ARMY, MARINE CORPS, NAVY, AIR FORCE

MULTISERVICE TACTICS, TECHNIQUES, AND PROCEDURES FOR NUCLEAR, BIOLOGICAL, AND CHEMICAL VULNERABILITY ASSESSMENT

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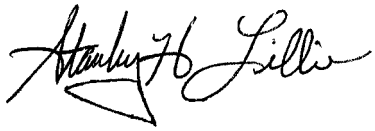
DECEMBER 2004

MULTISERVICE TACTICS, TECHNIQUES, AND PROCEDURES

FOREWORD

This publication has been prepared under our direction for use by our respective commands and other commands as appropriate.



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PREFACE

1. Scope

This multiservice operations publication provides tactics, techniques, and procedures (TTP) for conducting nuclear, biological, and chemical (NBC) vulnerability assessments (VAs). This document presents a comprehensive methodology for analyzing, managing, and assessing NBC risk. It provides tools that can be used to determine risks associated with vulnerabilities to NBC attack. It also provides the user with suggested actions that can be used to mitigate and reduce these vulnerabilities. Users of this manual are NBC and chemical, biological, and radiological (CBR) staff officers, unit commanders, NBC noncommissioned officers (NCOs), and others involved in planning and conducting NBC surveillance operations.

NOTE: The United States Marine Corps (USMC) uses the acronym METT-T (mission, enemy, terrain and weather, troops available, and time). Civilian considerations are inherently measured within the context of this acronym.

2. Purpose

a. The purpose of this publication is to provide commanders, staffs, and unit leaders a key reference for the planning and conduct of NBC VAs. It serves as a key source document for the development of other multiservice manuals and refinement of existing training support packages (TSPs), training center exercises, and service school curricula.

b. This manual provides the commander and his staff with the tools to—

- Counter the NBC threat.
- Conduct NBC threat analysis.
- Conduct NBC vulnerability analysis.
- Determine NBC vulnerabilities and risks.
- Implement NBC vulnerability reduction measures.
- Support the decision-making process.

3. Application

This publication is designed for use at the operational and tactical levels. The document will support command staff planning in preparing for and conducting NBC VAs. The manual also provides guidance to unit leaders and personnel for implementing NBC vulnerability reduction measures.

4. Implementation Plan

Participating service command offices of primary responsibility (OPRs) will review this publication; validate the information; and reference and incorporate it in service and command manuals, regulations, and curricula as follows:

Army. The United States Army (USA) will incorporate the procedures in this publication; in USA training and doctrinal publications as directed by the Commander, United States Army Training and Doctrine Command (TRADOC). Distribution is according

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Marine Corps. The USMC will incorporate the procedures in this publication in training and doctrinal publications as directed by the Commanding General (CG), United States (US) Marine Corps Combat Development Command (MCCDC). Distribution is according to the USMC publication distribution system.

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Air Force. The United States Air Force (USAF) will validate and incorporate appropriate procedures according to applicable governing directives. It will develop and implement this and other NBC multiservice tactics, techniques, and procedures (MTTP) publications through a series of USAF manuals providing service-specific TTP. Distribution is according to the USAF publication distribution system.

5. User Information

a. The United States Army Chemical School (USACMLS) developed this publication with the joint participation of the approving service commands.

b. We encourage recommended changes for improving this publication. Please reference the specific page and paragraph, and provide a rationale for each recommendation. Send comments and recommendations directly to—

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Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

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Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical Vulnerability Assessment

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*****This publication supersedes FM 3-14, 12 November 1997.

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Chapter I discusses NBC risk-based VA. It discusses a generalized method for conducting NBC threat analysis, vulnerability analysis and VA and developing associated vulnerability reduction measures.

Chapter II

Nuclear, Biological, and Chemical Threat Analysis

Chapter II addresses NBC threat analysis and the associated intelligence preparation of the battlespace (IPB) process. Threat analysis supports key functions, such as determining the likelihood of NBC attacks actually taking place, and the intention and capability to launch attacks.

Chapter III

Nuclear, Biological, and Chemical Vulnerability Analysis

Chapter III addresses the NBC vulnerability analysis process. It is the second step in the NBC VA process and culminates with estimating the severity levels of an NBC attack.

Chapter IV

Nuclear, Biological, and Chemical Vulnerability Assessment

Chapter IV addresses how the NBC threat analysis is paired with the NBC vulnerability analysis to develop the NBC VA.

Chapter V

Nuclear, Biological, and Chemical Vulnerability Reduction Measures

Chapter V provides preattack, during-attack, and postattack vulnerability reduction actions of an NBC or toxic industrial material (TIM) incident or attack.

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Chapter I

PRINCIPLES FOR NUCLEAR, BIOLOGICAL, AND CHEMICAL VULNERABILITY ASSESSMENT

> "Little minds try to defend everything at once, but sensible people look at the main point only; they parry the worst blows and stand a little hurt if thereby they avoid a greater one. If you try to hold everything, you hold nothing."
>
> Frederick the Great
> The Art of Modern War, 1940

1. Background

a. This chapter provides a basis for NBC risk-based VA. It discusses a generalized method for conducting threat analysis, vulnerability analysis, and VA and developing associated vulnerability reduction measures.

b. An NBC VA is a Department of Defense (DOD), command, or unit level evaluation (assessment) to determine the vulnerability of an installation, unit, activity, port, ship, residence, facility, or other site against an NBC attack. It identifies areas of improvement to withstand, mitigate, or deter NBC attacks. The NBC VA is the comparison of the threat analysis and vulnerability analysis for an installation, unit, activity, port, ship, residence, facility, or other site.

2. Nuclear, Biological, and Chemical Vulnerability Assessment Process

The NBC VA process is a continuous cycle of four functions (Figure I-1 [page I-2]) that begin with the threat analysis. These functions are NBC threat analysis (identify the threats), NBC vulnerability analysis (analyze friendly capability and limitations), NBC VA (assess threat and friendly capability), and NBC vulnerability reduction measures.

a. VA Functions.

(1) NBC Threat Analysis. The NBC threat analysis is a continual process of compiling and examining all available threat NBC information in order to identify the NBC threat. This is done using the IPB process. Possible NBC type threats to be considered also include releases of TIM, primarily from fixed facilities or bulk transport means. (A detailed discussion of the NBC threat analysis and the NBC IPB process is provided in Chapter II. A listing of possible threat NBC and TIM release indicators is provided in Appendix A.)

(2) NBC Vulnerability Analysis. The NBC vulnerability analysis is a continual process of compiling and examining information on the NBC protective posture of a force or facility. It assesses the NBC strengths and weaknesses of the NBC protective posture. Adequacy of individual and collective protection (COLPRO), detection, and decontamination

resources against possible TIM releases is also considered. A detailed discussion of the NBC vulnerability analysis process is provided in Chapter III.

(3) NBC VA. The NBC threat analysis is compared with the NBC vulnerability analysis to create the NBC VA. The process compares the NBC threat against the ability of the force or facility to protect against and/or mitigate the threat of NBC attacks. Potential TIM releases are also considered as part of the assessment process. A detailed discussion of the NBC VA process is provided in Chapter IV.

(4) NBC Vulnerability Reduction Measures. The commander and his NBC staff use VA as an aid in developing vulnerability reduction measures to counter the NBC and TIM threat and improve the command force protection (FP). The commander will decide which vulnerability reduction measures to implement (preattack, during-attack, or postattack) based on mission, enemy, terrain and weather, time, troops available, and civilian (METT-TC) considerations. (A detailed discussion of NBC vulnerability reduction measures is provided in Chapter V. A representative listing of preattack, during-attack, and postattack vulnerability reduction measures are provided in Appendixes B, C, and D, respectively.)

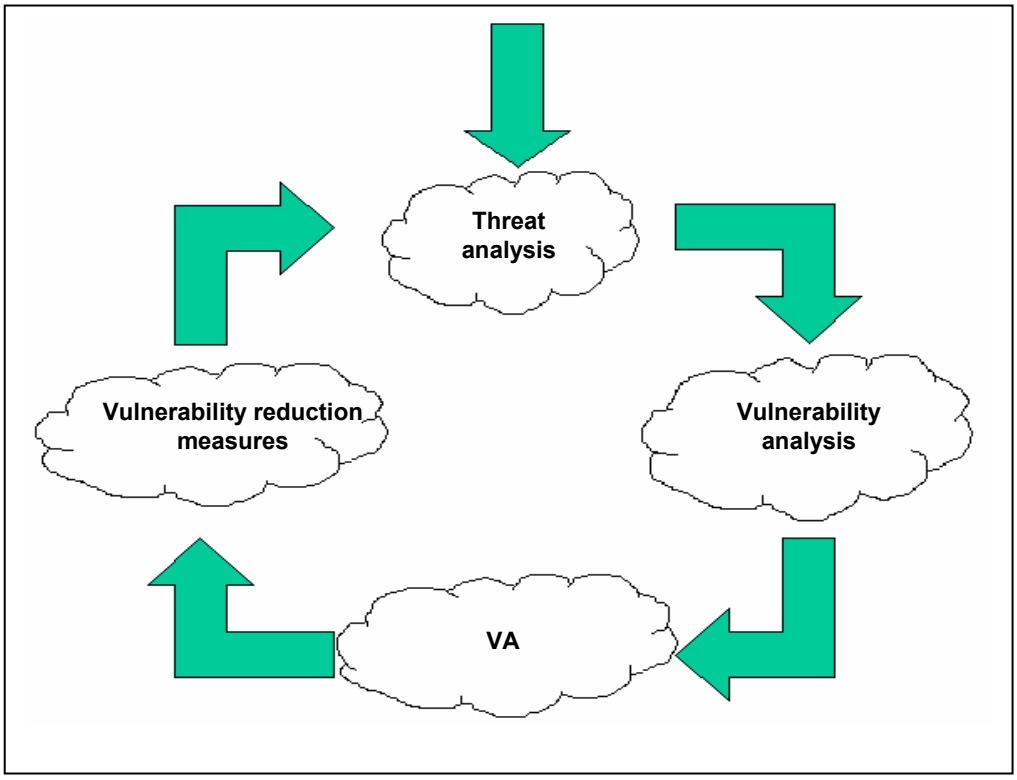

Figure I-1. VA Cycle

b. VA Conduct.

(1) Conducting NBC VA is the process of comparing enemy capabilities, METT-TC considerations, TIM facilities and potential release consequences, friendly vulnerabilities, and acceptable risks. The products of NBC VA are NBC vulnerability

reduction measures that are recommended to the commander. Selected NBC vulnerability reduction measures could include the following:

(a) Adjusting protective postures.

(b) Changing the disposition of units (dispersed versus clustered).

(c) Identifying named areas of interest (NAIs).

(d) Conducting medical countermeasures, such as prophylaxis, immunization, and medical treatment.

(e) Conducting the assessment of friendly force NBC and TIM protection, detection, identification, and warning.

(2) As NBC vulnerability reduction measures are implemented, the vulnerability of a unit or activity to NBC attacks and TIM releases should be diminished. Commanders at all levels must weigh the cost of vulnerability reduction measures against the impact of implementing these measures. The commander determines his level of acceptable risk and the level of effort required for NBC vulnerability/risk reduction measures.

