

# Principles of NBC Defense

**"Only about half the men say they even smelled gas. Some men smelled TNT of the HE shells and being familiar with that and detecting no foreign smell did not put on their masks until they had breathed it for some minutes. The woods are full of various odors, offensive and otherwise, dead animals, crushed foliage, upturned earth and rotten wood, HE, and gas. ... (I have) walked for miles through these woods and passed on thru without wearing the mask, and I realize personally that the men who are in the woods day and night have the same tendency ... otherwise one would be wearing the mask constantly."**

**Letter from Major Hunt, Division Gas Officer, 90th Division, to the Chief of the Chemical Warfare Service explaining the high gas casualties at Saint Mihiel, France after the Division suffered 887 gas casualties in ten days. 23 September 1918**

Nuclear weapons cause casualties through blast, heat, and radiation effects. They restrict terrain by blowing down trees and buildings, starting fires, or cratering. They may cause radiological contamination over a large area. Biological and chemical weapons cause serious injury or death through toxic properties. They may contaminate terrain and equipment. Effectiveness is degraded when troops don cumbersome protective clothing and equipment when operating in a toxic environment.

NBC defense is a balance of three principles—avoidance, protection, and decontamination—defend against the effects of nuclear, biological, or chemical weapons.

## THEATER STRATEGIC, OPERATIONAL, AND TACTICAL LEVELS OF WAR

At theater strategic and operational level NBC defense combines US nuclear and conventional precision-strike capability to provide our deterrent

posture. If the enemy uses NBC weapons, an effective NBC defense program gives our forces an advantage in operational tempo. This advantage causes the enemy to cease NBC warfare or continue the conflict on unfavorable terms.

At the tactical level of war NBC defense enables the force to survive, fight, and win under NBC conditions. Commanders reduce the likelihood of NBC attack through avoidance measures. They disperse their forces and ensure operations and communications security; harden positions to reduce the impact of an NBC attack; detect and mark contamination; and control the spread of contamination. When units cannot avoid contamination or are in danger of an enemy NBC attack, they implement NBC protective measures. Protective measures for biological and chemical hazards, including protective mask and clothing,

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normally degrade force effectiveness and erode combat power. To restore combat power commanders decontaminate as early as possible. Immediate decon supports individual survival. Operational decon allows temporary reduction of protective posture. Thorough decon allows the unit to significantly reduce protective posture. Thorough decon can be used as a part of unit reconstitution to reduce contamination hazards to negligible levels.

## **A V O I D A N C E**

Avoiding NBC attacks and hazards is the key to NBC defense. If forces avoid detection, they are less likely to be targeted for attack. Therefore they will not need to apply protection and decon. Although avoidance will not always be possible, all forces seek ways to reduce the chances of being contaminated. Avoiding contamination involves bypassing contaminated areas as well as avoiding detection by the enemy. The use of PSYOP can assist in avoidance of NBC attacks by targeting enemy decision-makers and public opinion with the objective of preventing NBC attacks. FMs 3-3 and 3-3-1 provides detailed guidance on conducting contamination avoidance procedures.

NBC contamination avoidance is absolutely critical, especially for light forces. To answer NBC defense questions, leaders conduct risk assessments to determine what protective measures will be directed. See FM 3-4 for detailed information on conducting risk assessments.

During risk assessment, consult area studies and the most recent intelligence summaries to determine enemy NBC capabilities. Assessments provide estimates and reports of any previous use, Enemy NBC doctrine (if any), where agents would likely be used (for example, ambush sites, airfields, troop concentrations), and the types of NBC weapons enemy forces could use. How environment (for example, desert, cold weather) impacts units and NBC weapons is also reviewed. See FMs 3-6 and 3-9 for detailed information on the characteristics and field behavior of NBC agents in different environments.

Decision points are identified for implementation of the NBC defense plan. Decision points can include elements relating to when and where to don MOPP, MOPP level, when and where automatic masking applies, or who does NBC recon of key templated areas. Decision points can be tied to events such as named areas of interest (NAI), timelines, or key events.

Based on the unit situation (static position or moving cross-country) and the chances of encountering contamination, assessments are made as to the impact of contamination. Degradation of unit effectiveness for various friendly courses of action is determined, and critical tasks are identified (for example, use of alarms, contamination marking, reporting, recon). Protective equipment needs are also determined based on risk assessment.

Determinations are made as to what equipment and supplies are needed; when resupply is needed; and where supplies are packed (for example, rucksack close for emergency use or in a resupply bundle).

