

* APPENDIX E

OPERATIONS IN NUCLEAR, BIOLOGICAL, AND CHEMICAL CONDITIONS

Chemical and biological agents and nuclear weapons may be employed separately or together and normally supplement conventional weapons. Planning must routinely address the use of each of these as well as protective measures against enemy NBC weapons.

CONTENTS	
PARAGRAPH	PAGE
Section I. NBC BATTLEFIELD	E-2
E-1 Function	E-2
E-2 Command	E-2
E-3 Staff	E-2
E-4 Effects of Nuclear Weapons	E-3
E-5 Protection	E-3
E-6 Radiological Monitoring	E-4
E-7 Radiological Survey	E-4
E-8 Operation Exposure Guide	E-5
E-9 Warning and Reporting System	E-5
Section II. CHEMICAL AND BIOLOGICAL DEFENSE	E-5
E-10 Characteristics	E-6
E-11 Defense Against Chemical Attack	E-6
E-12 Avoidance of Contamination	E-7
E-13 Defense Against Biological Attack	E-7
Section III. MISSION-ORIENTED PROTECTIVE POSTURE ..	E-8
E-14 Application	E-8
E-15 Mask Only	E-8
Section IV. DECONTAMINATION	E-9
E-16 Levels of Decontamination	E-9
E-17 Basic Skills Decontamination	E-10
E-18 Hasty Decontamination	E-10
E-19 Control Measures	E-10
Section V. RECONNAISSANCE	E-10
E-20 Employment	E-11
E-21 Organization	E-11
E-22 NBC Reconnaissance Systems	E-12

Section I. NBC BATTLEFIELD

The integration of NBC weapons as well as electronic warfare (EW) into tactical operations is described as the NBC-contaminated battlefield.

E-1. FUNCTION

The task force fights on the NBC-contaminated battlefield in essentially the same manner as on the conventional battlefield. However, combat service support and communications are disrupted more than on the conventional battlefield, and the task force and its units may be isolated or its movement restricted by nuclear, biological, or chemical contamination. Contamination avoidance is of paramount importance, but even contaminated units may have to fight. The larger force of which the task force is a part concentrates forces only when necessary to avoid creating a lucrative target. For the same reason, greater dispersion is required among task forces and their subordinate units. Tactics used on the conventional battlefield are especially suitable to the NBC-contaminated battlefield—full use of cover and concealment, overwatch, and suppression. However, in such an environment, the task force must be prepared to quickly implement unit protective measures to ensure its survivability. The task force may also be tasked to provide timely information to higher headquarters to assist employment of nuclear and chemical weapons in support of unit operations, or to exploit the effects of the use of these weapons. Operating effectively on the NBC-contaminated battlefield places additional responsibilities on all personnel within the battalion task force.

E-2. COMMAND

The task force commander prepares his units and personnel to operate in an NBC environment. To do this, he ensures that the task force takes the proper protective measures, including:

- Adequate dispersion and use of terrain shielding.
- Continuous NBC monitoring.
- Assuming the appropriate MOPP level.

E-3. STAFF

- a. For NBC operations, the task force chemical officer provides the technical advice to the task force commander and the remainder of the task force staff.
- b. Complete Decontamination (Deliberate). Complete decontamination is (deliberate) cleaning that reduces all or most of the contamination hazard to a level that permits removal of the protective mask and gloves. Residual

contamination may still remain after decontamination but not in sufficient amounts to warrant placing soldiers in full MOPP. To attain this goal, decontamination efforts must reduce residual contamination to negligible risk levels. Negligible risk levels are those that cause mild incapacitation among no more than 5 percent of unprotected soldiers who operate for 12 continuous hours within 1 meter of decontaminated surfaces.

E-4. EFFECTS OF NUCLEAR WEAPONS

- a. Nuclear weapons increase destructiveness on the battlefield compared to conventional weapons. Blast, nuclear, and thermal radiation effects are of primary concern.
- b. The electromagnetic pulse created in a nuclear burst can damage solid-state components and other electronic equipment, seriously interfering with command and control, communications, and target acquisition systems.
- c. Units should monitor radiation dosage levels to ensure soldiers are not exposed to dosage levels higher than the emergency risk factor. This is a radiation dose of more than 50 centigray (cGy). At this level, the commander can expect about 5 percent casualties. Because the body is weakened by radiation, soldiers should be allowed to rest.

