surrounding medium from a center of detonation or similar disturbance.

blister agent—a chemical agent that injures the eyes and lungs, and burns or blisters the skin.

blood agent—a chemical compound, such as one of the cyanide group, that affects bodily functions by preventing the normal transfer of oxygen from the blood to body tissues. Also called cyanogen agent.

CAC—contamination avoidance cover.

CARC—chemical agent resistant coating.

CB—chemical and biological.

CG—phosgene, a choking agent.

cGy—centigray. A unit of absorbed dose of radiation equal to a rad. Effective on 1 January 1986, the term cGy replaces rad.

chem—shortened form of chemical.

chemical agent—a chemical substance intended for use in military operations to kill, seriously injure, or incapacitate humans through its physiological effects. Excludes riot control agents, herbicides, smoke, and flame.

chemical agent cumulative action—the building up, within the human body, of small, ineffective doses of certain chemical agents so that the eventual effect is similar to one large dose.

chemical ammunition—a type of ammunition the filler of which is primarily a chemical agent.

chemical defense—the methods, plans, and procedures involved in defensive measures against chemical agents.

chemical operations—1. Use of chemical agents to kill, injure, or incapacitate humans or animals. Also, used to deny or hinder the use of areas, facilities, or material. 2. Defense against such use.

chemical protective cover for helmet—a brittle-coated protective cover for the personnel armor system ground troop helmet.

chemical strike warning—a warning of impending friendly or suspected enemy chemical attack. The acronym is CHEMWARN.

chemical survey—a directed effort to determine the nature and degree of chemical hazard in an area and to set boundaries of the hazard area.

chemical warfare—all aspects of military operations involving the use of lethal and incapacitating munitions/agents and the warning and protective measures associated with such offensive operations. Since riot control agents and herbicides are not considered to be chemical warfare agents, those two items will be referred to separately or under the broader term "chemical," which will be used to include all types of chemical munitions/agents collectively. Also called CW.

chemical warfare agent—See chemical agent.

chronic radiation dose—a dose of ionizing radiation received either continuously or intermittently over a period of time. A chronic radiation dose may be high enough to cause radiation sickness and death, but if received at a low dose rate, a significant portion of the acute cellular damage will be repaired.

CK—cyanogen chloride, a choking agent.

collective nuclear, biological, and chemical protection—protection provided to a group of individuals in a nuclear, biological, and chemical environment that permits relaxation of individual nuclear, biological, and chemical protection.

collective protection—a shelter, with filtered air, that provides a contamination-free working environment for selected personnel and allows relief from continuous wear of MOPP gear.

contaminate—to introduce an impurity; for instance, a foreign microorganism placed in a culture or environment containing microorganisms not intended to be contaminated.

contamination—1. The deposit and/or absorption of radioactive material or biological or chemical agents on and by structures, areas, personnel, or objects. 2. Food and/or water made unfit for consumption by humans or animals because of the presence of environmental chemicals, radioactive elements, bacteria, or organisms. 3. The by-product of the growth of bacteria or organisms in decomposing material (including food substances) or waste in food or water.

contamination avoidance—individual and/or unit measures taken to avoid or minimize NBC attacks and reduce the effects of NBC hazards. Passive contamination avoidance measures are concealment, dispersion, deception, and the use of cover to reduce the probability of the enemy using NBC weapons on our

units and minimize damage caused by NBC weapons if they are used. Active contamination avoidance measures are contamination control; detection, identification, and marking of contaminated areas; issuance of contamination warnings; and relocation or rerouting to an uncontaminated area.

contamination control—procedures to avoid, reduce, remove, or render harmless nuclear, biological, and chemical contamination for the purpose of maintaining or enhancing the efficient conduct of military operations.

contamination control point—that portion of the contamination control line used by personnel to control entry to, and exit from, the contaminated area.

continuous monitoring—surveillance for radiation in the unit area or along the unit route of march. It is initiated when a nuclear detonation is observed, heard, or reported; dose rate of 1 centigray (rad) per hour is read; or unit is on the move.

CP—command post.

