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Nuclear Contamination Avoidance

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Preface

This publication supercedes the nuclear/radiological portions of FM 3-3, dated 30 September 1986.

The mission of the Chemical Corps is to prepare the Army to survive and win in a nuclear environment by—

- Developing doctrine, organizations, training products, and equipment for nuclear defense, and nuclear retaliation.
- Minimizing the impact of nuclear weapons through contamination avoidance, protection, and decontamination.
- Employing smoke.
- Employing flame.

This manual is one of four that explain the fundamentals of NBC defense—

- **FM 3-3,** *Chemical and Biological Contamination Avoidance.*
- **FM 3-3-1,** *Nuclear Contamination Avoidance.*
- **FM 3-4,** *NBC Protection.*
- **FM 3-5,** *NBC Decontamination.*

A general overview of these fundamentals is given in FM 3-100, NBC Operations. This manual, FM 3-3-1, defines and clarifies the entire process of nuclear contamination avoidance. It details the NBC Warning and Reporting System (NBCWRS), how to locate and identify nuclear contamination, and how to operate in and around nuclear contamination. This manual is designed and intended to be an easy-to-read, step-by-step manual depicting the manual method of calculating nuclear contamination avoidance procedures for chemical officers and NCOs at brigade level and higher organizations. However, subject matter discussed in Chapters 1 and 2 and appendices A and C are of general use for all branches and MOS. Unless otherwise stated, whenever the masculine gender is used, both men and women are included.

Chapter 1 defines the nuclear threat and how to reduce unit vulnerability.

Chapter 2 defines how we warn our troops of an enemy nuclear attack and how we warn of a friendly nuclear attack.

Chapters 3, 4, and 5 detail procedures for detecting, identifying, evaluating and plotting hazards while operating in an nuclear environment. These chapters are essential for brigade, division, and corps chemical personnel.

Chapter 6 details the mathematical procedures required for evaluating nuclear information.

Chapter 7 details procedures required to operate in and around neutron induced radiation areas.

Chapter 8 discusses procedures for tactical units confronted with radiation hazards eminating from civilian facilities.

Appendices A through F detail specialized information often required in an nuclear environment.

Appendix G provides operational employment guidelines for the principles of contamination avoidance in the form of a checklist.

Chemical personnel must be familiar with and be able to apply the information in this manual.

DA Forms for which this publication is the prescribing directive are for Army use only.

The proponent of this manual is the US Army Chemical School. Submit changes for improving this publication on DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forward to:

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Introduction

Contamination avoidance is the best defense against enemy use of nuclear weapons. Avoidance reduces the risk of being targeted by nuclear weapons and minimizes the effects of nuclear contamination hazards. Knowing where contamination exists or how long the hazard may persist is essential to avoiding the hazard.

Enemy use of nuclear weapons makes battlefield operations more difficult and time consuming. Combat, combat support, and combat service support operations may be more difficult to perform in a nuclear environment. Tasks/missions may take more time because of the problems created by nuclear contamination. Nuclear attacks may cause casualties, materiel losses, and creation of obstacles. Training will reduce the problems caused by nuclear attacks on the unit. Units must locate clean areas as well as locate contamination in a nuclear environment. Contaminated units will have to perform decontamination (decon) operations.

To survive and accomplish the mission, individuals and units must take precautions to avoid or minimize effects of initial and residual nuclear hazards. The threat of contamination may force individuals and units into collective protection. Using collective protection requires special procedures that are time consuming. See FM 3-4 for information on what measures or steps an enemy nuclear attack may affect friendly forces. FM 3-3 outlines how to anticipate an enemy chemical or biological attack and minimize the effects on friendly forces.