### **Passive Avoidance Measures**

Passive avoidance measures are those that a unit takes regardless of the status of NBC warfare. Good military tactics dictate many practices that will reduce the impact of enemy NBC or conventional attacks. Good training, improved positions, and dispersed forces are particularly effective in reducing the chances of an NBC attack and reducing casualties if an attack does occur.

### **Training**

Confusion, stress, and ever-present battlefield danger place a heavy burden on soldiers' endurance, courage, and will to win. Unit commanders improve readiness and combat performance by providing soldiers with realistic integrated training. They ensure that soldiers know how to protect themselves from NBC hazards.

### **Camouflage and Concealment**

Friendly units use measures to counter sophisticated enemy intelligence equipment used for infrared scanning, TV viewing, night vision, radio interception, and direction-finding. Good OPSEC, communications security, and electronic security protect the unit. Friendly forces use all forms of natural concealment as well as camouflage and smoke. Avoiding detection becomes a state of mind. Friendly forces actively practice camouflage, noise, light, litter, and communications discipline to avoid detection and targeting.

### **Hardened Positions**

Units continually harden and improve fighting positions to increase cover and protection. Recon locates ready-made, hardened shelters, culverts,

tunnels, overpasses, caves, or built-up areas. Obscurants screen the hardening of shelters and engineer preparation of battle positions. When using obscurants to screen preparation of battle positions ensure that you do not actually tip off the enemy about your defense. Use a deception plan with multiple obscured areas to help conceal the friendly effort.

**Dispersion**

Friendly forces frequently require considerable space for dispersing and maneuvering. Dispersion protects the force and makes its intentions unclear to the enemy. Friendly forces continually analyze the effects of enemy nuclear and chemical weapons. They attempt to avoid positions that can be isolated by the obstacles created by these weapons. FM 101-31-2 contains guidance to determine how much a unit should disperse to limit the impact of a nuclear attack. Dispersion decreases the probability of a single nuclear or chemical attack destroying the entire force. Dispersion is also a countermeasure to enemy obscurants. However, dispersion may increase the risk that the force may be defeated by conventional weapon systems and maneuver forces. Many combat service support units, especially in the communications zone (COMMZ), do not have the capability to disperse. Activities such as combat equipment centers (CECs), Army depots, and area support groups (ASGs) prepare for fixed site NBC defense (see FM 3-4-1).

**Active Avoidance Measures**

Active avoidance measures are those taken specifically to avoid, control, or mitigate NBC hazards.

**Contamination**

**Detection**

Commanders need information about contamination hazards and locations of clean areas. They gain this information through the NBC warning and reporting system and their own NBC recon effort. As they collect data, they forward it to higher headquarters to help form the overall NBC picture. If higher headquarters requires additional information, they direct detailed surveys.

There is range of detecting and identifying devices and kits to assist the commander in detecting and identifying chemical hazards on the battlefield. The range of devices and kits begins at the individual soldier with detector paper and runs through corps and division with the M93 NBCRS (Fox). A typical company-sized organization is equipped with the automatic chemical alarms, chemical agent monitors, chemical agent detector kits, and detector paper. Table 3-1 provides an overview of the capabilities of each device or kit. NBC recon units are equipped with sophisticated detection and identification equipment.

*Table 3-1. Chemical detection and identification equipment*

	<b>M8 Paper</b>	<b>M9 Paper</b>	<b>M256 CADK</b>	<b>M8A1 ACAA</b>	<b>CAM</b>	<b>FOX</b>
<b>Detects</b>	G, V, H, L, CX	All liquid agents	G, V, H, L, CX, CK, AC	G, VX	GA, GB, VX, VX, HD, HN-3	All known agents
<b>Agent form</b>	Liquid	Liquid	Vapor	Vapor	vapor	Liquid and vapor
<b>Sources of false readings</b>	Any oil based product	Any oil based product	Extreme conditions	High power lines, vehicle exhaust, smoke	Petroleum products, ammonia, burning grass, other products	

**Reconnaissance.** NBC recon is a multi-echelon process that begins at the national level and ranges down to alert watchfulness of each soldier. Tactically, NBC recon is conducted as a routine part of conventional combat operations. Recon elements check for contamination in addition to looking for enemy activity. Units check relatively small areas and routes of immediate interest to unit commanders. When commanders need additional information unavailable through routine monitoring, they direct surveys of the area of interest.