CSA—corps support area.

curtain (smoke)—A smoke curtain is a dense vertical (not horizontal) development of smoke. It is placed between friendly and enemy positions. A smoke curtain prevents or restricts enemy ground observation of friendly positions and activities. It does not prevent or deny enemy aerial observation of friendly positions and activities.

CX—choking agent.

de Bruin, Bernd—Dutch newspaper reporter first to report Russian use of helicopters to deliver canisters expelling a dirty yellow cloud over the villagers of Jalalabad, Afghanistan, in June 1980. For 10 days he had skin lesions, diarrhea, and stomach cramps.

decay rate—1. The time rate of disintegration of radioactive material, which generally emits particles and/or gamma radiation. 2. The predictable rate at which microorganisms die.

deception—a technique used to deliberately deceive the enemy. Deceiving smoke is used to mislead the enemy. Smoke is but one part of a good deception plan. Deceptions can include feints, demonstrations, use of dummy equipment, falsification of materials, manipulation of electronic signature, or distortion of activity so that it is not what it seems to be.

decon—shortened form of decontamination.

decontaminant—anything used to break down, neutralize, or remove a chemical, biological, or radioactive material posing a threat to equipment or personnel.

decontamination—1. The process of making any person, object, or area safe by absorbing, destroying, neutralizing, making harmless, or removing chemical or biological agents. 2. Removing radioactive material clinging to or around a decontaminated person, object, or area.

decontamination station—a building or location suitably equipped and organized to cleanse personnel and materiel of chemical, biological, or radiological contaminants.

defoliant operations—the use of defoliating agents on vegetated areas in support of military operations.

defoliating agent—a chemical that causes trees, shrubs, and other plants to shed their leaves prematurely.

degree of risk—as specified by the commander, the risk to which friendly forces may be subjected from the effects of the detonation of a nuclear weapon used in the attack of a close-in enemy target. Acceptable degrees of risk under differing tactical conditions are emergency, moderate, and negligible.

deliberate decontamination—operations/techniques intended to decontaminate clothing and equipment so operators/crew members can perform their mission with individual and respiratory protection removed.

designated observer—unit—or representative(s)—with special equipment such as theodolites or radar instruments. These enable more precise measurements of the nuclear cloud than would normally be available from other units.

detect(ion)—Discover, identify, and mark contaminated areas. Detection is the act of finding out by use of chemical detectors or radiological monitoring/survey teams the location of NBC hazards placed by the enemy.

detector paper—used to determine the presence of liquid chemical agent under all weather conditions. It is gray-green in color and has an adhesive back. It is dispensed from a roll. It is worn by an individual or attached to a vehicle or a piece of equipment. When liquid chemical agent touches the paper, a pink, red, or purple spot appears.

detailed equipment decontamination—the process of removing or neutralizing contamination on interior and exterior surfaces of unit equipment to negligible risk levels. This permits MOPP-level reduction for extended periods.

detailed troop decontamination—the process of reducing MOPP levels for extended periods by: a. decontaminating individual fighting equipment to negligible risk levels; b. removing contaminated MOPP gear including protective masks; c. decontaminating protective mask; d. monitoring personnel equipment for decon effectiveness.

detector paper—the M9 chemical agent detector paper is dispensed from a roll 2 inches wide and 30 feet long. It will detect liquid chemical agent under all types of weather conditions. Because of the adhesive back, it can be worn by individuals, attached to vehicles, or placed on a piece of equipment. The M8 chemical agent detector paper is used to detect the presence of liquid VGH chemical agents. The M8 paper is issued in a book of 25 sheets. The ABC-M8 paper cannot detect chemical agents in water or aerosol agents in the air. When the M8 paper contacts liquid nerve or blister agents, it produces a specific color change to indicate presence of a chemical agent. Color codes are on the book cover.

deterrence—measures taken by the US and its allies to prevent hostile action by any other state outside the alliance.

dewarn—notification by signals that permit users to remove mask and gloves without risk of exposure to primary chemical hazard.

disease—a deviation from the normal state or function of a cell, an organ, or an individual.

disinfect—to free from pathogenic organisms or destroy them.

disinfectant—an agent, usually chemical, that destroys infective agents.