Contamination Avoidance

There are four steps to contamination avoidance—implement passive defensive measures, warn and report nuclear attacks, locate, identify, track and predict hazards, and limit exposure to nuclear hazards. If the mission permits, avoiding nuclear hazards completely is the best course of action. This is not always possible. The mission may force you to occupy or cross a contaminated area. This manual outlines procedures to use when working or training to work in a contaminated environment. Using these procedures, which are summarized by the four steps of contamination avoidance, units can minimize performance degradation.

Implement Passive Defensive Measures

Passive defensive measures are those measures taken to reduce the probability of being bit by a nuclear attack or, if hit, to reduce the effects of the attack. Operational security measures such as good communication procedures, light discipline, and good camouflage reduce the chances of a unit being targeted. Dispersion, hardening of positions and equipment, and using overhead cover reduces the effectiveness of an attack. Passive measures are discussed in more detail in Chapter 1.

Warn and Report

Once a nuclear attack has occurred everyone who might be affected by the hazard must be warned. This gives units time to protect themselves against a possible hazard. NBCWRS is used for warning and reporting nuclear hazards. These messages and their use are standardized and kept simple so they can be passed rapidly and be easily understood. The NBCWRS is discussed in Chapter 2. The Automated NBC Information System (ANBACIS) will assist in speeding this process.

Locate, Identify, Track, and Predict Nuclear Hazards

By locating, identifying, tracking, and/or predicting nuclear hazards, commanders can make informed decisions for operating in or around nuclear hazards. Planning nuclear reconnaissance is discussed in Chapter 5. Tactics and techniques of NBC reconnaissance are contained in FM 3-19, *NBC Reconnaissance*. Techniques for predicting nuclear hazards are given in Chapters 3, 4, and 6. A portion of ANBACIS provides for the automatic calculation of hazard areas due to nuclear weapons using or creating all NBC 1 through NBC 5 Reports.

Limit Exposure

If operation in a contaminated area is necessary, take steps to limit the amount of troop exposure. Chapter 5 discusses crossing contaminated areas. FM 3-4, NBC *Protection*, gives guidance on protective measures for such crossings and FM 3-19, *NBC Reconnaissance*, describes the techniques for finding the best crossing route.

Protection and Decontamination

If a unit is unable to avoid nuclear hazards, the individual soldier and unit must take protective measures. Actions that minimize equipment losses and limit the spread of contamination are discussed in this manual. Measures taken to aid in protection are covered in detail in FM 3-4.

If a unit is unable to avoid contamination, then some form of decon may be necessary. Decon reduces the immediate NBC hazard.

Tactical Considerations

If nuclear weapons are used, individual and collective protective measures must be taken. Time-consuming and manpower-intensive tasks such as nuclear reporting, radiological recon, surveys, and decon may be necessary.

Mission

Radioactive contamination forces the commander to reconsider how best to accomplish the mission with the available resources. The commander has three options. In order of preference, these are—

- First, do the mission in a clean area. The commander must decide whether the mission can be accomplished while staying out of contaminated areas.
- Second, do the mission in a contaminated area using a higher risk level, and use more soldiers, to do the mission faster.
- Third, do the mission in the same amount of time with the same number of soldiers, but wait for a longer period of time to start to allow for natural decay.

Enemy

In addition to trying to determine what the enemy plans to do, the commander also must determine how and where the enemy is most likely to use nuclear weapons. For example, if the enemy is attacking, expect nuclear weapons to be used to open gaps along avenues of advance or to destroy forces.

Terrain

Terrain modifies nuclear weapons' effects. Hills restrict the area affected by the initial effects of nuclear weapons and disrupt the normal dispersion of fallout. Valleys and low areas provide defense against initial nuclear effects, but residual hazards may accumulate and linger.

Troops

The physical condition of troops is very important. Tactical decisions must consider how troops will be affected.

Time

Tasks may take longer in a nuclear environment. Adding nuclear requirements to conventional recon adds time to the mission. Decon operations are also time-consuming.