Chapter II

NUCLEAR, BIOLOGICAL, AND CHEMICAL THREAT ANALYSIS

"The gravest danger our Nation faces lies at the crossroads of radicalism and technology. Our enemies have openly declared that they are seeking weapons of mass destruction, and evidence indicates that they are doing so with determination. The United States will not allow these efforts to succeed. We will build defenses against ballistic missiles and other means of delivery. We will cooperate with other nations to deny, contain, and curtail our enemies' efforts to acquire dangerous technologies. And, as a matter of common sense and self-defense, America will act against such emerging threats before they are fully formed. We cannot defend America and our friends by hoping for the best. So we must be prepared to defeat our enemies' plans, using the best intelligence and proceeding with deliberation. History will judge harshly those who saw this coming danger but failed to act. In the new world we have entered, the only path to peace and security is the path of action."

The National Security Strategy of the United States of America
September 2002

1. Background

This chapter provides an overview of the NBC threat analysis and associated IPB process. It is the first step of the NBC VA. It concludes with an assessment of the enemy's NBC capabilities and the probability of an NBC attack upon the force or activity. TIM fixed facilities and major transport modes are assessed for release potential and consequences of credible release scenarios. Threat analysis supports key functions such as determining the likelihood of NBC attacks actually taking place and an adversary's possible intent and capability to launch attacks and/or induce releases of available TIM.

2. Nuclear, Biological, and Chemical Threat Analysis Framework

During planning, the considerations contained in this chapter support the development of a framework for assessing the threat posed by an adversary possessing or suspected of possessing NBC weapons. The assessment of an adversary's capability can address the following factors: who, why, when, where, what, and how. These elements are summarized in Table II-1.

Table II-1. NBC Threat Analysis Framework

Who	Type of adversary possessing NBC weapons
Why	Broad objectives for the use of NBC weapons
When	Timing for use in crises and conflicts
Where	Types and locations of targets
What	Type of NBC use
How	Concept for NBC employment

a. Who. The first step in conducting a threat analysis is to determine who the adversary is. The number of nations capable of developing and possessing NBC weapons is steadily increasing. These countries range from the classic cold war threat of the former Soviet Union (now Russia and the various old Warsaw Pact countries), China, and the smaller regional powers (such as Pakistan and India) in the nuclear area. The number of nations or nonstate groups that possess an NBC capability has increased during the past decade, and it is very difficult to form assessments of nations or groups that have the capability to employ these agents. Developing nations or groups may receive these weapons or the means to develop them through technological transfer or overt/covert direct transfer. Further, industrialization in many regions has led to a vast array of TIM facilities in nearly every region and in most countries.

(1) NBC-Capable Nations. An NBC-capable nation is one that has the capability to produce or acquire and employ one or more types of NBC weapons to achieve political and military objectives. Inherent in this capability are varying degrees of abilities to conduct research and development; improve technology; and stockpile, weaponize, and deliver NBC weapons.

(2) NBC-Capable Groups or Individuals. There is significant intelligence and factual data to support the contention that terrorist groups or individuals are also attempting to obtain (and succeeding in obtaining) NBC capabilities. The March 1995 sarin (GB) attack in the Tokyo subway by the Aum Shinrikyo religious cult demonstrated this capability.

b. Why. The motivation behind the threat to use NBC weapons can assist the commander and his staff in assessing an adversary's intent to use NBC weapons or TIM. The motivation to use these weapons may be to cause casualties, contamination, or degradation or strictly for the psychological impact. For example, the psychological impact of chemical, biological, radiological, or nuclear (CBRN) weapons may cause panic or mob behavior among civilians.

c. When. Understanding the adversary's NBC weapons employment concepts can enhance the ability to predict if and when an adversary may use NBC weapons. Many of the former Soviet-influenced doctrinal precepts have been learned by potential enemies and still remain even after the end of the cold war; however, defining when an adversary may use NBC weapons largely remains only an estimate. Enemy employment of NBC weapons could occur at unexpected times and locations. (See Appendix A for possible threat NBC and TIM employment indicators.)

d. Where. Ports, airfields, supply depots, railheads, maintenance facilities, and major command headquarters (HQ) are potential targets for NBC attacks; and the fixed-site commander and staff will assess their vulnerability and may use a vulnerability checklist (see Appendix E) to support that process. Enemy forces operating in the rear area could contaminate critical command HQ or supply facilities and significantly affect the responsiveness of support organizations. Additionally, because of the proliferation of NBC weapons, future campaign locations may be fought on an asymmetric battlefield. Adversary-induced TIM facility releases could be low-technology, high-impact events that could disrupt or halt operations.

e. What. An assessment of what adversary NBC capability may be used will likely depend on the adversary's goals. Each NBC capability has advantages and disadvantages, and the enemy may perceive the following benefits:

(1) Nuclear and Radiological. The effects of a nuclear detonation are primarily in three areas: thermal radiation, blast, and radiological. Additional effects, such as electromagnetic pulse (EMP), can break down electronics system protection, disrupt communications, and have significant psychological impact on friendly forces. Additionally, the short- and long-term effects of radiological exposure of personnel must be monitored to minimize the degradation of individual and unit performance.

(2) Biological. Biological agents can produce large numbers of casualties. Additional effects resulting from biological attack (such as infectious diseases, mass casualties, large-area effects, degradation from wearing of mission-oriented protective posture [MOPP] gear, and the restriction of movement) can also have significant impact on friendly forces.

(3) Chemical. The effects of chemical agents are primarily casualty-producing effects and contamination. The personnel performance degradation produced by prolonged wearing of MOPP gear can also have significant impact on friendly forces. (See *Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical [NBC] Protection* for a detailed explanation of MOPP levels.)

(4) TIM. The effects of a TIM attack can produce casualties in humans and animals and damage plants, wildlife, and other material. Consequences from a TIM attack (such as infectious diseases, mass casualties, large-area effects, restriction of movement, contamination, degradation from wearing MOPP gear, and quarantine) can have significant impact on friendly forces. TIM can also have long-term effects on personnel and the natural environment. Additionally, it must be understood that MOPP does not protect personnel against all TIM.

f. How. Employment of NBC weapons may depend on the perceived advantage gained by their use at the strategic, operational, or tactical level.

(1) Strategic Use. The perceived strategic advantage gained by the use of NBC weapons may encourage asymmetric warfare that counters an adversary's strengths by focusing on its weaknesses. Because of US and allied conventional force superiority, some nations and nonstate groups may see asymmetric strategies (such as the employment of chemical-biological [CB] agents) as a means of avoiding direct engagements with dominant US conventional forces and a way to "level the playing field." This strategy could also apply particularly to terrorist groups intent on inflicting casualties or causing panic, if such groups judge that conventional means do not meet their goals and they do not fear political or military retaliation.

(2) Operational Use. Nations or nonstate groups may use NBC weapons in a combatant commander's area of responsibility (AOR) against high-value targets (HVTs) to adversely impact the commander's mission. For example, an adversary may use persistent chemical agents to restrict airbase (AB) and port operations and lines of communication (LOCs). Persistent nerve and blister agents could also slow the servicing of aircraft and

ships and hinder cargo handling. A biological attack could produce mass casualties over a large area. These agents could be effectively employed against large rear-area objectives or against command, control, communications, computers, and intelligence (C4I) or other critical targets. A nuclear attack could be directed against friendly strong points, air and naval power, and critical centers of gravity (COGs).

(3) Tactical Use. At the tactical level, developing nations' combatants who use former Soviet doctrine, with adequate chemical stocks, could use nonpersistent agents against front-line positions or against amphibious forces operating in littoral areas. They could also be inclined to use persistent agents on bypassed positions, strong points, and flanks. They may also use persistent or nonpersistent chemical agents in barrier and denial plans. The select use of casualty-producing biological agents could cause casualties within hours versus days. The use of tactical nuclear devices could cause large numbers of casualties, damage, and contamination through thermal radiation, blast, and nuclear radiation. Injuries to personnel can range from skin burns and flash blindness to radiation sickness, extreme psychological effects, and death. TIM incidents can also disrupt friendly force operations at locations such as ports or airfields.

3. Intelligence Preparation of the Battlespace

a. The IPB is the staff tool that helps identify and answer who, why, when, where, what, and how to help satisfy the commander's priority intelligence requirements (PIRs). IPB accomplishes the following:

(1) Identifies facts and assumptions about the battlespace environment and the threat. This enables staff planning and the development of friendly courses of action (COAs).

(2) Provides the basis for intelligence direction and synchronization that supports the command's COA.

(3) Contributes to complete staff coordination.

(4) Describes the NBC environment that the unit may operate within and the effects of that environment.

(5) Determines what the threat can accomplish within an NBC environment.

(6) Identifies and prioritizes the NBC target for counterforce operations.

b. Intelligence collection and IPB begin long before the initiation of hostilities with the collection and analysis of information on foreign military capabilities or terrorist groups. The use of information databases can be readily brought into use. Intelligence collection supports providing PIR responses to the commander and designating NAIs for intelligence collection.

(1) Once the NBC staff has completed the threat integration phase of the IPB, NBC-related intelligence collection tasks are incorporated into the reconnaissance and surveillance (R&S) efforts to collect the required information and to confirm or deny enemy

COAs. Templated targets are designated as NAIs that may confirm or deny a particular enemy activity. NAIs are shown on the collection plan (Figure II-1).

PIR	Indicators	NAI	Time		Specific Order or Request	Tasking		
			Not Earlier Than	Not Later Than		44 Chemical	2-1 Cavalry	1-87 Infantry
Will the enemy use NBC weapons or TIM? Where and when?	NBC detection equipment	32	2200	900	Check for chemical	x		
	Movement of chemical munitions forward	36	2200	900	Report activity	x		
	Movement of decontamination and NBC reconnaissance vehicle forward	20	2200	900	Report activity		x	
	Low-order artillery bursts	20	2200	900	Report activity			x

Figure II-1. Collection Plan (Land Force) (Sample)

(2) The collection plan assigns responsibilities for collecting information, to include observing NAIs. The NBC and intelligence staff and the surgeon provide the indicators for each NAI.

c. Joint Publication (JP) 2-01.3 gives detailed information on the joint intelligence preparation of the battlespace (JIPB) process. The process consists of four steps—defining the battlespace environment, describing the battlespace effects, evaluating the threat, and determining the threat COAs.

(1) Define the Battlespace Environment. The NBC officer/NCO focuses attention on the breadth of staff NBC defense concerns. The NBC staff coordinates with other staff elements to ensure a wide understanding and common assessment of possible NBC attacks and TIM releases. Multiple factors are examined, to include the following:

- Weather and topography of the area. Where might the enemy use NBC weapons?

- Capabilities of the threat forces. What are the capabilities and limitations of the NBC weapons systems?

- Population and demographics. Where are the densely populated areas?

- Political/socioeconomic factors. Does the adversary have allies that might add to its capabilities or trading partners to sell it NBC weapons?

- Infrastructure. Does the nation or area have TIM storage, production, or distribution capabilities?

- Rules of engagement (ROE) and legal restrictions. Is the adversary a treaty signatory? Are there significant moral or religious sanctions for or against threat use of NBC agents?