DKIE—decon kit individual equipment.

dose rate contour line—a line on a map, diagram, or overlay joining all points at which the radiation dose rate at a given time is the same.

dosimetry—the measurement of radiation doses. It applies to both the devices used (dosimeters) and to the techniques.

downwind hazard prediction—a chemical downwind hazard message prepared by corps and division NBCCs. The CDM is not confined to the area directly attacked, but—because chemical vapor or aerosol travels with the wind—it can produce casualties among unprotected troops downwind of the initial point of attack. This gives units in the area time to avoid the hazard or (if mission requires) minimize the effect of the chemical attack

on their unit while remaining in the contamination.

DS2—decontaminating solution No. 2. Available in 1-1/3-quart-sized cans and in 5-gallon-sized pails used for filling portable decontaminating apparatuses.

electromagnetic pulse (EMP)—the electromagnetic radiation from a nuclear explosion caused by Compton-recoil electrons and photoelectrons from photons scattered in the materials of the nuclear device or the surrounding medium. The resulting electric and magnetic fields may couple with electrical/electronic systems to produce damaging current and voltage surges. May also be caused by nonnuclear means. Also called EMP.

electromagnetic radiation—radiation made up of oscillating electric and magnetic fields and propagated with the speed of light. Includes gamma radiation; X rays; ultraviolet, visible, and infrared radiation; and radar and radio waves.

electromagnetic radiation hazards—hazards caused by a transmitter/antenna installation that: a. generates electromagnetic radiation in the vicinity of ordnance, personnel, or fueling operations in excess of established safe levels; b. increases the existing levels to a hazardous level; or c. a personnel, fueling, or ordnance installation located in an area illuminated by electromagnetic radiation at a level that is hazardous to the planned operations or occupancy. These hazards will exist when an electromagnetic field of sufficient intensity is generated to: a. induce or otherwise couple currents and/or voltages of magnitudes large enough to initiate electro-explosive devices or other sensitive explosive components of weapon systems, ordnance, or explosive devices; b. cause harmful or injurious effects to humans and wild life; or create sparks having sufficient magnitude to ignite flammable mixtures of materials that must be handled in the affected area.

emergency risk—a degree of risk involving anticipated effects which could cause some temporary shock, casualties, and/or significantly reduce the unit's combat efficiency.

exposure dose—the exposure dose at a given point is a measurement of radiation in relation to its ability to produce ionization. The unit of measurement of the exposure dose is the roentgen. (Roentgens are also called X rays.)

fallout—the descent to earth of radioactive particulate matter from a nuclear cloud; also applied to the particulate matter itself.

fallout contours—lines joining points which have the same radiation intensity that define a fallout pattern, represented in terms of roentgens per hour.

fallout pattern—the distribution of fallout as portrayed by fallout contours.

fallout prediction—an estimate, made before and immediately after a nuclear detonation, of the location and intensity of militarily significant quantities of radioactive fallout.

fireball—the luminous sphere of hot gases that forms a few millionths of a second after detonation of a nuclear weapon and immediately starts expanding and cooling.

fixed shelter—collective protection, usually in a rear area in a permanent location, such as a building basement, a bunker, or in an expandable rigid wall, tactical shelter. Uses are for field hospitals, operating rooms, maintenance shops, data processing centers, field kitchens, fire control centers, and supply storage areas.

flame—thickened fuel (by adding oil or gel to gasoline) used to kill, dislodge, or demoralize personnel, neutralize fortifications, and destroy flammable material.

flame field expedient—a hand-made weapon used by soldiers to extend their combat power. Sometimes they are constructed in haste for use in defense to repel an attacking force. They can be used to explode and produce casualties, simply to light up an area, or signal between ground troops and friendly tactical aircraft. Examples are flame mines, flame fougasses, and illuminators.

flamethrower—a weapon that projects incendiary fuel and has provision for ignition of this fuel.

Fuller, General J.F.C.,—the founder of tank warfare and a military historian for England in World War I.

fungi—unicellular or multicellular members of the plant kingdom, comprising the mushrooms, mildews, rusts, smuts, and so forth, characterized chiefly by the absence of chlorophyll.

gamma radiation—Gamma radiation is primarily an internal hazard although it originates from an external source. Gamma rays are the primary radiation hazard for soldiers on the battlefield. Gamma rays are short wavelength electromagnetic radiation of nuclear origin emitted from the nucleus of the atom.

germ—a disease-producing microorganism, microbe, or pathogenic bacterium. Includes bacteria, rickettsiae, viruses, and fungi.