Anticipating the timing of nuclear attacks is important. Chemical and biological attacks are most likely to occur during the night and early morning or evening hours and may be employed to enhance nuclear weapons effects. Employment of nuclear weapons causes severe problems, especially among pilots and crewmen, due to dazzle and flash blindness.

Training

Commanders must understand the importance that training has on a soldier and the unit's ability to complete the mission. When troops are well trained, they can survive and fight on a contaminated battlefield. Poorly trained troops may not be able to recognize a nuclear attack. Well-trained troops can do their jobs, while in a nuclear environment. They know tasks take longer, but are able to adjust their procedures and/or work rate accordingly.

Chapter 1

Vulnerability Analysis

The focus of this field manual is nuclear contamination avoidance. Like most concepts in the Army, contamination avoidance is a process. This process involves:

- Identifying the threat facing friendly forces.
- Identifying whether friendly units are a target.
- Understanding the operational concerns and impact of nuclear contamination.
- Locating nuclear hazards on the battlefield.

By identifying and locating nuclear hazards on the battlefield, units will be able to either avoid the hazard or implement the protective procedures outlined in FM 3-4 to minimize the affects. It should be emphasized, at this point, that if threat forces posses nuclear weapons, they also probably possess chemical and/or biological weapons as well. Therefore, US forces must be prepared to operate in an NBC environment. But, for the purpose of this manual, contamination avoidance principles will center only on nuclear operations.

Before we begin the discussion of contamination avoidance, we must first discuss two critical, often overlooked, aspects of successful operations on the contaminated battlefield. These two aspects are nuclear threat assessment and vulnerability analysis. Both are described in this chapter.

With the current trend in nuclear proliferation, the nuclear threat now and in the future will be global. The proliferation of nuclear-capable nations in all contingency regions increases the likelihood of US forces being targets of nuclear attack. The extensive development worldwide of nuclear power plants presents an additional nuclear hazard condition if these facilities are damaged deliberately, inadvertently, or by industrial accident.

As Chapter 1 to FM 3-100 points out, nuclear weapons technology proliferation is increasing. Deploying US forces must be capable of accurately assessing the nuclear threat imposed by the opposing force and be capable of addressing unit vulnerability to attack. Chapter 2 in FM 3-100 describes in detail how nuclear weapons may be used and how their use may shape the battle.

When planning operations, commanders must consider the potential effects of nuclear weapons on personnel and equipment. In conventional operations, concentration of forces increases the chance for success, but this same concentration increases the effects of nuclear attacks and the likelihood of their occurrence. Commanders must decide what size of force to use and when they should be concentrated.

To assess a unit's vulnerability to nuclear attack, the commander determines how well protected the unit is and the type and size of weapon likely to be used against it. The commander then weighs various courses of action and determines which presents an acceptable risk to allow accomplishment of the mission. This whole process starts with the Intelligence Preparation of the Battlefield (IPB) and an initial assessment of the nuclear threat.

The IPB Process

The IPB process is a staff tool that helps identify and answer the commander's priority intelligence requirements (PIR). It's part of the operational planning that is necessary for battle management.

IPB is initiated and coordinated by the S2 and used to predict battlefield events and synchronize courses of action. IPB is designed to reduce the commander's uncertainties concerning weather, enemy, and terrain for a specific geographic area in a graphic format. It enables the commander to see the battlefield: where friendly and enemy forces can move, shoot, and communicate; where critical areas lie; and where enemy forces (and his own) are most vulnerable. IPB guides the S2 in determining where and when to employ collection assets to detect or deny enemy activities. These assets, working collectively, fulfill intelligence requirements and answer the PIR. IPB is the key for preparing for battle. It analyzes the intelligence data base in detail to determine the impact of enemy, weather, and terrain on the operation and presents this information graphically. It is a continuous process which supports planning and execution for all operations. IPB consists of a systematic five-function process:

- Evaluation of the battlefield (areas of operation and influence).
- Terrain analysis.
- Weather analysis.
- Threat evaluation.
- Threat integration.