E-5. PROTECTION

- a. The nuclear weapon, although a tremendously destructive device, is not one for which there is no defense. The more that soldiers know about the effects of nuclear weapons, the more effective they will be on the nuclear battlefield and the greater will be their chances for survival. Battlefield survival depends upon discipline, camouflage, cover, concealment, dispersion, and immediate reaction. A tank or deep fighting position with overhead cover provides the best protection from all nuclear weapons effects. Armor and mechanized infantry crews may have to operate on the nuclear battlefield with hatches closed.
- b. Operations on a nuclear battlefield require that soldiers take protective measures without receiving detailed directions. These measures include spreading the alert, taking advantage of natural shielding such as valleys and reverse slopes, positioning thickest vehicle armor toward the blast, locking turrets and brakes, removing antennas and vision blocks, removing flammable materials (including camouflage), securing equipment and ammunition, and disconnecting radio frequency (RF) cables. Unit SOPs must include actions to be taken during and after both friendly and enemy employment of nuclear weapons.

E-6. RADIOLOGICAL MONITORING

- a. Radiological monitoring is the detection of radiation and the measurement of dose rate with radiac instruments. Radiological monitoring of the unit area alerts the commander to a hazard that otherwise would go undetected and unmeasured.
- b. A single radiation measurement usually has a limited operational significance (except to the unit in the immediate area), since it gives information at the point of the reading only. However, a number of individual measurements considered together can give a picture of the radiation pattern over an area. A number of readings made at the same points over a period are required in uneven terrain.
- c. Monitoring is included in the normal reconnaissance and intelligence activities of all units. Radiological monitoring at all levels is a command responsibility. It is initiated upon order of the unit commander or higher headquarters, or pursuant to SOPs. Units that detect radiation in an area report it according to their SOP and mark the area with a radiological contamination marker. Radiation dosages and times and location of readings are reported to higher headquarters.
- d. Monitoring techniques, correlation factor data, and recording forms are described in FM 3-3. Monitoring may be periodic or continuous:
 - (1) Periodic monitoring is conducted during nuclear warfare. All units routinely (at least once an hour) monitor a designated point in their respective areas. The NBC defense annex of the unit SOP must give detailed guidance on monitoring procedures.
 - (2) Continuous monitoring is initiated by all units when a fallout warning is received; when a unit is on an administrative or tactical move; when a nuclear burst occurs; when radiation above 1 cGy per hour is detected by periodic monitoring and on order of the commander. Continuous monitoring stops upon instructions from the commander or higher headquarters, or when the dose rate falls below 1 cGy per hour (except for units on the move),

E-7. RADIOLOGICAL SURVEY

The radiological survey is a directed effort to determine the degree and extent of radiological contamination in a specific area. FM 3-3 provides detailed guidance for radiological surveys. Surveys are performed by one or more radiological survey parties and a control party. A ground survey party includes a monitor who operates a dose-rate meter and records all survey data, and an assistant who may be a driver, radio operator, or both. Additional personnel may be included in the party for security or other reasons. An aerial survey party consists of a monitor, whose duties are similar to those of the ground monitor, and a pilot or aircrew. The control party directs the survey, collects the data reported, and

assembles the data into a usable form. The control party organization varies, depending on the level of command that it serves. The control party and the survey parties are usually organized and equipped from unit resources as follows:

- a. **Companies.** Companies train one primary and one alternate operator for each dose-rate survey meter in the unit.
- b. **Task Forces.** Battalion commanders equip and organize a control party capable of planning and directing decentralized survey operations.

E-8. OPERATION EXPOSURE GUIDE

Operations in a nuclear environment are complicated by the necessity to control exposure of personnel to nuclear radiation. AN OEG is a method of determining the maximum radiation dose to which units may be exposed and still accomplish a mission. Determination of this dose is based on the accumulated dose or radiation history of the unit. The OEG requires that radiation exposure records be maintained on all units within the task force. The most realistic data can be obtained from readings at the platoon level.

E-9. WARNING AND REPORTING SYSTEM

The primary means of warning units of an actual or predicted NBC hazard is the NBC warning and reporting system. It is a key in minimizing the effects of NBC attacks.

- a. The system consists of six reports:
 - NBC 1 — Observer's initial report giving basic data.
 - NBC 2 — Evaluated data report.
 - NBC 3 — Warning of predicted contamination report.
 - NBC 4 — Monitoring and survey report.
 - NBC 5 — Actual contaminated areas report.
 - NBC 6 — Detailed information on chemical or biological attack.
- b. 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.