GPFU—gas particulate filter unit.

ground zero—the point on the surface of the earth at, or vertically below or above, the center of a planned or actual nuclear detonation.

half-life—the time required for the activity of a given radioactive species to decrease to half its initial value due to radioactive decay. The half-life is a characteristic property of each radioactive species and is independent of its amount or condition. The effective half-life of a given isotope is the time in which the quantity in the body will decrease to half as a result of both radioactive decay and biological elimination.

half thickness—thickness of absorbing material necessary to reduce by half the intensity of radiation that passes through it.

hasty decon—actions of teams or squads using equipment found within battalion-sized units to reduce the spread of contamination on people or equipment and allow temporary relief from MOPP4.

haze (smoke)—A smoke haze is a light concentration of smoke placed over friendly areas to restrict accurate enemy observation and fire. Hazy smoke is not dense enough to disrupt friendly operations. However, it can hinder aerial and ground observation of friendly units by the enemy.

height of burst—the vertical distance from the earth's surface (or target) to the point of burst.

herbicides—chemical compounds that can kill or damage plants or inhibit their growth. The term herbicides includes defoliants, desiccants plant growth regulators, and soil sterilants.

Hiroshima—a city of southwestern Honshu, Japan. Destroyed in 1945 by first atomic bomb used in warfare.

host—any animal or plant that harbors or nourishes another organism.

hot spot—an area of unusually high radioactivity within an area which contains low radioactivity.

identification—Positive identification of presence of chemical agents requires use of the M256 detector kit. It detects blood, blister, and nerve agents. Biological agents require a laboratory facility for identification. Nuclear radiation is measured by the unit's radiac instruments.

immunize—to render resistant to any particular disease.

incapacitate—disable.

incapacitating agent—a chemical that produces temporary disabling conditions that (unlike those caused by riot control agents) can be physical or mental and persist for hours or days after exposure to the agent has ceased.

incubation period—the time between infection or exposure and the onset of symptoms.

individual nuclear, biological, and chemical protection—protection provided to the individual soldier in a nuclear, biological, and chemical environment by protective clothing and/or personal equipment.

induced radiation—radiation produced as a result of exposure to radioactive materials, particularly the capture of neutrons.

infection—the invasion of body tissues by microorganisms, with their subsequent growth and reproduction; usually spoken of in relation to the disease or injury that is caused.

initial nuclear radiation—the radiation, essentially neutrons and gamma rays, resulting from a nuclear burst. It is emitted from the fireball within 1 minute after burst.

initiative—Initiative means not always waiting to be told what to do. It is freedom to maneuver. Any act must relate to the mission. Higher and adjacent commands—as well as adjacent and other units—should be informed.

ionization—the process of producing ions by the removal—or addition—of electrons to atoms or molecules.

Italo-Abyssinian (Ethiopian) War—In 1935, Italian Fascist forces campaigned with vengeance and success against Abyssinians. Today Abyssinia is called Ethiopia. The Fascists used mustard gas because the Abyssinians could not defend against it, and they had no means of retaliation-in-kind.

kiloton weapon—a nuclear weapon, the yield of which is measured in terms of thousands of tons of trinitrotoluene (TNT) explosive equivalents, producing yields from 1 to 999 kilotons.

KT—This shortened word form is sometimes used for kiloton. When addressing the explosive power of nuclear weapons, the terms kiloton (KT) and/or megaton are used.

lethal—deadly; fatal.

marking—when contamination is found, mark it to keep others out of it. Mark entry to, and exits from, contaminated areas to protect friendly units. Standard NBC markers are used to keep troops from wandering accidentally into contaminated areas.