- Protective equipment. Do allies have CB equipment? Is a noncombatant evacuation operation (NEO) a requirement? Have protective measures been taken for friendly or enemy civilian populations to minimize the loss of noncombatant life?

- Intelligence, surveillance, and reconnaissance (ISR). What ISR capability is available?

- Indications of attack. What are the warnings that signal the imminent use of CBRN weapons by an enemy?

- Preventive measures. Have counterproliferation and counterforce measures been considered to remove the threat from its source?

- Allied capabilities. Are there allied counterproliferation and counterforce capabilities?

- Defense capabilities. What viable active-defense capabilities can the area of operations (AO) commander employ?

- Current intelligence. What do I need to know?

(a) Identify the Limits of the Command AO and Battlespace. The AO is the geographic area where the commander is assigned responsibility and authority to conduct military operations (see Figure II-2) and is the area that may be targeted for a possible enemy NBC attack.

(b) Establish Area of Interest (AOI) Limits. The AOI is the area of concern to the commander—including the area of influence and areas adjacent thereto and extending into enemy territory—that impacts the objectives of current or planned operations. This area also includes areas occupied by enemy forces that could jeopardize the accomplishment of the mission. The AOI is the geographical area from which information and intelligence are required to permit planning or the successful conduct of the command operation. Planning evaluates existing databases and identifies NBC-related intelligence gaps—any areas in which sufficient detail is not known. Identifying the gaps early allows planners to initiate action to collect the NBC intelligence required to fill them.

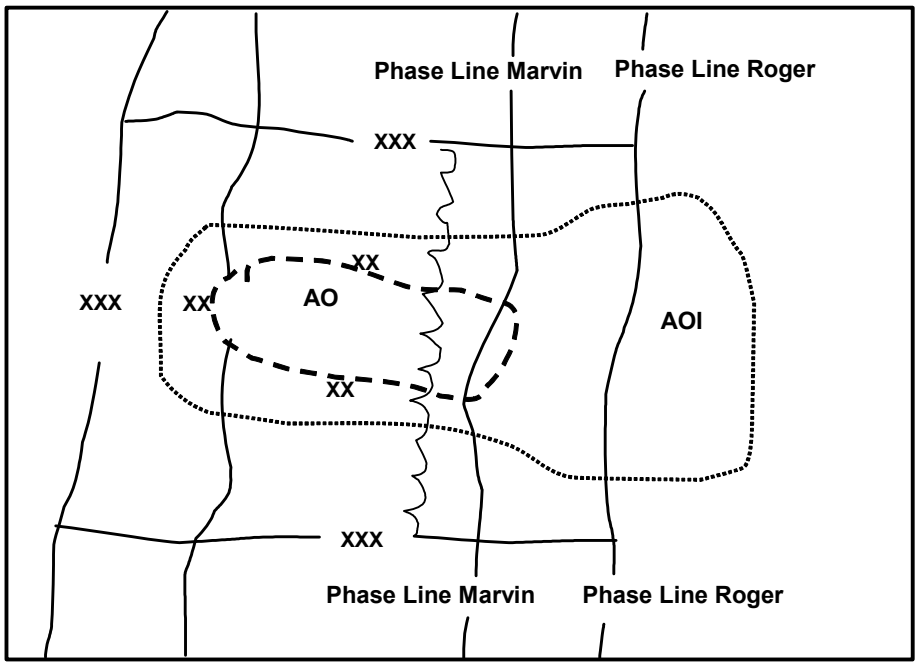

Figure II-2. AO and AOI (Land Force)

(2) Describe the Battlespace Effects. The NBC staff addresses the battlespace effects on NBC operations, such as the soil type, surface drainage, vegetation type and distribution, precipitation, wind patterns, temperature, humidity, cloud cover, and topography. This information is key for NBC staffs to conduct NBC IPB. These variables affect agent and radiation persistency and effectiveness and possible contamination areas. The NBC staff must also consider these variables for hazard prediction and reduction measures, such as decontamination. Most of this information can be determined through a map analysis supplemented by reconnaissance (chemical, aerial, military intelligence, or scout assets), a chemical downwind message (CDM), an effective downwind message (EDM), and any supporting weather elements.

(a) Weather. Over the next 72 to 96 hours, when is the weather favorable and unfavorable for enemy use of CB weapons at the intended target? (See Tables II-2 and II-3, page II-8, for a summary of the critical weather factors for enemy CB weapons use. Such detail might not be correct or known at all by the enemy, so an attack does not have to be optimized using these criteria.)

(b) Terrain. Where will NBC weapons use and induced releases of TIM from fixed sites or transport modes cause the most problems to our operation?

Table II-2. Weather Effects on Biological-Agent Employment (Long Line Source)

Event	Weather Element	Favorable[1]	Marginal[2]	Unfavorable[3]
Biological	Wind speed at heights below 16 meters	9 to 15 kph	15 to 32 kph	Less than 9 kph or greater than 32 kph
	Air stability[4]	Stable[5]	Neutral	Unstable
	Temperature	1° to 20°C	Less than 1°C; or from 21° to 29°C	30°C or more
	Humidity	More than 60%	40% to 60%	Less than 40%
	Precipitation	None to very light	Light	Moderate to heavy

[1] Weather makes threat use of biological weapons possible, and use under these conditions has the greatest potential to cause wide-area dispersion of the BW cloud.

[2] Weather does not favor the use of biological weapons; however, there is still a low-to-moderate risk of the BW cloud being carried downwind.

[3] Weather does not favor the use of biological weapons for a wide-area BW attack.

[4] Lapse conditions are generally favorable for point source, fixed-site attacks.

[5] Stable conditions are generally not favorable for air-delivered (spray) biological attacks.

Table II-3. Weather Effects on Chemical-Agent Employment

Event	Weather Element	Favorable[1]	Marginal[2]	Unfavorable[3]
Chemical (nonpersistent)	Wind	Steady, less than 5 kph	Steady, 5 to 13 kph	• For artillery employment if speed is greater than 13 kph • For aerial bombs if speed is greater than 19 kph
	Air stability	Stable	Neutral	Unstable
	Temperature	More than 21°C	4 to 21°C	Less than 4°C
	Precipitation	None	Light	Any
	Cloud cover	• Broken low clouds at night • Broken middle clouds at night • Scattered clouds of all types at night • Clear sky at night	• Thick, low overcast • Thick, middle overcast	• Broken, low clouds during daytime • Broken, middle clouds during daytime • Overcast or broken, high clouds during daytime • Clouds of vertical development

Table II-3. Weather Effects on Chemical-Agent Employment (Continued)

Event	Weather Element	Favorable[1]	Marginal[2]	Unfavorable[3]
Chemical (persistent) liquid agents employed for liquid contamination	Wind	• Low wind speeds for agents with significant vapor pressure • Little or no turbulence	Moderate wind speeds	High wind speeds, except liquid agents with little vapor pressure, which are only slightly affected
	Air stability	Stable	Neutral	Unstable
	Temperature	Surface temperature just above the agent freezing point	Intermediate	High soil temperature
	Humidity	High	Intermediate	Low
	Precipitation	None	Light rain	Heavy
Chemical (persistent) liquid agents employed to produce vapor for casualty effect	Wind	Low wind speeds with a small degree of turbulence	Intermediate	High wind speeds and high turbulence
	Air stability	Neutral	Stable if released below the inversion cap	Unstable
	Temperature	Intermediate to high	Intermediate	Low
	Humidity	High	Intermediate	Low
	Precipitation	None	Light or transitional	Heavy

[1]Weather makes threat use of chemical weapons possible, and use under these conditions has the greatest potential to produce friendly casualties.

[2]Weather does not favor the use of chemical weapons, but there is still a low-to-moderate risk of friendly casualties if chemical weapons are employed.

[3]Weather does not favor the use of chemical weapons, and the risk of friendly casualties is very low.

(3) Evaluate the Threat. During threat evaluation, the staff assesses the enemy—

- Type and composition (NBC-capable units) in the AO and AOI.
- Disposition (C2 posts and threat training status).
- Capabilities (ranges and effectiveness of NBC delivery systems, types of NBC weapons available, and NBC protective and detection equipment available).
- Intent (national policy and NBC employment doctrine).

A nuclear-capable threat may base employment on the weapon type, yield, and delivery systems available. How the enemy employs biological weapons will also depend on similar factors—usually the type of agent and delivery system available. Enemy chemical employment can also be identified by the type of agent and delivery system. However, the use of chemical, nuclear, or radiological weapons could also be classified into three groups: terrain-oriented, force-oriented, or a combination of the two. A terrain-oriented threat will attempt to use these agents to restrict terrain or shape the battlespace. A force-oriented

threat directly targets personnel concentrations. Conversely, biological agents would likely be used against personnel. Overall, this step will estimate how threat forces prefer to conduct operations under ideal conditions. To do this, the NBC officer or NCO, in coordination with the intelligence section, must—

(a) Identify NBC-related intelligence gaps and initiate actions to fill them (use the knowledge base discussed previously, and begin new intelligence collection operations).

(b) Determine NBC-related gaps in the PIRs and add them to the collection plan.

(c) Update threat models with the NBC-related data that has been collected.

(d) Convert threat doctrine into a doctrinal template.

(e) Describe the threat NBC-related tactics and options.

(f) Identify HVTs that may be targeted by NBC weapons.

(g) Identify threat NBC capabilities.

(4) Determine the Threat COAs.

(a) Identify the COAs available to the threat. Does the threat have the capability and intent to use NBC weapons?

(b) Identify threat likely objectives and desired end state.

(c) Identify the full set of COAs available to the threat that may include the use of NBC weapons. Would another nation or group use NBC weapons or TIM?

(d) Evaluate and prioritize each COA based on the impact of NBC conditions on the force.

(e) Develop each COA in as much detail as time allows.

(f) Identify initial NBC-related collection requirements.

(g) Identify the area of risk and the impact on the mission, based on enemy COA and weather.

(h) Pass potential NBC targets to counterforce operational commanders.

d. See Appendix F for further discussion on the operational levels of war, IPB, and planning.

4. Estimating the Probability for the Use of Nuclear, Biological, and Chemical Agents and Toxic Industrial Material

a. Throughout the NBC threat analysis and IPB process, information has been gathered to make one final determination—what is the probability of the use of NBC weapons or TIM release?

b. Conducting a threat analysis on the probability of the use of NBC weapons (low, medium, or high) is input for the vulnerability analysis (see Chapter III) process along with other information developed in the VA (see Chapter IV) to determine the overall vulnerability and risk to land, sea, and air forces. (See Figures II-3 through II-6, pages II-12 through II-15 for sample templates that support estimating the probability of the use of nuclear weapons, biological warfare [BW] agents, chemical warfare [CW] agents, or TIM.) Estimates are used in Chapter IV (as part of the VA/risk assessment matrix) to determine the overall vulnerability. The overall process is subjective, and the final risk level is determined by the commander. (Appendix A provides additional threat indicators that can be used with Figures II-3 through II-6.)