Section II. CHEMICAL AND BIOLOGICAL DEFENSE

It is the policy of the United States not to use toxic chemical weapons first. However, they may be used in retaliation if an enemy employs them against

United States forces. The United States policy is not to use biological weapons under any circumstances. Countries that once made up the former Soviet forces have both chemical and biological weapons, and may use them. The battalion task force should expect to fight in an active chemical and biological environment. These weapons may be used separately, simultaneously with conventional weapons, or in combination with conventional and nuclear weapons.

E-10. CHARACTERISTICS

- a. Chemical agents are used to degrade battlefield performance, restrict the use of terrain, incapacitate, and kill. Agents such as an air-contaminating agent (aerosol) or ground-contaminating agent (liquid) may be placed on a target. A mixture of agents can be used to increase confusion and casualties. (See FM 3-6 and FM 3-9.)
- b. Biological agents are disease-producing microorganisms (germs) or their poisonous by-products (toxins), which can cause injuries, death, disease, and deterioration of material. The intentional use of microorganisms creates a disease hazard where none exists naturally. These biological agents may be dispersed as aerosols by generators, explosives, bomblets, missiles, and aircraft. Harmful microorganisms may also be spread by the release of vectors such as flies, mosquitos, fleas, and ticks.

E-11. DEFENSE AGAINST CHEMICAL ATTACK

- a. Protective measures taken by units when operating under the threat of chemical attack or in a chemical environment are governed by the nature of the threat, the mission, the situation, and the weather. The primary consideration in chemical warfare is to avoid contamination. Under threat of chemical attack, soldiers should employ all measures to protect themselves from contamination. However, once troops are contaminated, the task force commander must employ techniques that ensure their survival and the sustainment of the battle.
- b. Maneuver of troops and supplies should be planned so that contaminated terrain is avoided, consistent with security and the mission. Contaminated terrain is crossed only when necessary and then as quickly as possible, preferably in vehicles at speeds and intervals that minimize contamination of following vehicles. Decontaminating materials and sufficient time for decontamination must be made available after the area has been crossed. Heavy work by personnel dressed in chemical protective clothing and equipment is planned for the coolest part of the day, if the situation and mission permit. When positions are occupied, the area should be so organized that alternative uncontaminated positions can be occupied quickly if required. Individual soldiers must be thoroughly trained in the use of individual protective measures.

E-12. AVOIDANCE OF CONTAMINATION

Fundamental to the avoidance of contamination is the detection and identification of chemical hazards.

a. **Detection and Identification.**

- (1) Detection measures include use of chemical-agent alarms and chemical detection kits. Reconnaissance missions include NBC detection capability to—
 - Provide early warning of contamination.
 - Determine the extent of contamination.
 - Find clear routes through or around contamination.
- (2) Once a hazard has been detected, the next step is to identify it.
- (3) When contamination is found, it must be marked.

b. **Actions Before Chemical Attack.** The commander designates a level of MOPP for the unit. He bases his decision on an analysis of the situation in which he balances his mission requirements against the chemical protection requirements and other factors. MOPP is discussed in detail in FM 3-4.

E-13. DEFENSE AGAINST BIOLOGICAL ATTACK

Defense against a biological attack is keyed on recognition of a biological threat, preventive measures that can be taken by friendly units, and prompt evacuation or isolation of casualties.

a. **Recognition.** Although biological attacks are difficult to detect, alert personnel can recognize indications that a biological agent may have been employed through—

- Evidence of delivery mechanisms (for example, aircraft spray, liquids, bombs).
- Outbreak of a disease not common to the area.
- Increased reports of sickness.
- Dead or sick animals in the area.

b. **Preventive Measures.** Preventive measures to reduce casualties from biological attack include—

- Maintaining high standards of personal hygiene.
- Avoiding practices that may produce extreme fatigue.
- Ensuring adherence to high standards of field sanitation.
- Providing immunization from known or suspected enemy biological agents.
- Providing instruction in proper care of cuts and wounds.
- Using only approved sources of food and water.

- Ensuring that rodents and other pests are controlled.
 - Quarantining contaminated areas.
- c. **Casualties.** Personnel who become ill because of a biological attack are processed the same as for illness resulting from normally transmitted diseases. Those patients affected by a contagious biological agent may require isolation to ensure contamination control on the NBC-contaminated battlefield.