Mask Only—The use of masks without other protective gear provides personnel who must work in a contaminated environment some relief from MOPP gear. Personnel must be inside protective shelters such as some kinds of vans, tanks, or buildings where danger of transfer hazards are minimal. Wearing only the mask, soldiers can tolerate exposure to vapor hazards but not transfer hazards. This permits longer work periods. But personnel must assume full MOPP level before leaving the sheltered area.

maximum permissible dose—that amount of radiation a military commander or other appropriate authority may prescribe as the limiting cumulative radiation dose to be received over a specific period of time by members of his command. It must be consistent with current operational military considerations.

median incapacitating dose—the amount or quantity of chemical agent that—when introduced into the body—will incapacitate 50 percent of exposed, unprotected personnel.

median lethal dose—1. Nuclear—the amount of radiation over the whole body that would be fatal to 50 percent of the exposed personnel in a given period of time. 2. Chemical—the dose of chemical agent that would kill 50 percent of exposed, unprotected, and untreated personnel. It is expressed in milligram minutes per cubic meter.

megaton weapon—a nuclear weapon, the yield of which is measured in terms of millions of tons of trinitrotoluene (TNT) explosive equivalents.

microorganism—a microscopic plant or animal so small it is invisible to the unaided eye.

miosis—excessive contraction of the pupils of the eyes caused by exposure to minute quantities of chemical agents. The pupil is unable to dilate and remains contracted. Thus, performance of tasks, navigating on foot, identifying or engaging targets, or driving vehicles is practically impossible. Miosis also is often accompanied by pain, headache, and pinpointing of the pupils.

mission—The mission states specific tasks and implies others that may become necessary by battlefield changes. It also states the purpose of the operation to carry out the operation plans for each unit of the command.

moderate damage—See nuclear damage (land warfare).

moderate risk—a degree of risk which anticipates effects that are tolerable, or only a minor nuisance at worst.

molecule—a chemical combination of two or more atoms into a specific chemical substance.

monitoring and survey—Each unit conducts monitoring, survey, and reconnaissance. The monitoring and survey report is the fourth standardized report in the NBC warning and reporting system. This report consists of six standardized reports. This enables the US, NATO, and Australian British Canadian American Quadripartite Standardization Agreement (QSTAG) all[illegible] the same message formats for th[illegible] When any unit detects NI[illegible]ity, the information is reported [illegible] NBC 4 report (for nuc, chem, [illegible] format. The NBC 4 provides information on where the use of NBC materiel [illegible]ired, giving its exact location.

MOPP—the acronym for mission-oriented protective posture. A flexible system that provides maximum NBC protection for the individual with the [illegible]st risk possible and still maintains for mission accomplishment.

MOPP gear—combination of all individual protective equipment including suit, boots, gloves, mask with hood, first aid treatments, and decon [illegible].

MOPP-gear exchange—MOPP gear is exchanged to remove g[illegible]s contamination from soldiers. Mask and hood are wiped down, and individual gear is brushed with decontaminant.

mucus—the viscid (sticky) secretion of the mucous glands.

NAAK—nerve agent antidote kit.

NATO—North Atlantic Treaty Organization.

NBC—the shortened word form for nuclear, biological, and chemical.

NBCC—nuclear, biological, and chemical center. The division NBCC plans for and directs the collection effort for NBC hazards information.

NBC reports—see NBCWRS.

NBCWRS—nuclear, biological, and chemical warning and reporting system. Units use the NBCWRS as battlefield intelligence to send and receive NBC 1-6 reports.

negligible risk—a degree of risk in which personnel are reasonably safe from a nuclear burst, with the exception of dazzle or temporary loss of night vision.

nerve agent—a lethal agent that causes paralysis by interfering with the transmission of nerve impulses.

neutron-induced radiation—radioactivity induced in the ground or an object as a result of direct irradiation by neutrons.

nonpersistent agent—a chemical agent that—when released—dissipates and/or loses its ability to cause casualties after 10 to 15 minutes.

nuclear airburst—the explosion of a nuclear weapon in the air at a height greater than the maximum radius of the fireball.

nuclear, biological, chemical collection center—an agency responsible for the receipt, collation, and evaluation of reports of nuclear detonations, biological and chemical attacks, and resultant contamination within the zone of observation, and for the production and dissemination of appropriate warnings.

nuclear, biological, chemical operations—a collective term used to refer to: a. individual or unit operations in a nuclear, biological, or chemical environment; b. defense actions in a nuclear, biological, or chemical environment using avoidance, protection, decontamination or smoke; or c. retaliatory actions using nuclear or chemical weapons. The US will never use biological weapons.