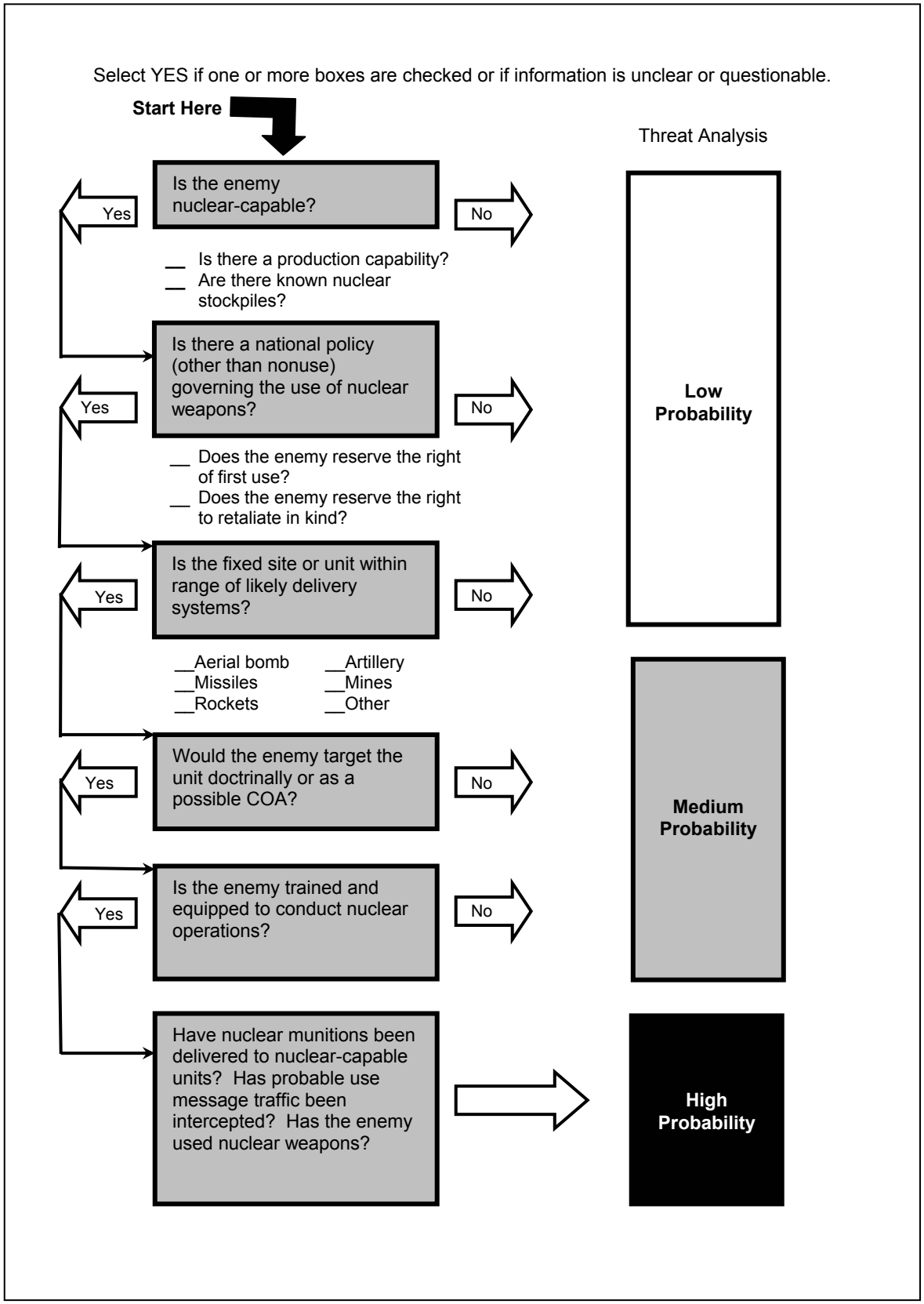

Figure II-3. Estimating the Probability of the Use of Nuclear Weapons (Sample)

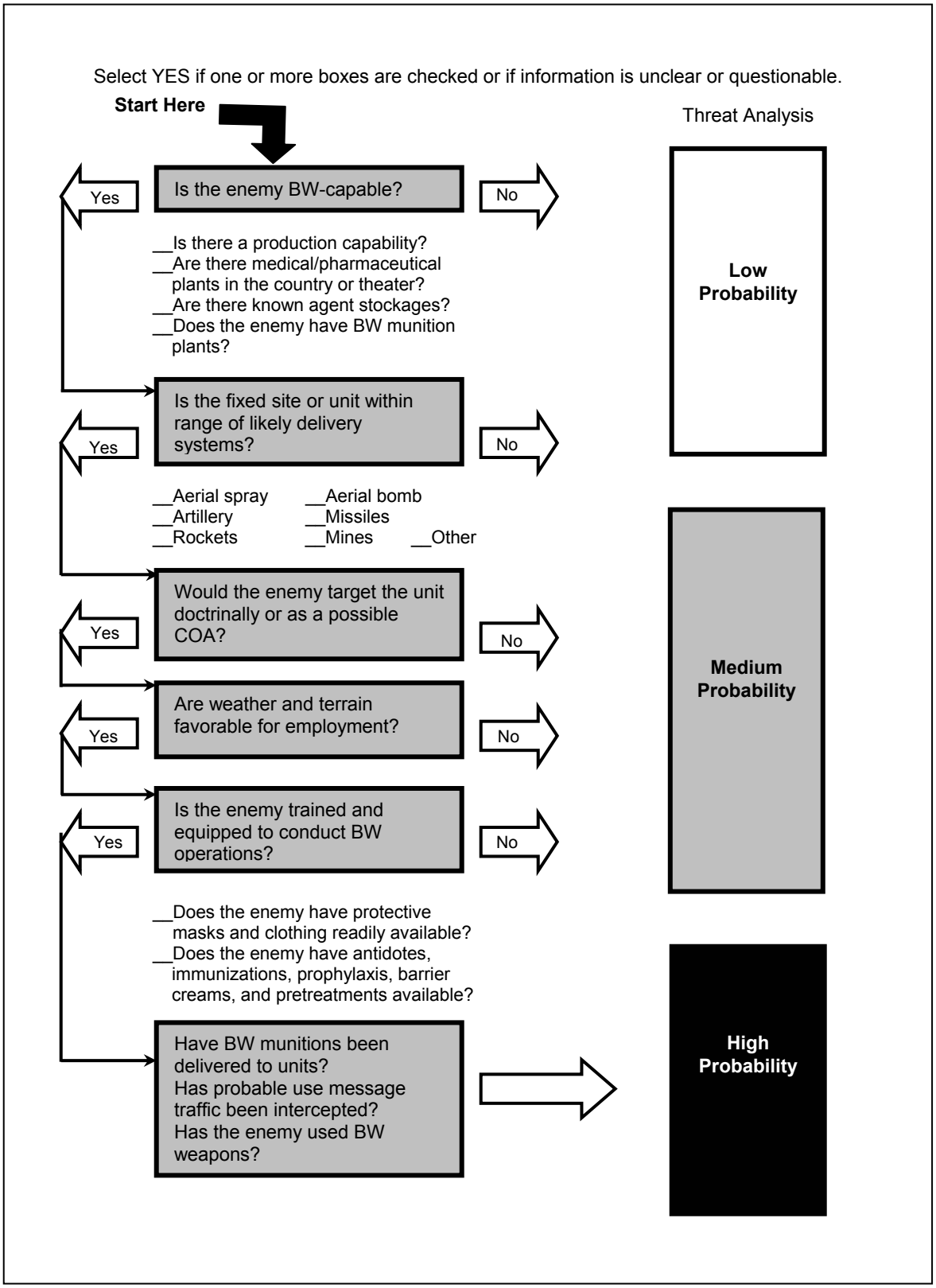

Figure II-4. Estimating the Probability of the Use of BW Agents (Sample)

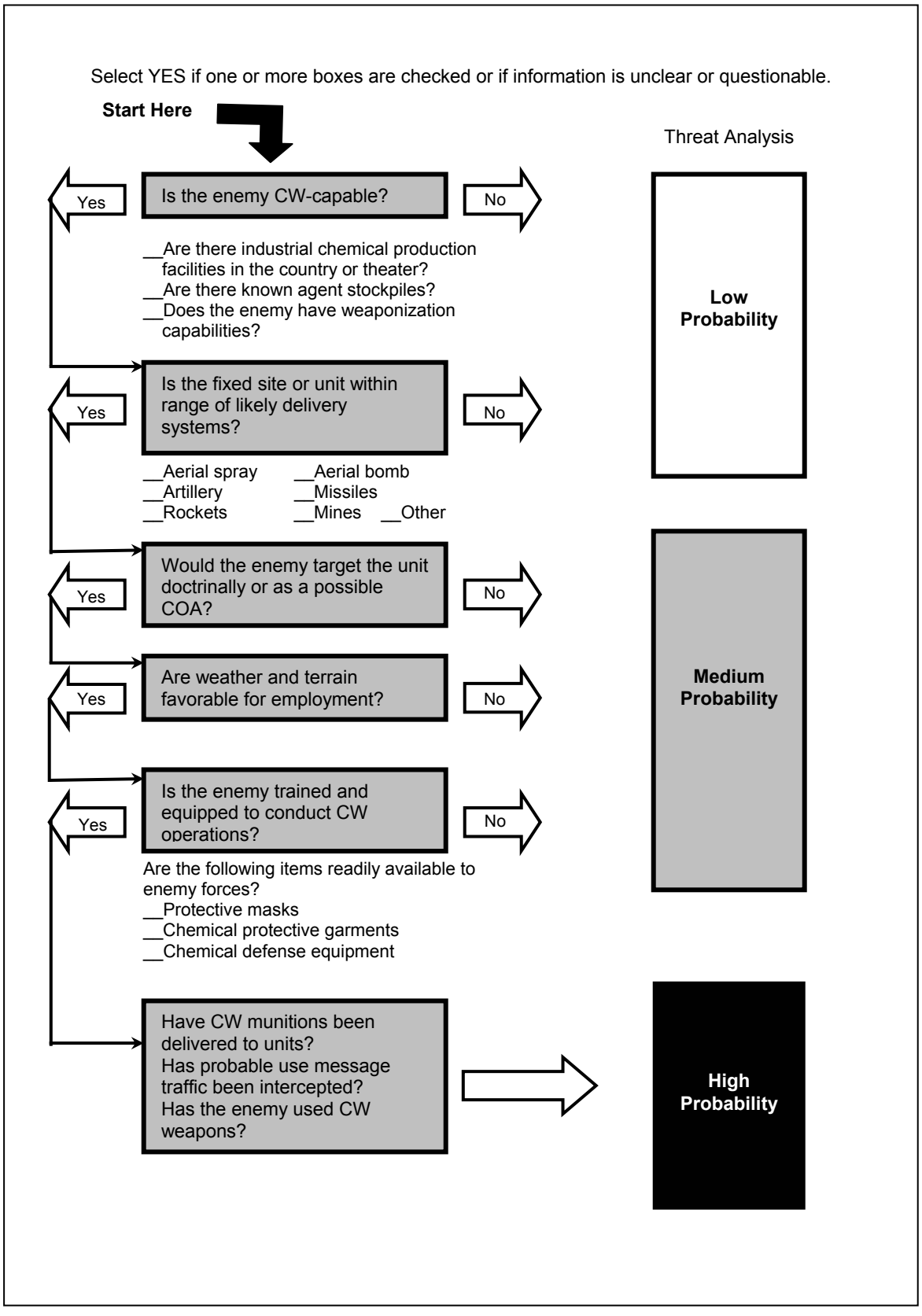

Figure II-5. Estimating the Probability of the Use of CW Agents (Sample)