Section III. MISSION-ORIENTED PROTECTIVE POSTURE

MOPP is a flexible system of protection used in chemical warfare. It requires the soldier to wear individual protective equipment consistent with the chemical threat, the work rate imposed by the mission, and the temperature. Individual protective clothing becomes standard combat dress when directed by the theater commander.

MOPP does not mean that soldiers must wear all of their protective equipment all of the time. In fact, because of duty requirements, body heat buildup, and basic human needs, they cannot wear it for an indefinite period. It does, however, give the commander and staff a range of choices of chemical protection for their units. For further details concerning individual and collective protection, see FM 3-4.

Mission accomplishment is never compromised for protection.

E-14. APPLICATION

All combat operations are conducted under the MOPP system. There are five levels of MOPP a commander may designate (Figure E-1).

E-15. MASK ONLY

In a contaminated environment in which no blister agent vapors are present, soldiers do not need to wear protective overgarments or rubber gloves as long as they are protected from direct skin exposure to liquid or solid contamination. Tanks, some kinds of vans, and buildings are examples of shelters that provide partial protection from contamination. Inside these shelters, soldiers are normally exposed to vapor hazards but not to direct exposure.

MOPP LEVEL	OVER-GARMENT	OVER-BOOTS	MASK/HOOD	GLOVES
0	Available	Available	Carried	Available
1	Worn, open or closed based on temperature	Carried	Carried	Carried
2	Same as MOPP1	Worn	Carried	Carried
3	Same as MOPP1	Worn	Worn, hood opened or closed, based on temperature	Carried
4	Worn, closed	Worn	Worn, closed	Worn

Figure E-1. Levels of MOPP.

Section IV. DECONTAMINATION

The more decontamination the unit does, the more expensive it is in resources-manpower, time, and materials. The wisest way to conserve those resources and still sustain combat potential is by applying the following four principles:

- Decontaminate as soon as possible.
- Decontaminate only what is necessary.
- Decontaminate as far forward as possible.
- Decontaminate by priority.

E-16. LEVELS OF DECONTAMINATION

- Partial Decontamination (Basic Skills and Hasty).** Partial decontamination includes any technique that removes or neutralizes all visible or detectable contamination from exposed portions of the skin, individual clothing, and equipment and from those surfaces of equipment that operators or crew must touch to perform their mission. Partial decontamination is the complete decontamination of a small area on a piece of equipment.
- Complete Decontamination (Deliberate).** Complete decontamination is (deliberate) cleaning that reduces all or most of the contamination hazard to a level that permits removal of the protective mask and gloves. Residual contamination may still remain after decontamination, but not in sufficient amounts to warrant placing soldiers in full MOPP. To attain this goal, decontamination efforts must reduce residual contamination to negligible levels. Negligible risk levels are those that cause mild incapacitation among no more than 5 percent of unprotected soldiers who operate for 12 continuous hours within 1 meter of decontaminated surfaces.

E-17. BASIC SKILLS DECONTAMINATION

Soldiers use these techniques to survive and continue to fight on the NBC-contaminated battlefield. The soldiers are trained to decontaminate themselves and their equipment automatically after being contaminated.

- Skin decontamination.
- Personal wipedown.
- Operator's spraydown.

E-18. HASTY DECONTAMINATION

Hasty decontamination (which includes the actions of teams, squads, and platoons) reduces performance degradation in three ways. It reduces the spread of contamination on people and equipment that can allow temporary relief from MOPP4; it speeds the weathering process for chemical and biological contamination, which can lead to the complete decontamination objective; and it may reduce radiological contamination significantly, in turn reducing radiation hazards to unprotected soldiers to a negligible risk.

E-19. CONTROL MEASURES

The following control measures are used for decontamination operations:

- Coordination point.
- Route.
- Task force assembly area.
- Unit decontamination position.
- Ready line.
- Dismount point.
- Decontamination site.
- Route to company holding area.
- Company holding area.
- Driver's route to dismount point.

Section V. RECONNAISSANCE

During mechanized infantry or armored combat operations, NBC reconnaissance platoons or sections operate throughout the battlefield. In the forward combat area, commanders integrate all of these into the overall reconnaissance and surveillance effort to determine whether specified areas are

contaminated. Commanders use this information along with their IPB to manage the battlefield. Contamination avoidance procedures are discussed in greater detail in FM 3-3.

E-20. EMPLOYMENT

NBC reconnaissance platoons or sections perform five critical tasks on the battlefield, and must do so quickly.