nuclear cloud—an all-inclusive term for the volume of hot gases, smoke, dust, and other particulate matter from the nuclear bomb itself and from its environment. It is carried aloft in conjunction with the risk of the fireball produced by the detonation of the nuclear weapon.

nuclear collateral damage—undesired damage or casualties produced by the effects from friendly nuclear weapons.

nuclear damage (land warfare)—1. Light damage—damage that does not prevent the immediate use of equipment or installations for which it was intended. Some repair by the user may be required to make full use of the equipment or installations. 2. Moderate damage—damage that prevents the use of equipment or installations until extensive repairs are made. 3. Severe damage—damage that permanently prevents use of equipment or installations.

nuclear defense—the methods, plans, and procedures involved in establishing and exercising defensive measures against the effects of an attack by nuclear weapons or radiological warfare agents. It encompasses both the training for—and the implementation of—these methods, plans, and procedures.

nuclear detonation, detection, and reporting system—a system deployed to provide surveillance of critical friendly target areas and indicate place, height of burst, yield, and ground zero of nuclear detonations.

nuclear incident—an unexpected event involving a nuclear weapon, facility, or component which results in any of the following (but not constituting a nuclear weapon(s) accident): a. An increase in the possibility of explosion or radioactive contamination. b. Errors committed in assembling, testing, loading, or transporting equipment. Also, the malfunctioning of equipment and materiel that could lead to an unintentional operation of all or part of the weapon arming and/or firing sequence, or that could lead to a substantial change in yield or increased dud probability. c. Any act of God, unfavorable environment, or condition resulting in damage to the weapon, facility, or component.

nuclear radiation—particulate and electromagnetic radiation emitted from atomic nuclei in various processes. The important nuclear radiations from the weapons standpoint are alpha and beta particles, gamma rays, and neutrons. All nuclear radiations are ionizing radiations, but the reverse is not true. X rays, for example, are included among ionizing radiations. However, they are not nuclear radiations since they do not originate from atomic nuclei.

nuclear strike warning—a warning of impending friendly or suspected enemy nuclear attack. The acronym is NUCWARN.

nuclear surface burst—an explosion of a nuclear weapon at the surface of land or water or above the surface at a height less than the maximum radius of the fireball.

nuclear underground burst—the explosion of a nuclear weapon in which the center of the detonation lies at a point beneath the surface of the ground.

nuclear vulnerability assessment—an estimate of the probable effect on population, forces, and resources from a hypothetical nuclear attack. It is made predominantly in the preattack period. However, it may be extended to the transattack or postattack periods.

nuclear warfare—warfare involving the employment of nuclear weapons.

nuclear warning message—a warning message that must be disseminated to all affected friendly forces any time a nuclear weapon is to be detonated if effects of the weapon will have impact upon those forces.

nuclear weapon—a device the explosion of which results from the energy released by reactions involving atomic nuclei. It may be either fission or fusion or both.

nuclear weapon(s) accident—any unplanned occurrence involving loss or destruction of, or serious damage to, nuclear weapons or their components that results in an actual or potential hazard to life or property.

nuclear yields—the energy released in the detonation of a nuclear weapon. It is measured in terms of the kilotons or megatons of trinitrotoluene (TNT) required to produce the same energy release. Yields are categorized as:

Very low ....Less than 1 kiloton.
Low .....1 to 10 kilotons.
Medium .....over 10 kilotons to 50 kilotons.
High.....over 50 kilotons to 500 kilotons.
Very high ...over 500 kilotons.

observers—The observing unit uses the NBC 1 report to give initial and follow-up data about an NBC attack. An NBC 1 report is sent by a platoon or company to battalion headquarters. It is sent only by designated observers to division NBC centers (NBCCs). The NBC 1 report is a part of the standardized NBC warning and reporting system (NBCWRS).

operator's spraydown—Operators or crews use their onboard decon apparatuses on chemical or biological contamination to remove contamination from all equipment surfaces that must be used or touched to do the mission.

organism—any living being, animal or plant.

overt—open; manifest.

pathogen—a disease-producing microorganism.