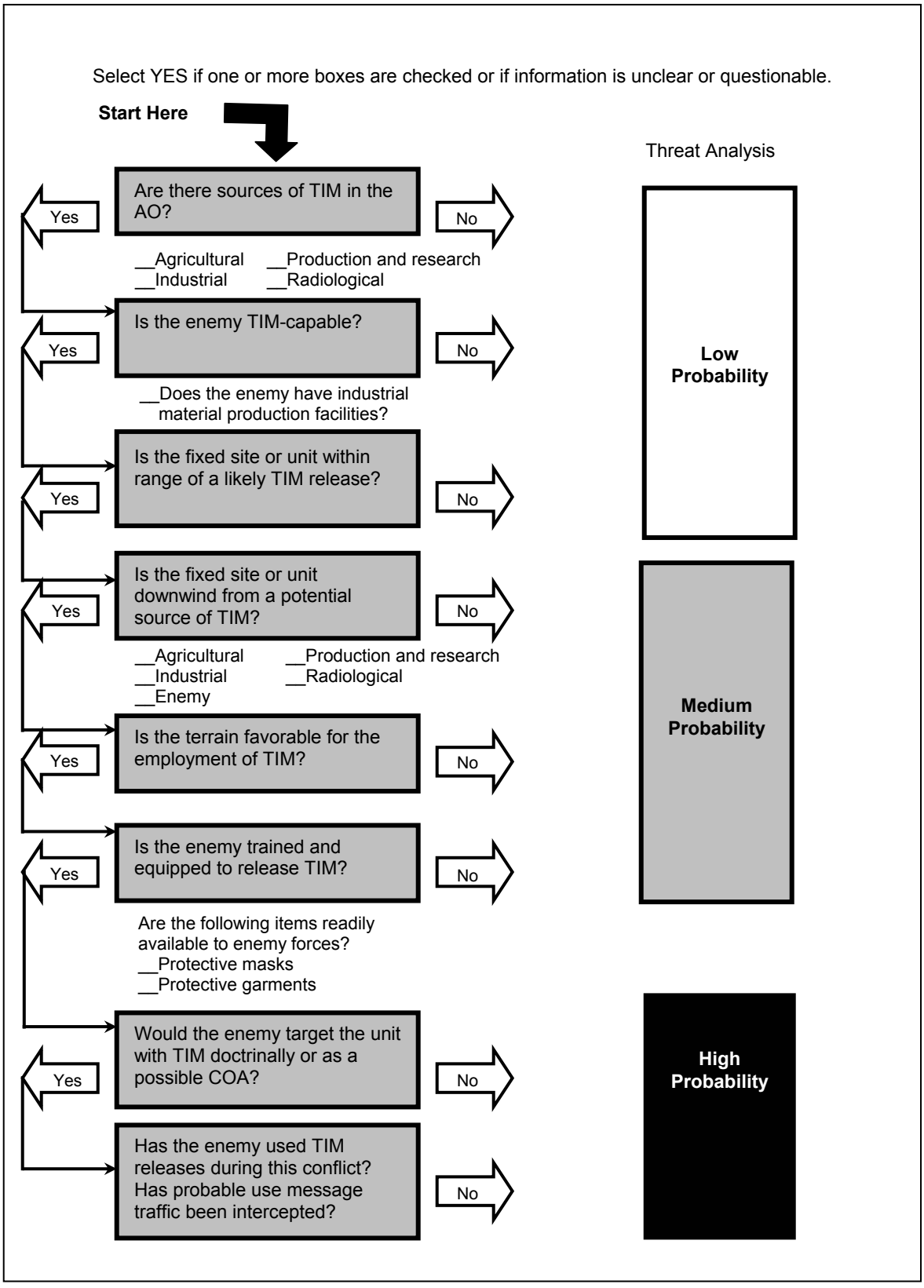

Figure II-6. Estimating the Probability of the Use of TIM (Sample)

Chapter III

NUCLEAR, BIOLOGICAL, AND CHEMICAL VULNERABILITY ANALYSIS

"Uncertainty and risk are inherent in tactical operations and cannot be eliminated. A commander cannot be successful without the capability of acting under conditions of uncertainty while balancing various risks and taking advantage of opportunities. Although the commander strives to maximize his knowledge about his forces, the terrain and weather, civil considerations, and the enemy, he cannot let a lack of information paralyze him. The more intelligence on the enemy, the better able the commander is to make his assessment. Less information means that the commander has a greater risk of making a poor decision for the specific situation. A commander never has perfect intelligence, but knowing when he has enough information to make a decision within the higher commander's intent and constraints is part of the art of tactics and is a critical skill for a commander."

FM 3-90, Tactics

1. Background

This chapter outlines the vulnerability analysis process that may be used by maritime, air, or land forces against enemy NBC or TIM employment. It is the second step in the NBC VA process and culminates with estimating the severity levels of an NBC attack.

2. Nuclear, Biological, and Chemical Vulnerability Analysis and Vulnerability Analysis Process

Vulnerability analysis is a continuous and integrated process of compiling and examining information on the FP posture of a unit or activity. The process assesses multiple factors, such as antiterrorism (AT), FP, medical surveillance (MEDSURV), and the NBC defense capabilities (strengths and weaknesses) of a force or activity. Further, a biological attack is not likely to be identified until MEDSURV systems respond to patients presenting with clinical symptoms or until biological point detection systems provide a presumptive identification result that will likely be used to support detect-to-treat recommendations. The assessment provides the commander with an estimate of the potential severity of an NBC attack or TIM release. The severity level assessment can then be used in the overall NBC VA matrix (see Chapter IV).

The goal of the NBC vulnerability analysis is to accomplish the assigned mission with minimal disruption and degradation. NBC vulnerability analysis is conducted by assessing multiple factors, which may include assessing the mission of the unit/activity, analyzing the critical assets and infrastructure, and analyzing the ability of a unit/activity to respond to an NBC or TIM threat.

a. Assess the Unit/Activity Mission. Mission vulnerability analysis assesses the mission of the unit in relation to the NBC threat. The analysis also assesses the value of vulnerability reduction measures in terms of lost or reduced mission effectiveness. The

commander then assesses the tradeoffs and the acceptable risk to units, facilities, and personnel given the potential estimated degradation in mission effectiveness.

b. Analyze the Critical Assets and Infrastructure. This analysis identifies critical assets and infrastructures (i.e., including food and water sources) located within, on, and adjacent to the unit, activity, installation, base, ship, or port, such as HVTs or LOCs. It addresses the impact of temporary or permanent loss of critical assets or infrastructures on the ability of the unit, activity, installation, base, ship, or port to perform its mission. The staff determines and prioritizes critical assets. The commander approves the prioritized list. This assessment—

- Selects and prioritizes critical assets.

- Determines whether critical functions can be duplicated under various NBC attack or TIM release scenarios.

- Determines time required to duplicate, recover, or restore critical assets or infrastructure efforts if temporarily or permanently lost.

- Determines vulnerability of critical assets or infrastructures to all forms of NBC attack or TIM release.

- Determines priority of response to critical assets and infrastructures in the event of NBC attacks or TIM releases.

c. Analyze the Ability of a Unit/Activity to Respond to an NBC or TIM Threat. This analysis determines the ability to plan for and respond to threat NBC attacks or TIM releases against critical assets and infrastructures. The planning and response analysis examines passive-defensive measures and how well they are integrated into representative functional areas. The NBC training readiness and proficiency must be analyzed when conducting the VA for each functional area outlined below.

(1) Personnel. The vulnerability analysis compares the number of personnel and units available to the number required to effectively respond to an NBC attack or TIM release. Personnel and elements assigned to or identified to respond to an NBC attack may be subordinate or augmented by host nation (HN), local, state, federal, or adjacent units.

(2) Intelligence. The vulnerability analysis of intelligence focuses on the organization's ability to gather, evaluate, and disseminate NBC threat information. It includes passive and active intelligence collection analysis of existing intelligence and the nomination of intelligence collection efforts through the determination of PIRs, intelligence requirements (IRs), and special information requirements (SIRs).

(3) Operations and C2. The vulnerability analysis of planning also examines how a unit, activity, installation, base, ship, or port prepares to respond to an attack. While the preponderance of the actions are preincident, planners cannot disregard the continuous and ongoing nature of planning. In the event of an NBC attack or TIM release that could impact military activities, the unit or activity must plan for and coordinate a large contingent of internal and external support organizations for an effective response.

The subtasks can include operation plans (OPLANs) to include medical and mortuary affairs annexes, operation orders (OPORDs), memorandums of agreement (MOAs) or memorandums of understanding (MOUs), C2 responsibilities, conventional VA, emergency operations center (EOC) functions, information dissemination, warning and reporting, and training exercises. An analysis of these subtasks for completeness, relevance, and effectiveness is considered when conducting a vulnerability analysis. Training must also be addressed. The training readiness is assessed to determine if the unit is trained and ready.

(3) Logistics Support. The analysis of logistics support looks at the operational support (such as supporting logistics infrastructure and the ability to obtain, maintain, store, move, and replenish material resources) required to respond to and recover from an NBC attack or TIM release. For example, transportation support is required to move all assets, both human and materiel, in response to an NBC attack or TIM release. This includes the ability to protect the transport means and the operators during the response support. An NBC environment should also increase the importance of alternative modes and routes. This makes centralized movement control imperative.

(4) Communications. Analyzing communications capabilities is vital to establishing the effectiveness of NBC defense. An organization's NBC defensive capability can be affected if it does not have the communications architecture and interfaces, such as the Joint Warning and Reporting Network (JWARN) to support Nuclear, Biological, and Chemical Warning and Reporting System (NBCWRS) requirements. A crucial aspect of implementing the plan is establishing, maintaining, and controlling communications among the forces in the incident area, the operations center (OPCEN), C2 elements, and NBC response elements. Communications personnel must be able to respond to changing needs during the incident, maintain the existing infrastructure, respond to changing needs over a prolonged period, and maintain control of all incoming and outgoing communications and the communications channels included in the NBC defense response plan.

(5) NBC or TIM Response. The NBC or TIM response includes the ability of the unit or activity to take avoidance, protection, decontamination or contamination control, and other countermeasures to respond to an NBC attack or TIM release. Unit, activity, installation, base, ship, or port personnel should be trained to properly respond to and notify the proper authorities of a suspected or actual NBC attack or TIM release. The proper authorities would then activate the response plan. A comprehensive response plan addresses the full spectrum of incidents that may occur. For example, a TIM response capability includes the capability to detect an oxygen-deficient explosive or flammable atmosphere. Commanders should devise plans to achieve minimal mission degradation as appropriate.