NBC recon elements organic to corps and divisions are designed to conduct NBC recon missions. These elements provide early warning of contamination; determine the extent of contamination, and find clear routes of advance. They can determine if contamination remains in an area. NBC recon performs five critical tasks on the battlefield — detect, identify, mark, report, and sample. There are four NBC general NBC recon techniques — search, survey, surveillance, and sampling used during zone, area, and route recon missions.

- Search techniques are used to locate contaminated areas during recon operations.
- Survey techniques are used once the contaminated area is located. The purpose of surveys are to define the extent of the contaminated area.
- Surveillance is the systematic observation of a specific area for indications of an NBC attack.
- Sampling is the collection of material and environmental items to support intelligence collection and operational requirements. These requirements include verification that an attack occurred; identification of agents used; delivery systems; their nation of origin; and the level of CB technology involved.

NBC recon missions include —

- **Route recon.** Recon elements collect detailed information about all terrain from which the enemy could influence movement along the route. With accurate and timely contamination plots of a route, commanders can avoid contamination or direct an appropriate MOPP posture.
- **Area recon.** When a gap exists in NBC data, the unit obtains missing information with area recon. The directing headquarters must specify the area boundaries and information required. Such a directed effort might obtain detailed information concerning the terrain or enemy activity within a prescribed area such as a town, a ridge line, or woods.
- **Zone recon.** When little is known about enemy

hazards across a wide area, a unit may direct a zone recon. This action can provide information concerning routes, obstacles (including chemical or radiological contamination), terrain, and enemy forces within a zone prescribed by a boundary. Commanders assign this mission when the enemy situation is in doubt or when they need information concerning cross-country trafficability.

● **Point recon.** This mission is conducted when NBC hazard information knowledge concerning a specific terrain feature (chokepoint, bridge, and so forth) or enemy facility (NBC production or storage, and so forth) is required. A point recon is similar to an area recon, but much more specifically defined.

● **By-pass.** Recon units rapidly locate a route around contamination during combat operations. It is normally conducted in support of a mounted maneuver force during an offensive mission. The contaminated area may be located within indirect and direct fire range of enemy weapon systems. The objective of finding a clean route around the contaminated area is to allow the maneuver force to continue the mission in the lowest MOPP level without disrupting the operational tempo.

**Identification.** Once a unit finds an NBC hazard, the next step is to identify the hazard. Radiation is measured with the unit's radiac instruments. Biological and unknown chemical agent samples must be evacuated through intelligence channels to a laboratory facility for definitive identification. Unit personnel detect and make preliminary identification of chemical agents using kits authorized at squad level. They may also use the detector paper carried by each individual.

## Contamination

### Marking

Contamination is marked to warn friendly personnel. Units or NBC recon teams mark all likely entry points into the area and report contamination to higher headquarters. The only exception is where marking would help the enemy. In this event the hazard is reported to higher headquarters as an unmarked contaminated area.

When a unit enters a previously marked contaminated area, personnel check the extent of contamination and adjust plans as necessary. As the hazard area changes, the unit relocates the signs. When the hazard is gone, the unit removes the signs. The unit reports all changes to higher headquarters.

## Alarms and Signals

This section implements STANAG 2047, Emergency Alarms of Hazard or Attack.

See FMs 3-3 and 3-3-1 for additional information on techniques and procedures. Alarms and signals convey warning of NBC contamination. Units use easily recognizable and reliable alarm methods to respond quickly and correctly to NBC hazards. Standard alarms, the NBC warning and reporting system, and contamination markers help give orderly warning that may also require a change of MOPP level.

**Vocal Alarms.** The vocal alarm for any chemical or biological hazard or attack is the word, "Gas!" Personnel hearing the alarm will mask, repeat the alarm, take cover as necessary, and increase MOPP level if appropriate. Units may send the alarm by radio or telephone.

**Automatic Alarms.** When an automatic chemical agent alarm sounds or flashes, the first person to hear or see it masks and gives a vocal alarm and/or hand-and-arm visual signal as described in FM 3-4 and STP 21-1-SMCT. Unit personnel relay the alarm through the area by voice, signal, telephone, or radio, if required.

**Fallout Warning.** The radiological monitor warns unit personnel when the dose rate reaches one centigray per hour. Unit personnel pass the alarm. Where mission allows, soldiers move to shelters with increased protection until leaders give an all-clear signal or provide directions to move.

**Nonvocal Signals.** Sounds of combat may mask the vocal alarm. This is why units use other signals to supplement the verbal warning. The SOI specifies these other signals. Nonvocal signals include metal-on-metal and specified horn or siren patterns. Units must ensure nonvocal signals are included in tactical SOPs.