periodic monitoring—the frequent check of the unit area for presence of beta or gamma radiation. It is done if intelligence indicates threat use of nuclear weapons; nuclear warfare has been initiated; that the dose rate falls below 1 centigray per hour; or when ordered by the unit commander.

personal wipedown—Personal wipedown is performed on the mask, hood, gloves, and essential gear by the soldier. For chemical and biological contamination,

they use the skin decon kit to decontaminate. Do not attempt to remove chemical contamination from your battledress overgarment. Its special protective properties minimize the effects of chemical hazards. Brush radiological or biological contamination from your overgarment.

persistency—the ability of NBC weapons to continue in their lethality long after they have been released. This includes both over the target where released and downwind for indefinite distances.

presidential release—Only the President of the United States can choose for our forces to use nuclear weapons. Only the President may order American chemical weapon retaliation. The United States will never use biological agents.

QSTAG—acronym for quadripartite standardization agreement.

quadripartite standardization agreement—an agreement between four nations: America, Britain, Canada, and Australia. Equipment and procedures agreed upon often have the prefix ABCA. The purpose is to standardize the equipping and operations of the four member nations to ensure interchangeability of equipment and operations regardless of composition of units or who is in command.

quarantine—isolation of infected individuals and of possible carriers and contacts for a period of time to prevent disease transmission.

radiac—an acronym derived from the words "radioactivity, detection, indication, and computation." Radiac is used as an all-inclusive term to designate various types of radiological measuring instruments or equipment. Radiac is usually used as an adjective.

radiac dosimeter—an instrument used to measure the ionizing radiation absorbed by that instrument.

radiacmeters—portable, battery-operated radiation detectors and indicators used to detect and measure beta and gamma radiations.

radiation dose—the total amount of ionizing radiation absorbed by material or tissues, commonly expressed in centigrays (rads). The term "radiation dose" is often used in the sense of the exposure dose expressed in roentgens, which is a measure of the total amount of ionization that the quantity of radiation could produce in air. This could be distinguished from the absorbed dose, also given in centigrays (rads), which represents the energy absorbed from the radiation per gram of specified body tissue. Further, the biological dose, in rems, is a measure of the biological effectiveness of the radiation exposure.

radiation dose rate—the radiation dose (dosage) absorbed per unit of time. A radiation dose rate can be set at some particular unit of time (for example, H+1 hour) and would be called H+1 radiation dose rate.

radiation sickness—an illness resulting from excessive exposure to ionizing radiation. The earliest symptoms are nausea, vomiting, and diarrhea, which may be followed by loss of hair, hemorrhage, inflammation of the mouth and throat, and general loss of energy.

radiation situation map—a map showing the actual and/or predicted radiation situation in the area of interest.

radioactivity—the spontaneous emission of radiation, generally alpha or beta particles. It is often accompanied by gamma rays from the nuclei of an unstable isotope.

radius of damage—the distance from ground zero at which there is a 0.50 probability of achieving the desired damage.

rainout—radioactive material in the atmosphere brought down by precipitation.

residual contamination—contamination that remains after steps have been taken to remove it. These steps may consist of nothing more than allowing the contamination to decay normally.

residual radiation—nuclear radiation caused by fallout, radioactive material dispersed artificially, or irradiation that results from a nuclear explosion and persists longer than 1 minute after burst.

riot control agents—often referred to as RCA. Riot control agents are chemical compounds that produce only temporary irritating or incapacitating effects when used in field concentrations.

screen (smoke)—Screening smoke is used in friendly operational areas or between friendly and enemy forces. It degrades enemy ground and aerial observation and defeats or degrades enemy electro-optical systems. Screening smoke also conceals ground maneuver, breaching and recovery operations, key assembly areas, and supply routes. The three types of smoke screen are blanket, haze, and curtain.

shock wave—the continuously propagated pressure pulse formed by the blast from an explosion in air, under water, or under ground.

skin decon—basic soldier-survival skill. Remove contamination from exposed skin.

spore—an asexual, usually single-celled reproductive body of nonflowering plants such as fungi, mosses, or ferns. A microorganism, as a bacterium, in a resting or dormant state.

stable air condition (sometimes called inversion)—an increase of air temperature with increase in height (the ground being colder than the surrounding air). This condition usually occurs on clear or partially clear nights and early mornings until about 1 hour after sunrise but sometimes persists longer. When the stable air condition exists, there are no convection currents and—with wind speeds below 5 knots—little mechanical turbulence. Therefore, these conditions are the most favorable for ground-release smoke. The upper extreme of this condition is termed the stable or inversion cap.