(6) Security. The security plan to be used must be analyzed in order to identify the unit's ability to safeguard personnel, limit exposure, and restrict access at the site of the attack. Additionally, sufficient security forces must be organized, trained, manned, and equipped to react to security events involving NBC weapons. The security force should consist of personnel specifically organized, trained, and equipped to protect the physical security interests of the command. Additionally, security forces should receive training that prepares them to respond to CBRN and TIM incidents. Observer reports, physical evidence, and samples are important in documenting the attack; and the analysis should assess how well the unit plans to conduct these representative functions.

(7) Decontamination Assets. The analysis of decontamination assets should include how well a unit can detect contamination, effect rescue, render lifesaving first aid, and provide decontamination support.

(8) Health Service Support (HSS). The analysis of health and medical services should determine how well a unit can provide adequate preventive medicine (PVNTMED) measures and health and medical care following an NBC attack or TIM release at the attack site and within the medical system. The use of NBC weapons or systems may create large numbers of casualties in short periods, compromise the quality and quantity of health care, pose a serious contamination threat to medical personnel, constrain mobility and evacuation, and potentially contaminate the logistical supply base. These factors have the potential of severely degrading health care delivery, and they require detailed planning. The analysis should observe pre- and postattack medical planning, to include how well a unit—

- Conducts prior coordination with subordinate, adjacent, higher, HN, state, and local medical facilities and aeromedical evacuation units.

- Trains medical teams in the identification, treatment, and handling of contaminated casualties.

- Detects contamination, supervises patient decontamination, and treats patients.

- Designates areas in medical facilities to treat and segregate contaminated patients.

- Assesses and identifies suspicious illnesses and diseases.

- Provides and stockpiles antidotes, pretreatments, and prophylaxis for potential agents (including agents or antidotes from commercial or industrial sources) based on the existing threat and develops a plan for their distribution.

- Conducts medical evacuation and incorporates contaminated patient transport and contamination control into litter and ambulance operations.

(9) Support Services. The purpose of support services is to coordinate efforts to provide shelter, food, and emergency relief supplies following an NBC attack or TIM release. The provision of emergency shelter for NBC attack or TIM release victims includes the use of preidentified shelter sites in existing structures, the creation of temporary facilities (such as tent cities) or the construction of temporary shelters, and the use of similar facilities outside the NBC attack or TIM release-affected area if evacuation is necessary. There may be a need to provide food to victims and emergency workers. This can be done through a combination of fixed sites, mobile feeding units, and bulk food distribution.

(10) Public Works, Civil Engineers (CEs), and Fixed-Site Engineers. Public works should ensure that all facilities and supporting infrastructures remain operational, damage is remedied or mitigated, and the full recovery of affected elements is accomplished

in a timely manner to allow for the recovery of unit operations after an NBC attack or TIM release.

(11) Support Functions (HN, Tactical, Operational, Strategic, National, Local, State, and Federal). An analysis of how a unit, activity, installation, base, ship, or port plans for and integrates support assets into its overall NBC defense response plan should be conducted. An organization that takes a comprehensive approach to NBC planning can take advantage of shared capabilities, resulting in reduced expenditure of limited and finite resources. This support function includes the integration of mortuary affairs operations to include the handling of contaminated remains. This in itself may affect NBC vulnerability reduction measures.

(12) Restoration and Recovery. The restoration and recovery procedures analysis determines the capability to recover from the temporary or permanent loss of critical assets and infrastructures to NBC attacks or TIM releases. Staffs establish restoration and recovery procedures to ensure the continued ability to perform ongoing and future missions. An analysis of how well a unit, installation, activity, base, ship, or port performs restoration and recovery procedures should be completed.

(13) Mortuary Affairs. See JP 4-06 for information on the decontamination of contaminated remains.

(14) Explosive Ordnance Disposal (EOD). The unit or activity response plan integrates the capability of EOD assets. The possibility of unexploded ordnance (UXO) and secondary devices makes it essential for the integration of EOD capabilities.

(15) Installation, Activity, and Fixed-Site Emergency Responders. The unit or activity response plan integrates the capability of emergency responders (such as fire and rescue, emergency services, emergency medical services [EMSs], and hazardous materials [HAZMAT] teams) to respond to an incident. The integration of these capabilities saves lives and minimizes property damage.

d. NBC Defense Planning. The NBC vulnerability analysis is a key first step in developing the NBC defense plan.

(1) Upon the completion of the initial NBC vulnerability analysis, the staff revises or develops the NBC defense plan. The NBC defense plan should provide tiered sets of response actions. The unit, activity, installation, base, ship, or port can then take the appropriate measures commensurate with the estimated severity of the existing NBC threat level.

(2) The NBC vulnerability analysis represents an ongoing process. As such, the NBC defense plan is also continually updated to reflect the heightened or lowered capabilities of a force. A unit's vulnerabilities may change based on—

- The IPB reassessments of an adversary's intent.
- The implementation of vulnerability reduction measures.
- The reduction of protective capabilities.

- A change in friendly force capabilities, such as increased NBC training and enhanced proficiency.

e. Utilize Checklists and Templates. Appendix E provides a supporting checklist for fixed-site and activity vulnerability analysis. The checklist can be used as a sample template when conducting fixed-site NBC VA.

f. Evaluate Assessment Results. The results of the assessment are evaluated and plans are revised as required. For example, the time-phased force and deployment list (TPFDL) may be revised to include required response assets.

3. Nuclear, Biological, and Chemical Severity Categories

The last phase of the NBC vulnerability analysis estimates the potential severity of an NBC attack or TIM release. The estimated severity of an NBC attack is used in the NBC VA (Chapter IV) along with information developed in the NBC threat analysis (Chapter II) to estimate the overall vulnerability and risk to a unit, activity, installation, base, ship, or port.

a. NBC Severity. NBC severity is the expected consequence of an NBC attack in terms of degree of injury, property damage, illness, or other mission-impairing factors that could occur. A subjective or an analytical approach can be taken in estimating the severity of an NBC attack. The severity of NBC attacks can be separated into three categories as follows:

(1) Category I, Critical. A Category I attack causes significantly degraded mission capability or unit readiness, permanent partial disability, extensive damage to equipment or systems, significant damage to property or the natural or physical environment, security failure, or significant collateral damage.

(2) Category II, Marginal. A Category II attack causes degraded mission capability or unit readiness and minor damage to equipment or systems, property, or the natural or physical environment.

(3) Category III, Negligible. A Category III attack causes little or no adverse impact on mission capability, slight equipment or system damage (fully functional and serviceable), and little or no property or environmental damage.

b. Estimating the Severity of an Attack. Estimating the severity of an NBC attack or TIM release upon a unit, activity, installation, base, ship, or port has many inputs and can be a hasty, subjective process. This is a multilayered analysis, where some functions become less important when another function is executed effectively. For example, if the response function is effectively executed, the need for mass care may not be as great. However, analytical tools and manuals and automated decision support tools are available to support assessments to determine the severity of an NBC attack or TIM release. The detailed methods for estimating the severity of an attack can vary according to service doctrine. Also, the level of training that a force has reached can affect the severity of an attack. For example, the impact of an NBC attack can be mitigated by individual and collective NBC defense training.

4. Air Force Chemical Vulnerability Analysis

Readiness personnel use Air Force Manual (AFMAN) 32-4017 and its VA tools for chemical vulnerability analysis.

5. Navy Chemical Vulnerability Analysis

The USN damage control personnel aboard ship use Naval Ships Technical Manual (NSTM), Chapter 470, and its shipboard chemical-hazard assessment guide for chemical vulnerability analysis.

6. Land Force Chemical Vulnerability Analysis (Army, Marine Corps, and Navy Seabees)

Chemical vulnerability analysis focuses specifically on casualty estimates. The basic steps are estimating the delivery capability, generating effects information, and estimating casualty effects downwind.

The casualty estimate process relies on thorough IPB, enemy and physical environmental assessments, and friendly mission analysis. The basic inputs for determining chemical casualty effects are anticipated (or actual) friendly target size, anticipated agent and delivery system, and weather. Additional considerations may include individual protection, COLPRO, and specific response actions.

In many cases, the enemy's primary objective may not be casualty generation. It may be target contamination and the degradation of mission capabilities. When critical equipment, facilities, or terrain are contaminated, operating tempo (OPTEMPO) may slow dramatically. This is caused not only by casualties, but also by MOPP degradation, decontamination requirements, psychological impacts, and mission adjustments in response to the attack or anticipated attacks.

Before conducting a vulnerability analysis, determine the risk of a chemical attack or the threat's capability/probability of use in the unit's AO/AOI within a specific time period. Use this information to generate simplified effects information.

a. Estimate Delivery Capability.

(1) Step 1. Determine the time periods of interest. Time periods of interest are based on the commander's operational concept and situation variables, such as METT-TC. The time period is coordinated with the intelligence and operations officers. They will normally conform to phases or the expected duration of an operation; however, it may be desirable to use other criteria. For example, a maintenance unit may want to use the expected time lag between an anticipated threat chemical attack and the time required to retrieve and don protective gear as the time period of interest. A time period may also be based on factors relating to enemy tactics, such as the expected arrival time of a second echelon force. Further, significant weather changes could also influence the selection of time periods. Vulnerability analysis is generally conducted in support of the planning process, not in support of current operations. The conduct of vulnerability analysis is linked to the planning window appropriate to the level of war at which the HQ operates (e.g., 48 hours at the tactical level, and 96 plus hours at the operational level). The resulting VA should be continuously confirmed or revalidated. For example, the

operational-level HQ would conduct a vulnerability analysis to determine probable enemy targets, agents, dispersal methods, timing, etc. and then the operational- or tactical-level HQ would refine the product of this analysis as weather forecasts and other data become available. Some planning factors are based on a 12- to 48-hour cycle. Fixed-site operations may be based on a significantly higher time frame (i.e., 12 to 96 hours), with time periods of 24 hours or greater used when the IPB allows. Time periods of less than 6 hours are generally not used. For short-term actions, shorter time periods could be used to estimate the effects of initial enemy preparation fires or to estimate the effect of a single chemical-agent attack.

(2) Step 2. Associate the weather data with each time period. Associate each time period with a temperature (ambient or ground), wind speed, and stability category. The M93 Nuclear, Biological, and Chemical Reconnaissance System (NBCRS) can also report ground temperature. The temperature will impact primarily on agent persistency. For each time period, temperature should be expressed as one of the following in degrees Celsius (C): 55, 50, 40, 30, 20, 10, 0, minus 10, minus 20, or minus 30. Determine the temperature by taking the average of the temperatures from each CDM line applicable to the time period of interest. Use this average temperature for all calculations.

NOTES:

1. All required information can be obtained from the CDM.

2. When estimating the persistency for agents expected to last beyond the time period of interest, use the average daily temperature of the day in which the attack may occur.

(a) Wind speed will impact on casualty production, persistency, and downwind agent travel. It should be expressed as one of the following: 3, 6, 9, 12, 15, or 18 kilometers per hour (kph). As a rule of thumb, for any wind speed above 18 kph, use 18 kph. Calculate the wind speed in the same manner used for temperature. In some situations, it may be necessary to modify this number for casualty estimate purposes. For example, if a 24-hour period contains 6 hours of expected high wind speeds (turbulent conditions), you will probably elect to disregard those figures and develop a separate (lower) average for casualty estimation. (The staff estimates that an enemy would not employ chemicals for casualty effects during that 6-hour period of high winds.) Base this decision on the magnitude and duration of the wind change and the expected enemy COA.