**Visual Signals.** Visual signals replace or supplement sonic alarms when sound is lost in battlefield noise or the situation does not permit sound signals. Personnel may use the standard hand-and-arm signal to direct masking. Other visual signals include colored smoke or flares. The SOP or SOI specifies the exact meaning of these signals.

**All-Clear Signal.** Leaders give the all-clear signal after the test for contamination proves negative and unmasking procedures are completed. They pass this signal by word of mouth through the chain of command. Unmasking should be conducted, if possible, by company-size units. Elements operating more than 500 meters from the rest of the unit should conduct separate unmasking procedures. Field behavior of chemical agents may cause different concentrations of agent at several places within a unit area.

## Warning and Reporting System.

The NBCWRS provides a means to rapidly send reports on NBC attacks. The reports inform friendly units of clean areas and possible contamination. For the NBCWRS to be effective, units must send information on first use by the fastest communications means available. First use reports require FLASH precedence. Units send subsequent information by any reliable communications means.

## Contamination

### Control

To maintain freedom of action, friendly forces can bypass contamination or practice mitigation techniques. Mitigation techniques include leaving nonessential forces behind, encapsulating personnel and critical items, and covering equipment. If friendly forces are already in contamination, they can control exposure by relocating to an uncontaminated area and decontaminating as appropriate.

**Bypassing.** Bypassing is the preferred method of limiting or avoiding contamination. Soldiers mask when passing near but do not normally require MOPP. Additionally, they avoid contamination on vehicles and equipment. The unit may don protective clothing for a bypass to ensure freedom of maneuver in an emergency situation.

**Leaving Personnel and Equipment.** When the mission requires entering a contaminated area, the unit should leave non-critical personnel and equipment to prevent exposing the entire unit to contamination. In some cases, the unit will setup a decon site for use on return.

**Encapsulating.** Anything carried outside a vehicle can become contaminated. Units should place vital equipment inside combat vehicles or shelters. Personnel should assume an appropriate level of

MOPP or enter shelters. Shielding reduces exposure to radiological hazards.

**Covering.** Units may cover equipment with tarps, plastic bags, or earth. If possible, personnel leave equipment in its original container (such as an ammunition can).

**Relocating.** The unit commander should take immediate action to determine the type of hazard. For skin contact hazards the unit must take appropriate action to protect personnel and limit contamination spread. The commander will analyze the situation to determine if relocation to an uncontaminated alternate location is necessary and/or possible.

In preparing for unit relocation, NBC recon teams locate contamination along proposed routes. The commander selects a route that provides freedom of maneuver and minimizes contact with contamination. Sound tactical movements are conducted according to METT-T.

## PROTECTION

A unit may become contaminated because of direct NBC attack or because mission causes them to enter a contaminated area. In either case NBC protection is an integral part of operations. Avoidance and protection are closely related. Techniques that work for avoidance also provide protection. However, there are four broad groups of activity that comprise protective measures. They are hardening positions and protecting personnel, assuming MOPP, reacting to attack, and using collective protection. FM 3-4 provides detailed guidance on conducting NBC protective procedures.

### Hardening Positions and Protecting Personnel

Hardening includes anything that makes a unit more resistant to the effects of enemy strikes. This reduced vulnerability makes a unit a less lucrative target. Hardening includes readying positions, readying personnel, and positioning alarms and monitors.

### Readying the Positions

Hardening of positions includes all actions to make them more resistant to the blast effects of conventional or nuclear munitions, to the heat and radiation of nuclear weapons, and to the contamination of biological or chemical weapons.

Foxholes and bunkers with strong waterproof overhead cover provide excellent shelter. Tanks and other armored vehicles in defilade are good NBC shelters. Existing natural and man-made features, such as caves, culverts, tunnels, and empty storage bunkers, offer expedient shelter. Shelters do not always adequately protect against vapor hazards. In fluid battlefield situations each unit establishes a command post in a protected or built-up area. They provide maximum protective shelter for off-duty personnel and critical equipment. Route recon locates handy shelters, such as culverts and overpasses. Commanders schedule stops near these shelters.

### Readying the Personnel

Ordinary garments offer significant protection from flash burns of a nuclear explosion. Under BNV conditions personnel use gloves, scarves, and headgear to protect normally exposed portions of the body. Under the threat of enemy chemical or biological attacks leaders ensure protective equipment is prepared and readily available. They ensure that the unit maintains good field sanitation and personal hygiene. Additionally, leaders ensure soldier readiness to operate in special environments (desert, cold weather, NBC). FMs 3-3-1, 3-4, and 3-5 provide detailed information on operations in these environments.