- a. **Detect Contamination.** NBC reconnaissance platoons or sections must detect hazards early so those in affected areas can be warned.
- b. **Identify Contamination.** NBC reconnaissance platoons or sections must identify the type of contamination so preventive measures can be taken and casualties treated.
- c. **Mark Contaminated Area.** Contaminated areas must be marked so friendly forces can avoid them.
- d. **Report.** Contamination data must reach commanders or leaders so they can respond.
- e. **Sample.** To ensure proper identification of contaminating agents, the NBC reconnaissance platoon or section returns samples for laboratory analysis.

E-21. ORGANIZATION

The NBC reconnaissance platoon in a mechanized infantry or armored division consists of 1 officer and 19 enlisted soldiers. It is equipped with six M93 NBC Reconnaissance System (NBCRS) vehicles or M113A2 APCs. Each platoon consists of three squads. Each squad consists of two teams; each team has one vehicle (Figure E-2). The platoon leader and sergeant ride in two of the vehicles to control the platoon.

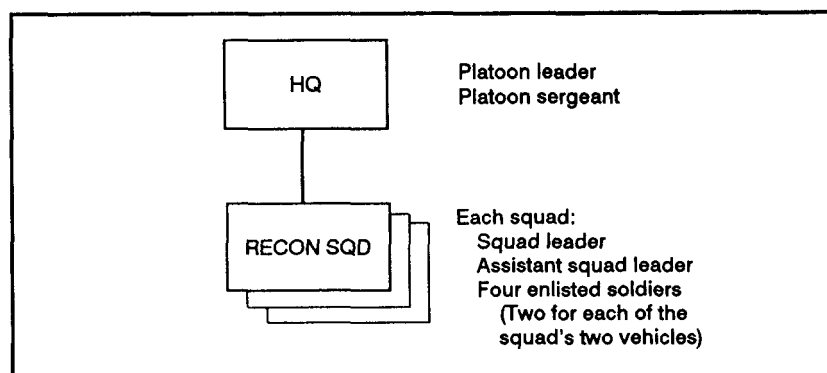


Figure E-2. Organization of an NBC platoon in a mechanized infantry or armored division.

E-22. NBC RECONNAISSANCE SYSTEMS

Using NBC reconnaissance systems (vehicles) allows the commander to obtain accurate, timely reports of the condition of the battlefield. Commanders must therefore know how to employ these systems within the bounds of their limitations and capabilities.

- a. **M93 NBCRS-Equipped.** The M93 NBCRS, also known as the Fox NBC system, is a lightly armored wheeled vehicle with on-board chemical detection equipment.
 - (1) **Capabilities.** The NBCRS can monitor the environment while moving and, depending on terrain, can usually move as quickly as maneuver forces. The vehicle's built-in positioning system simplifies navigation and increases the accuracy of its reports of contaminated areas. The crew operates from inside the vehicle. An overpressure system allows the crew to work without masks in contaminated areas, increasing their effectiveness. The on-board detection apparatus identifies all known chemical warfare agents. It can also store new data on unknown chemical agents.
 - (2) **Limitations.** Calibrating the detection instruments and repairing the vehicular components of the NBCRS requires special maintenance and support. Before a mission, the system's on-board chemical detection apparatus requires 20 to 30 minutes of preparation. However, the greatest limitation of the NBCRS is that soldiers do not easily recognize it as friendly.
- b. **M113 APC-Equipped or HMMWV-Equipped.** NBC reconnaissance platoons may use these vehicles instead of or along with the M93 NBCRS.
 - (1) **Capabilities.** Parts for the M113 APC and the HMMWV are readily available, and soldiers can easily recognize both vehicles as friendly. Their large sizes enable them to carry a lot of contaminated material, and they have larger weapon systems for their own protection (each has a .50 caliber heavy barrel machine gun). On rough terrain, these vehicles can keep up with maneuver forces.
 - (2) **Limitations.** If the maneuver forces are equipped with M1 tanks or BFVs, the M113 APCs and HMMWVs, which cannot move as quickly on flat, open terrain, will slow them down. Also, because these vehicles lack overpressure systems, their crews must wear MOPP4 clothing. Finally, neither vehicle has on-board detection equipment, so the soldiers must stop and exit the vehicle and must collect the information manually using less reliable and less complete means (either chemical agent monitors—CAMs—or M256A1 paper).