(b) Stability categories (stable, neutral, or unstable) also affect casualty production and downwind agent travel. Stability has a major impact on casualty production downwind since it affects the vertical dispersion of the agent. During inversion (stable atmosphere), the agent is trapped in a shallow layer near the ground and the concentration remains high. Inversions typically occur at night with clear skies and light winds. When the atmosphere's stability category is neutral or unstable, the agent's concentration near the ground is lower due to mixing with the surrounding air. Determine the stability category in the same way as temperature and wind speed.

(c) Other environmental factors exist that could impact the analysis. Terrain and vegetation could affect the estimate. These factors can affect the dispersion of the agent, its concentration downwind, and the estimated casualties. However, these factors have been incorporated in the persistency estimate process.

(3) Step 3. Estimate the delivery capability. Estimate the number of chemical munitions likely to be employed in the AO for each required time period. Coordinate with the intelligence officer to produce this estimate. The intelligence officer will need the time periods of interest to produce information concerning the threat's capability to deliver chemical munitions in the AO.

(a) The estimate should indicate the number of delivery units (by type) and the number of rounds (by agent), if available. The intelligence officer also provides estimates on what type of agent the enemy might use in the AO and when and where he might use it. If the situation or event template does not yield the needed information, assume that the enemy can optimize the agent mix. For example, to determine the threat's capability to create a contamination obstacle, assume that they will fire only persistent agents. Likewise, to predict casualty effects, assume that the enemy will fire agents that have the greatest casualty-producing effects.

(b) When the primary threat is covert or unconventional, express enemy delivery capability in terms of the agent weight or as the agent weight plus the expected delivery means—for example, 10 kilograms (kg) of nerve agent delivered by an agricultural sprayer. If estimates indicate a limited agent supply, it will be difficult to estimate how much of that supply will be used each day. As an option for this situation, conduct the analysis for a single enemy attack based on the threat's maximum employment capability during the selected time period.

(c) The intelligence officer considers a number of factors in making his estimate, such as—

- The number of employment assets within range of the AO.
- Other AOs that the enemy force must service (do not assume every delivery system within range will be firing into the AO being considered).
- Enemy locations of chemical munitions.
- Weather effects on probable agents.
- Threat forces' capability to transport chemical munitions to delivery systems.
- The impact of threat attacks on civilians.

(d) The intelligence estimate should provide a range of numbers based on the estimated COA for each time period. The estimate should provide the enemy's maximum weapons capability and most likely delivery capability. Alternatively, different estimates can support various enemy COAs. Estimates should not be based on a friendly COA unless they would significantly impact on the enemy's delivery capability.

(e) It is not necessary to assess every possible situation and enemy option. To do so would result in inefficient use of available time. The goal is to provide estimates to the commander and staff that can be refined later. Continuously assess the situation and look for events and options with the potential for changing the outcome of the battle.

b. Generate Effects Information.

For each estimated time period and munitions estimate combination, develop a set of effects information: casualty estimates, contamination obstacles, persistence, and times and locations of downwind agent effects. Effects information will provide casualty effects and downwind agent effects.

(1) Determine the Casualty Estimate. Use the following steps to determine the casualty estimate.

(a) Step 1. Determine the probable friendly target size. Based on the chemical and the intelligence staff's IPB, select an area/activity that the enemy would probably target and then determine the target size. For example, determine the area occupied by a fixed-site activity; in this case, 400 by 600 meters (m). Calculate the number of hectares (ha) in the selected target area. One ha is equal to 10,000 square meters (m^2); therefore, an area that is 400 by 600 m equals 240,000 m^2 or 24 ha.

(b) Step 2. Determine the probable agent. Unless it is known which agents the threat will employ, assume that the most effective casualty-producing agent is available.

(c) Step 3. Estimate casualties based on IPB, unit training and proficiency, the number of munitions the threat may use, and the predicted temperature (use Tables III-1, III-2, and III-3 for corresponding casualty percentages).

NOTE: If the number of munitions falls between the given numbers, assume the worst case by rounding up to the next higher number. The casualty estimates are valid for wind speeds less than 20 kph. Other factors (such as air stability category, humidity, variation in wind speeds under 20 kph, and delivery error) have minimal effect on casualty estimates for a given time period as opposed to a specific point in time. For example, the templated target area is 24 ha, the predicted agent is GB, the temperature is 10°C, and the weapon is a 152-millimeter (mm) gun/howitzer. Intelligence analysis estimates that the enemy will fire 240 rounds at the target (240 rounds divided by 24 ha is 10 rounds per ha). Go to Table III-1 and extract the approximate casualty percentage (50 percent). To determine blister-agent casualties, use the same procedures with Table III-3; however, use the MOPP level rather than the temperature.

Table III-1. GB Casualties

Munitions in Rounds per ha (100 m^2)			Temperature			
Rocket Launcher	150–155 mm	120–122 mm	-12°C	0°C	10°C	20°C
			Casualty Percentage			
1	2	4	10	16	24	33
2	4	7	14	22	30	40
3	6	10	19	27	37	47
4	8	14	25	34	45	54
4	10	17	31	40	50	60
NOTE: Based on 15 liters/minute breathing rate (rest or light work) and a 9-second masking time.						

Table III-2. TGD or VX Casualties

Munitions in Rounds				Temperature			
Missiles per 1,000 ha	Missiles per 150 ha	Bombs per 1,000 ha	Bombs per 150 ha	-12°C	0°C	10°C	20°C
				Casualty Percentage			
6	1	26	4	5	14	20	21
9	2	40	6	8	18	25	25
12	2	54	8	12	24	31	31
15	2	68	10	16	28	36	36
18	3	80	12	19	32	40	41
21	3	94	14	21	35	42	43
24	3	106	16	23	37	44	45
NOTE: Based on MOPP0. At higher levels, agents are not as effective due to the increased skin protection.							

Table III-3. Blister-Agent Casualties

Munitions in Rounds per ha (100 m^2)		Protective Posture	
		MOPP0	MOPP1
150–155 mm	120–122 mm	Casualty Percentage	
4	7	17	13
7	14	24	18
11	20	34	23
14	27	43	28
18	33	51	32
21	40	57	36

(2) Determine the Downwind Hazard. Associated risks from downwind hazards (see FM 3-11.3 or the appropriate service publication for downwind prediction models) can be broken into three categories as follows:

(a) High Casualty Risk. High casualty risk occurs at winds speeds of less than 10 kph during slightly stable, stable, or extremely stable atmospheric conditions. Agent clouds will produce very narrow and very long hazard clouds.

(b) Low Casualty Risk. Low casualty risk occurs at wind speeds of 10 kph or greater at stability categories of neutral to very unstable. The casualty risk is very low outside the area of immediate effects. Although a significant number of units will be forced to mask, agent hazards will be short and will not extend as far as in previous categories.

(c) High Degradation Risk. High degradation risk occurs during stability categories of neutral to very unstable and wind speeds of less than 10 kph. Agent clouds will produce wide hazard areas with lethal effects rarely extending as far as 10 kilometers (km). The casualty risk to warned, unmasked personnel is low. However, due to the large cloud width, it is possible for every unit in the downwind hazard area to be forced to mask for several hours.

7. Nuclear Vulnerability Analysis

Nuclear vulnerability analysis addresses the impact(s) from blast (shock wave), thermal radiation (high intensity light and heat), initial radiation (within the first minute after detonation), residual radiation (fallout and induced radiation), and EMP. The intensity of nuclear explosion effects varies with the weapon yield and type of burst. The severity of their impact on friendly operations is, in part, a function of activities, such as training readiness, and the defensive measures taken to reduce vulnerability.

a. A technical or operational approach can be used to evaluate the friendly unit vulnerability to nuclear detonations. A technical approach compares unit dispersions with the effects of an expected weapon yield. An operational approach compares unit dispositions with assessed targeting criteria used by a threat target analyst.

b. The primary tool for analyzing friendly dispositions is the radius of vulnerability (RV). The RV is the radius of a circle within which friendly personnel will be exposed to a risk equal to, or greater than, the emergency risk criterion. The RV also includes material that will be subjected to a 5 percent probability of the specified degree of damage (see the RV tables in JP 3-12.2 or JP 3-12.3). The unclassified sample information in Table III-4 is for planning purposes only. For actual vulnerability radii, use JP 3-12.2.

Table III-4. RV (Meters) (Sample)

To obtain the RV, enter the yield column at the nearest listed yield.
(Unclassified, For Planning Purposes Only)

Category	Location						Moderate Damage			Severe Damage		
											Randomly Parked Helicopters	
Yield (kt)	Open	Open Fighting Position	APC	Tank	Earth Shelter	Exposed	Shielded	Tanks	Towed Artillery	Supply Depot	Cargo Transport	Light Observer
0.1	700	600	600	500	300	200	150	100	100	100	400	500
0.5	900	800	800	700	450	300	250	200	200	200	500	800
1.0	1,200	900	900	800	500	400	350	300	250	250	700	1,100
2.0	1,700	1,000	1,100	900	600	500	450	400	300	300	850	1,300
3.0	2,000	1,100	1,200	1,000	700	600	500	500	400	450	1,000	1,600
5.0	2,500	1,200	1,250	1,100	800	700	600	600	500	500	1,200	1,900
10.0	3,200	1,300	1,300	1,250	900	800	700	700	600	600	1,500	2,500
15.0	3,700	1,400	1,400	1,300	950	900	800	800	700	700	1,800	2,800
20.0	4,000	1,500	1,450	1,400	1,000	1,000	900	900	800	800	1,900	3,400
30.0	5,000	1,600	1,500	1,500	1,100	1,200	1,100	1,000	900	950	2,200	3,700
40.0	5,500	1,700	1,600	1,600	1,200	1,400	1,250	1,100	1,000	1,200	2,500	4,100
50.0	6,000	1,800	1,700	1,700	1,300	1,700	1,500	1,200	1,200	1,400	2,700	4,500
100.0	8,000	1,900	1,800	1,800	1,400	2,200	1,900	1,300	1,300	1,700	3,200	5,700
200.0	12,000	2,000	1,900	1,900	1,500	2,500	2,000	1,500	1,500	1,900	3,700	6,200
300.0	14,000	2,100	1,950	1,950	1,600	3,000	2,100	1,600	1,600	2,000	3,800	7,100

c. The ground zero (GZ) for the RV is always assumed to be the point where detonation will do the greatest damage to the friendly unit or installation. Delivery errors are not considered. For the RV of categories not given, see the comparable table in JP 3-12.2 or JP 3-12.3.

d. Analyzing the vulnerability of friendly dispositions and installations consists of the following:

(1) Determining the appropriate threat yields based on current intelligence.

(2) Determining the disposition of friendly unit personnel.

(3) Obtaining the appropriate RV from the RV table.

(4) Estimating the fractional coverage for each target category using the visual, numerical, or index technique. For information concerning these three techniques, use JP 3-12.2. The visual technique is provided in paragraph 8e below.

(5) Recommending ways to decrease vulnerability and increase protection.

e. To determine vulnerability using the visual technique—

(1) Prepare an outline of the unit's current position.