### Positioning Alarms and Monitors

The NBCWRS warns units of attacks in other areas. Units position organic systems to detect chemical contamination or nuclear fallout. They position alarms upwind of friendly positions. Unit personnel place detector paper in positions that give maximum exposure to chemical agents. Leaders disperse radiological monitoring teams for best coverage of potential radiological contamination.

When moving, the commander determines the protection required for drivers and crew members. Alarms should be mounted on the exterior of the upwind vehicle. Although this method will not give the vehicle occupants advance warning of a hazard (since they are collocated with the alarm), it will provide verification of a hazard to the lead vehicle's masked personnel. These personnel can pass the alarm to other elements who will pass through that area. They will also observe the area closely for liquid contamination.

## Assuming Mission-Oriented Protective Posture

MOPP is the flexible use of protective clothing and equipment that balances protection with performance degradation. Wearing MOPP can cause heat and mental stress and reduce efficiency. The higher the MOPP level, the more protection it provides, but the more it degrades performance. The commander must weigh the needs of individual protection against unit efficiency. MOPP is based on threat, temperature, work rate, and mission.

Commanders must balance the probable number of heat casualties in MOPP against the possible number of chemical casualties among unprotected troops. Heat casualties are likely when soldiers in MOPP gear are performing hard, physical work under stress of combat. Leaders establish an initial MOPP level before the mission and adjust it as the situation changes or new intelligence is received. Leaders must also consider the serviceability and protection offered by overgarments. For example, the battle dress overgarment (BDO) should be exchanged within 24 hours after exposure to liquid chemical agent. See FM 3-4 for further information on individual protective equipment.

Using MOPP requires judgment. Leaders constantly balance the amount of protection needed against the urgency of the mission. As MOPP level increases, mission efficiency decreases. Mission and performance degradation are unavoidable while in MOPP. Physical skills degraded include: fine and gross motor skills, vision, hearing, and stamina.

Wearing protective gloves reduces ability to grasp tools and manipulate controls. Wearing MOPP slows movement. Wearing the mask reduces visual acuity and peripheral vision. Wearing the hood reduces hearing.

Although some mission degradation is unavoidable, acclimation and training help reduce performance degradation. MOPP impacts the better trained individual soldier's performance less than the poorly trained or undertrained. Proper training also reduces psychological stress.

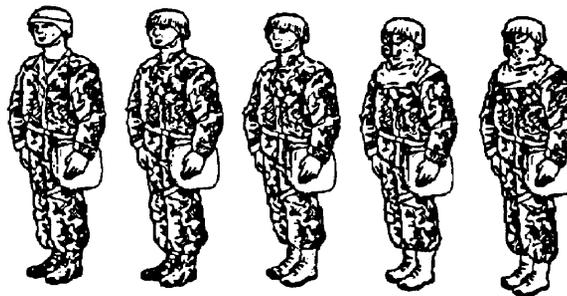
### Flexibility

MOPP is not a rigid procedure that puts everyone at the same level. To maintain the balance between protection and efficiency, leaders apply MOPP with common sense. Theater and corps commanders use strategic and tactical intelligence to determine the probable initial use of nuclear, biological, or

chemical weapons. They consider the operational and logistical burdens NBC warfare 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.

Army operations doctrine emphasizes that subordinate leaders must take the initiative by independent action within the overall plan. Therefore, the primary responsibility of higher-level commanders is to provide subordinate commanders the threat information needed to set the most appropriate MOPP level for their mission.

When commanders provide MOPP guidance, they should not set levels so high as to limit the flexibility of their subordinates. Commanders should take care not to impose high MOPP levels over large areas merely as a precautionary measure.



### MOPP Analysis

Leaders, generally at battalion level, conduct 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. Commanders must recognize the significant increase in time required for mission execution in MOPP3 or MOPP4 and anticipate the effects of that degradation on subsequent missions. Leaders must also understand the increased water requirements. The use of MOPP involves risk; the better commanders are at analyzing their units' needs for protection, the lower their units' risk. FM 3-4 contains a detailed discussion on MOPP analysis and water requirements.

Leaders must carefully analyze the factors of METT-T for their situation whenever MOPP is considered. MOPP analysis, in conjunction with METT-T, enables leaders to select the appropriate MOPP level. During MOPP analysis the commander considers—

- Mission.