STANAG—the acronym for North Atlantic Treaty Organization (NATO) standardization agreement. NATO consists of 15 member nations allied together for military interoperability in both equipment and methods of operations. As each STANAG is adopted, it becomes part of each nation's unilateral procedures, and is incorporated into national doctrinal and procedural publications.

strike warning—The strike warning is actually an advance friendly nuclear or chemical attack to ensure that friendly forces are able to protect themselves from the effects of the attack. This strike warning is in the form of a nuclear strike warning (NUCWARN) or chemical warning (CHEMWARN) message that must be sent to subordinate units likely to be affected by the attack. It also is sent to adjacent land, air, and naval headquarters affected by the attack and next-higher command when units not under the command of the executing commander may be affected by the attack.

target analysis—an examination of potential targets to determine military importance, priority of attack, and weapons required to obtain a desired level of damage or casualties.

thermal effects—1. The energy emitted from the fireball as thermal radiation. 2. The heat and light produced by a nuclear explosion.

three lethal rings—If you could look at a cross section of a nuclear explosion, you

would see three rings. The three rings of initial nuclear effects are lethal. They are thermal radiation, nuclear radiation, and blast.

toxins—a class of poison. A toxin may be obtained naturally, that is, from secretions of various organisms, or synthesized.

TREE—the acronym for transient radiation effects on electronics.

vector—a carrier; especially the animal or intermediate host that carries a pathogen from one host to another, as the malaria-carrying mosquito.

vehicle washdown—removal of gross contamination from vehicles using the battalion-level, lightweight decon system.

warn—attack signals to warn personnel to take protective action to prevent chemical casualties.

weathering—Weathering gradually accomplishes decontamination by evaporating or decomposing the chemical agent. It takes time for decontamination by weathering, although it is the easiest form of decontamination. Unfavorable weather such as low temperature, humidity or rain, and cloudy weather can slow the weathering process. High temperature, high wind, and bright sunlight can speed up the evaporation or decomposition of chemical agents.

yield—See nuclear yields.

REFERENCES

REQUIRED PUBLICATIONS

Required publications are sources that users must read in order to understand or to comply with FM 3-100.

FIELD MANUALS (FMs)

21-2	Soldier's Manual of Common Tasks (Skill Level 1)
21-3	Soldier's Manual of Common Tasks (Skill Levels 2, 3, and 4)
100-1	The Army
100-5	Operations (How to Fight)
101-5-1	Operational Terms and Graphics (How to Fight)
101-10-1	Staff Officers' Field Manual: Organizational, Technical, and Logistic Data (Unclassified Data)
101-31-1	Staff Officers' Field Manual: Nuclear Weapons Employment Doctrine and Procedures
101-31-2	Staff Officers' Field Manual: Nuclear Weapons Employment Effects

RELATED PUBLICATIONS

Related publications are sources of additional information. Users do not have to read them to understand FM 3-100.

ARMY REGULATION (AR)

220-58	Organization and Training for Nuclear, Biological, and Chemical Defense

FIELD MANUALS (FMs)

3-3	NBC Contamination Avoidance
3-4	NBC Protection
3-5	NBC Decontamination (Decon)
3-10-1	Chemical Weapons Employment
3-50	Deliberate Smoke Operations
3-101	Chemical Units
5-25	Explosives and Demolitions
6-20	Fire Support in Combined Arms Operations (How to Fight)
20-33	Combat Flame Operations
31-71	Northern Operations

90-3	Desert Operations (How to Fight)
90-5	Jungle Operations (How to Fight)
90-6	Mountain Operations (How to Fight)
90-10	Military Operations on Urbanized Terrain (MOUT) (How to Fight)
101-5	Staff Organization and Operations

TECHNICAL MANUAL (TM)

3-366	Flame Fuels

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FM 3-100

By Order of the Secretary of the Army:

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