- Work rate and its duration.
- Probable warning time.
- Terrain, weather, and time of day.
- Unit training and additional protection available.
- Alarm placement.
- Automatic masking policy.

### **Automatic Masking**

Upon initiation of CW, commanders must decide whether personnel should automatically mask upon indication of chemical use, such as enemy artillery or rocket attacks and smoke operations. Commanders establish and continually assess policy on automatic masking as the situation and mission change. They use MOPP analysis to conduct this assessment.

Before initial chemical or biological weapons use, soldiers automatically mask when there are high-probability indicators of a chemical attack. High-probability indicators include activation of chemical alarms, color change of detector paper, aircraft spray, or chemical agent symptoms. The leaders' decision on whether personnel should automatically mask is critical in NBC defense preparation.

If intelligence sources have identified possible enemy use of biological agents, including toxins, the commander may institute automatic masking. Troops will automatically mask for conditions that may signal biological attack such as smoke, spray, mist, or presence of dead animals or insect vectors. Since some toxins will attack the skin, protective clothing should be worn.

### **Reacting to Attack**

Personnel take immediate action to reduce the impact of an NBC attack. Following an attack they take poststrike actions to restore fighting power and prepare to continue the mission. Specific actions vary according to the type of attack.

### **Nuclear Attack**

An enemy nuclear attack would normally come without warning. The first indication is a flash of intense light and heat. Induced radiation arrives with the light. Blast and hurricane-like winds follow within seconds. Initial actions must, therefore, be automatic and instinctive. Dropping immediately and covering exposed skin provide protection against the blast and thermal effects.

Poststrike actions include damage assessment and restoration of combat power. Leaders maintain

control and take contingency actions quickly. They restore fighting power by replacing cover and readying weapon systems. They also take action to prepare for fallout. As a minimum, unit personnel cover foxholes and shelter openings. Radiac operators begin continuous monitoring. Personnel cover exposed skin with their poncho or don MOPP. They discard this clothing during decon. Covering the mouth with a handkerchief reduces probability and amount of contaminants entering the lungs. This method is generally preferable to masking to avoid trapping contaminants in the mask filter.

### **Biological Attack**

Personnel should treat a suspected biological attack just as a chemical attack. The protective mask provides protection against all known biological and military chemical agents. However, current detector systems will not react to biological agents.

### **Chemical Attack**

Warning of a chemical attack may come from automatic alarm, vocal or visual signal, color change of detector paper, or symptoms observed in oneself or another. The first reaction should always be to mask and then give the alarm. Soldiers take whatever cover is readily available to reduce the contaminants landing on the body. They conduct immediate decon as necessary to remove all contaminants from the skin. Liquid chemical agents can penetrate normal clothing, leather boots, and gloves; soldiers must don MOPP4 for full protection.

After the attack, leaders adjust MOPP levels as appropriate for the type of hazard and mission. If necessary, soldiers will continue to fight in MOPP4. When time allows, leaders will direct decon so personnel can remove masks and reduce MOPP. Continued reassessments are needed of available threat information and mission requirements to ensure that MOPP levels are not set too high.

If overgarments are not available (for example, unexpected attack during a low-intensity conflict situation) at time of attack, soldiers must use field-expedient protection measures. For example, as a temporary expedient units can use their protective mask with hood, protective gloves, the issue wet weather parka, battledress uniform, field boots, load-bearing equipment, and personal weapon. However, the poncho provides protection for only one to three minutes as a cover against a liquid chemical agent.

### Using Collective Protection

Collective protection (COLPRO) complements the individual protection provided by MOPP gear. COLPRO provides a toxic-free working environment for selected personnel. This environment may allow soldiers to function more effectively while continuing to wear overgarments (as with the ventilated facepiece system). Alternatively, it may allow the soldier to temporarily remove overgarments (as with an overpressure system). In either event the collective protection system is effective only as long as entry and exit procedures remain valid.

When collective protection shelters are used to provide relief from wearing MOPP, commanders establish a system for rotation of personnel. They plan for supplies, maintenance, and transportation to support the system. They establish operating procedures for the shelter that assure security, reliability, and utility.

## DECONTAMINATION

The extent and timing of decon depend on the tactical situation, mission, degree and type of contamination, and resources available. FM 3-5 provides detailed guidance on conducting decon operations.

The primary purposes of decon are to stop erosion of combat power and reduce casualties that may result from inadvertent exposure or failure of protection. Combat power drops as soon as personnel don MOPP. The mask restricts the field of vision and reduces observation and target acquisition ability. Communication is more difficult. Mobility is reduced because personnel reduce their physical work rate to avoid heat stress. The longer a unit remains contaminated, the greater the chance of NBC casualties. Concomitant injuries may also increase because combat efficiency is reduced. Timely correct decon avoids problems, such as protective gear failure and heat stress. Thus, decon reduces the number of casualties that may result from an NBC attack.

### Principles of Decontamination

Decon is costly in terms of manpower, time, space, and materiel. These same resources are required to fight the battle, so commanders must apply them wisely and sparingly. The following principles support this action—

- **Speed.** Decontaminate as soon as possible to restore full combat potential as soon as possible.
- **Need.** Decontaminate only what is necessary.

Consider mission, time, extent of contamination, MOPP status, and decon assets available.

- **Limit.** Decontaminate as close to site of contamination as possible to limit its spread. Do not move contaminated equipment, personnel, or remains away from the operational area if it is possible to bring decon assets (organic or supporting units) forward safely. This will keep the equipment on location, speed decon, and limit the spread of contamination to other areas.

- **Priority.** Decontaminate the most important items first and the least important items last.

### Levels of Decontamination

Various methods of decon allow units to lessen the impact of an NBC attack. The following sections explain these methods in terms of levels and techniques.

#### Immediate

##### Decontamination

Immediate decon is exactly what the term implies—the immediate actions taken by a soldier to survive. Individual soldiers conduct immediate decon using supplies and equipment they carry.

STP 21-1-SMCT describes skin decon and personal wipedown in detail. Immediate decon consists of—

- **Skin decon.** Soldiers remove chemical or biological contamination from their skin with the skin decon kit. Radiological contamination is washed away with soap and water.

- **Personal equipment wipedown.** Soldiers brush radiological contaminants away and clean chemical and biological contamination from essential gear with the individual equipment decon kit.

- **Operator spray down.** Operators and crew remove contamination from all surfaces that must be frequently touched to accomplish the mission. They brush radiological contaminants away with rags or branches. They spray chemical and biological contaminants with the on-board decon apparatus.

#### Operational

##### Decontamination

Teams or squads conduct operational decon using decon equipment organic to battalion-size units. If this equipment is not available, units will request vehicle washdown through command channels. This mission will normally be tasked to the supporting chemical unit. These procedures limit the spread of contamination and allow temporary relief from

MOPP4. Operational decon makes thorough decon easier by speeding up the weathering process for chemical and biological contamination. Operational decon is less resource-intensive than thorough decon. FM 3-5 describes in detail the procedures for operational decon. Operational decon includes—

- 1 **MOPP gear exchange.** Teams of two or more personnel exchange contaminated overgarments for clean ones to remove gross contamination.
- 1 **Vehicle washdown.** The crew of the lightweight decon system (LDS) sprays vehicles with hot, soapy water to speed the weathering process. Washdown limits the spread of contamination. Forces must select decon sites that avoid contamination of surface water or drinking sources.

**Thorough Decontamination**

This is the most resource-intensive level of decon. It requires external support by platoon- or company-size elements assigned the mission of NBC decon. These elements require augmentation from supported units to accomplish missions. The decon unit is in charge of the decon site and operation. Forces coordinate decon sites with the host nation through civil-military liaison teams. The commander of the decon operation takes positive action to prevent runoff and contamination of civilian water sources. FM 3-5 describes in detail the procedures for thorough decon. The three techniques used in thorough decon are—

- 1 **Detailed troop decon.** The unit removes MOPP, monitors for contamination, and decontaminates masks with assistance from a decon unit.
- 1 **Detailed equipment decon.** A decon unit conducts equipment decon with the assistance of the contaminated unit.
- 1 **Detailed aircraft decon.** A decon unit conducts aircraft decon with the assistance of the contaminated unit.

**Effects of**

**Decontamination**

Decon has positive and negative effects on unit effectiveness. The overriding positive effect and ultimate goal of decon are the

restoration of the combat power lost when assuming MOPP. A negative, offsetting effect is a consumption of resources (time and supplies). Commanders must decide where the optimum trade-off occurs between restored power and resource depletion (See Figure 4-1).

**Combat Power Restoration**

Immediate decon allows soldiers to survive and continue to fight on the battlefield. Operational decon allows the force to fight longer by reducing contamination. Soldiers may temporarily unmask under controlled conditions to eat, drink, and rest. When time permits, thorough decon restores almost all combat power of the contaminated force. However, the decon operations reduce combat power during the decon period.

**Resource Depletion**

All decon uses valuable resources including time. Staff estimates must include time and resupply requirements. Chemical personnel work closely with combat operators and logisticians to determine

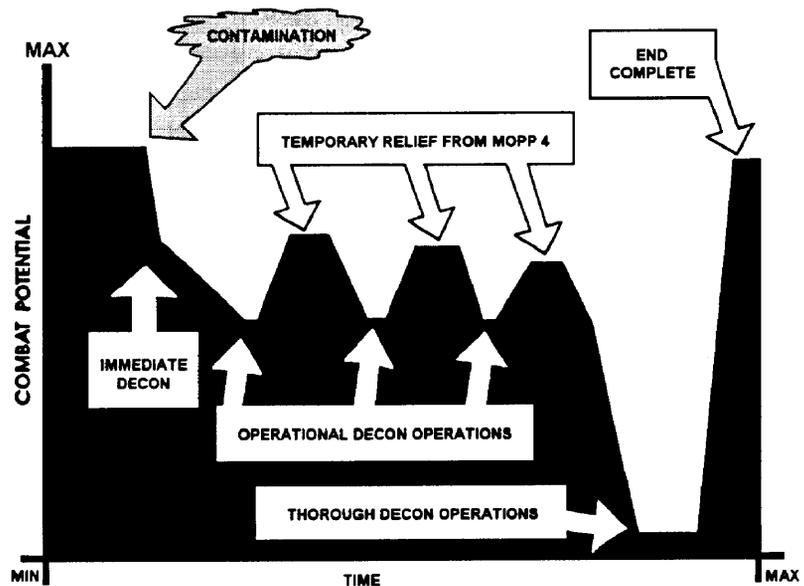


Figure 4-1. The effects of decontamination on combat power potential.

**resources needed and availability. In some cases** resources will not be readily available for decon. In this event the **commander may choose weathering to reduce contamination. There may be substantial time before personnel can reduce MOPP levels if weathering is allowed.**

### **Guidelines for Decontamination**

Every decon mission is unique. Commanders use on-the-spot judgment to combine the fundamental principles of NBC defense. Leaders must—

- Understand contamination hazards and avoid contamination when possible.
- Protect forces and equipment when contaminated.
- Know how to neutralize or remove the hazards of contamination.
- Conduct only as much decon as is needed to continue the mission until more thorough decon may be accomplished.
- Leave as much combat power forward as possible during decon. When necessary, units may conduct small-group decon.

### **Casualty Decon**

Patient decon is absolutely essential. Personnel injured from chemical munitions will be triaged separately and decontaminated before medical care is rendered. Additionally, patient decon is done as far forward as possible to limit the spread of contamination. See FM 8-10-7 for additional information concerning patient decon.

Casualty decon **presents special problems for units** and health service support personnel. Under NBC conditions, contaminated wounded soldiers create increased hazards to rescuers and health service support personnel.

On the NBC battlefield, two classifications of casualties will be encountered: contaminated and uncontaminated. Those who are contaminated may

be suffer the effects of an NBC agent, a conventional wound, or both. Some may be battle fatigue or heat casualties, induced by the stress of NBC conditions and extended time spent in MOPP4. It is important to follow proper decon procedures to limit the spread of contamination.

Casualty decon begins at platoon and company levels with individual soldiers. The individual soldier or members of their teams perform immediate decon. The casualty is tagged with a field medical card (DD Form 1380), noting the time and type of contamination. When the casualties' conditions and battle permit, they may go through a MOPP equipment exchange. When battle conditions prevent decon procedures forward, casualties may require evacuation to the battalion aid station (BAS) before decon. Patients who arrive at the BAS contaminated must be deconned before admission into the clean treatment area. Patient decon is performed by a patient decon team from the supported unit. The team operates under the supervision of medical **personnel to ensure no further patient injury during the decon process.**

The division clearing station (DCS), located in the brigade support area, may receive contaminated patients from the BAS or directly from areas in the BSA. The DCS also has a patient decon area. As with the BAS, the DCS is supported by a patient decon team from the supported unit.

### **Terrain Decon**

Terrain decon maybe necessary, despite the tremendous logistical burden, at fixed sites, such as rail heads, depots, and so forth. Terrain decon may be very limited, such as to paths, specific buildings, piers, and docks. Terrain decon will occur only where operationally absolutely required. If terrain **decon is required, expedient methods such as** covering with earth or scraping may be used.