(2) Use a compass, an overlay with the RV drawn to scale, or a circular map scale, and superimpose the RV chosen from Table III-4 or JP 3-12.2 over the predicted targeted area.

(3) Select the GZ that would result in the highest fractional coverage of the target (the highest percentage of casualties or materiel damage).

(4) Use the center point of the compass, template, or circular map scale as the GZ. Choose the GZ that would result in the highest fractional coverage of the target area and visually estimate the percent of the unit covered by the RV.

NOTE: If the estimated fractional coverage yields unacceptable losses of personnel or equipment, the commander must then make a decision on how to reduce the estimated damage or casualties. Countermeasures could include using additional shielding or using other vulnerability reduction measures (see Chapter V).

9. Biological Vulnerability Analysis

Biological vulnerability analysis relies heavily on thorough intelligence to assist commanders with decision support information for the following considerations:

- Immunization level (availability of prophylaxis for anticipated agents).
- MOPP levels.
- Detection posture (deployed biological detection capability such as dry filter units [DFUs] or the Joint Biological Point Detection System [JBPDS]).
- Maneuver (mobility) status (fixed sites are static).
- Hygiene practices.
- Time and weather.

a. Table III-5 provides a sample method for analyzing vulnerability: critical, marginal, or low. Combined with assessments of agent selection, employment "windows," and medical intervention response times, the matrix outlines a sample basic decision-related process that supports vulnerability analysis.

Table III-5. Biological Vulnerability Risk Matrix (Sample)

Immunization (Against Predicted Agents)		Protective Posture[1]		Detection Posture		Hygiene		Time and Weather	
Relative Value		Relative Value		Relative Value		Relative Value		Relative Value	
Complete (90% or greater)	2	MOPP3/4	2	BIDS Portal Shield IBADS JBPDS	2	Good	2	Unfavorable for BW use	2
Incomplete (less than 90%)	4	MOPP1/2	4	Less than two of the detection systems (above)	4	Average	4	Marginal	4
None	6	MOPP Ready MOPP Zero	6	None	6	Poor	6	Favorable for BW use	6

Relative Values = Subjective Rating		Minimum actions resulting from these ratings are described below.
8–15	Negligible	
16–23	Marginal	
24–30	Critical	

Negligible: Maintain the current efforts. Attempt to improve on the areas that are weak.

Marginal: Analyze the current actions, and increase the efforts to reduce the rating. Concentrate on the areas where immediate control is possible (e.g., MOPP levels, hygiene, and detection assets).

Critical: Analyze the current actions, and immediately increase the efforts to reduce the rating. Concentrate on the areas where immediate control is possible (e.g., MOPP levels and hygiene).

Determine the OPCON of the detection assets. If assets are not under OPCON, determine where they are and if the unit is inside the detection "umbrella." Determine if the assets can be repositioned to cover the operation.

Determine if immunization rates are satisfactory for the total force. Typically, contract workers from whatever source may require more immunizations than US military personnel. Provide immunizations as soon as medical and political situations allow. Remember that immunizations require time to work effectively.

[1]If the protective posture provides the required protection for the predicted agent, use a value of 2.

Sample Biological Vulnerability Analysis

1. Begin at the left column, and add the relative values from each column.
Approximately 30% of the unit has been immunized.
- The unit is currently in MOPP0.
- The unit has a biodetection unit attached.
- The unit practices average hygienic measures.
- The weather and time are favorable for enemy BW agent use.

2. Add the values as follows:

4 for immunization
6 for MOPP level
4 for detection posture
4 for hygiene
6 for time and weather
TOTAL = 24 (Critical Vulnerability)

b. Prior to conducting vulnerability analysis, determine the risk of a biological agent attack or the enemy's capability and probability of use (i.e., a BW attack on personnel or BW agent contamination of food or water). Once it is determined that the enemy has the capability and the willingness to employ biological weapons, the next step is to determine the unit's vulnerability to an attack.

c. To determine vulnerability, assess the following areas:

(1) Determine immunization levels in relationship to threat/theater-endemic agents and the availability of prophylaxis.

(2) Determine the unit's protective posture (e.g., biological defense training readiness and proficiency).

(3) Determine the unit's biological detection posture. Does the unit/activity have biological collection detection systems point or standoff capabilities?

(4) Assess the local sanitation, unit hygiene, and field sanitation (i.e., food and water security and the adequacy of the vector control program).

(5) Consider the time of day and weather conditions. The time most conducive for a BW attack is during a clear night or early morning hours with light winds.

d. Apply rating measures in relationship to the probable agent of choice. Also, ratings do not consider troop motivation/morale factors. The final rating provides an estimate and can be used as one basis to support the vulnerability analysis process.

10. Toxic Industrial Material Release Vulnerability Analysis

a. Nature of the Problem.

(1) TIM Release. Because of their lower toxicity and stability, the incidental release of TIM from transport vehicles is expected to affect an area considerably smaller than the one expected from CW agent attacks. However, enemy forces may partially compensate for this by the flexibility offered by targeting transport vehicles (trains, trucks, watercraft). Releases from fixed facilities may be much larger and similar to CW agent attacks in size and downwind magnitude. A ready reference for information on TIM releases is the US Department of Transportation (DOT) *2000 Emergency Response Guidebook, A Guide for First Responders During the Initial Phase of a Dangerous Goods/ Hazardous Materials Incident,* which contains extensive cross-reference tables of dangerous TIM and exposure safety and contamination danger guidance.

(2) Sources. Virtually every nation in the world has some form of TIM production, storage facility, or distribution capability. Most of these TIM are used for peaceful purposes and are considered to be in one of the following categories:

- Agricultural—insecticides, herbicides, and fertilizers.

- Industrial—chemical and radiological materials used in manufacturing, fuels, processes, or cleaning.

- Production and Research—TIM used in research or pharmaceuticals or produced in a facility.

- Radiological—nuclear power plants, medical facilities, and laboratories.

(3) TIM VA. TIM VA relies heavily on intelligence to gain an understanding of the TIM hazard in the AO. The TIM hazard may—

- Produce environmental damage that could result in pollution of water supplies and long-term ecological damage.

- Cause corrosive effects or damage eyes, skin, respiratory tract, and equipment (especially electronic equipment).

- Create flammable or explosive hazards.

- Cause short- and long-term health effects, ranging from short-term transient effects to long-term disability to rapid death.

(4) Protection and Detection. Military protection and detection and medical countermeasures are not specifically designed for the hazards from TIM. Often, there are no specific antidotes for toxic industrial chemicals (TIC). TIM should be recognized for the multiple health hazards they pose as well as the potential risks resulting from an explosion or fire. Most TIM will present a vapor (inhalation) hazard. Vapor concentration at or near the point of release may be very high and may reduce the oxygen concentration below that required to support life.

b. TIM Information Collection. Before any operation, the response element develops an understanding of the potential hazard from TIM in the area of concern. Furthermore, information collection requirements that can support vulnerability analysis include some of the following key factors:

- Identifying all possible industrial plants, storage sites, shipment depots, and the adequacy of security.

- Identifying TIM routinely produced, used, or processed in the area.

- Reviewing available incident response plans (i.e., the availability of military HN response assets).

- Assessing the effects of a TIM release as a result of collateral damage or an accident.

- Assessing whether the deliberate release of a TIM is realistic in this particular situation.

- Identifying local hazard management procedures and civilian agencies responsible for handling HAZMAT incidents.

- Identifying the probable TIM, extent of possible contamination, minimum protective equipment requirements, and other personnel safety considerations.

- Identifying local hazard identification labeling and placarding systems.

- Assessing the need for special detectors and modifications of detectors, such as improved chemical-agent monitors (ICAMs).

- Assessing the need for specialized protection equipment, such as the self-contained breathing apparatus (SCBA) or other special protective equipment.

- Assessing potential information items for the commander, such as the location of safe areas, the decontamination equipment that can be used or is needed, and the effects on military equipment.

c. TIM VA. Before deployment on a mission, leaders conduct VA. The process identifies and assesses the threat, develops controls, makes risk decisions, implements controls, and follows up with supervision and the continuance of the risk management (RM) process.

(1) Analyze the Threat. The IPB process provides information on the TIM threat. The information collected provides data, such as the types of TIM that may be encountered, possible TIM locations, and types of industrial or research facilities that may be encountered during mission execution. An HN liaison (government official, factory worker, or local citizen) may also be able to help further characterize the nature of the threat in question. The analysis determines the direct impact of each TIM on the operation. Technical reach-back may be required to support the assessment, and automated decision support tools also support the assessment process. The unit staff (medical, intelligence, NBC subject matter experts [SMEs]) conducts coordination to prepare an assessment that estimates the severity of the TIM threat, estimates the probability of a TIM event, and determines a risk level and the overall risk to mission accomplishment.

(2) Analyze the Required Standard Precautionary Measures.

(a) Various precautionary measures are analyzed, and options considered include—

- Avoiding the risk and taking precautionary measures, such as selecting an alternate location for an operation and coordinating with fire service and HAZMAT teams.

- Reducing the risk by delaying the COA and waiting until additional resources are available.

- Transferring the risk by taking precautionary actions, such as using another unit that is better positioned or more survivable to accomplish the mission.

- Using physical or operational control (OPCON) measures, such as barriers or signs. Additionally, operational actions, such as use of boundaries, may be used as controls.

- Developing a TIM hazard reconnaissance OPLAN.

- Coordinating with theater medical elements for assistance and follow-on technical support.

- Coordinating with technical escort unit (TEU) elements for follow-on technical support.

- Coordinating with structural engineer elements if the facility to be reconnoitered was damaged or destroyed or the vulnerability analysis indicates that it has been abandoned for a long time.

- Coordinating with the in-theater supporting medical laboratory for the delivery of samples collected during the conduct of TIM reconnaissance operations.

- Reporting findings through command channels.

(b) The availability of needed assets are analyzed in order to implement specific measures. Implementation provides applicable plans or orders that may indicate information, such as the TIM threat or operational measures, or assign missions to collection assets. When friendly units are required to operate in an area where a potential TIM hazard exists, the implementation of precautionary measures may also involve—

- Coordinating emergency response capabilities with local authorities. These teams may be formed from US, coalition, or multinational assets.

- Identifying what and how much TIM material is present, the amount of contamination present, or the extent of possible future contamination in an accidental release of TIM materials

- Coordinating with HQ, coalition, multinational, and HN forces (if available) to identify the availability of chemical accident/incident response and assistance (CAIRA) teams (i.e., TEUs, PVNTMED units, or civilian agencies).

- Revising an accident and incident response plan.

(3) Analyze the Capability of Military Protection and Decontamination Equipment for Responding to TIM Releases. For proper handling, protection, and hazard management information, planners seek guidance from their C2 element. Other sources for assistance include the Chemical Transportation Emergency Center (CHEMTREC) hotline. For emergency assistance within the US and Canada, call 1-800-424-9300; outside the continental United States (OCONUS), call 1-202-483-7617. Commanders also identify the local civilian authorities that may have additional emergency response procedures and resources that can be used.

(4) Analyze the Response Capabilities. Determine what response capabilities are needed for detection of TIM, such as chlorine or ammonia. For example, detection systems can be used for detecting and determining the concentration of a large number of TIC.

(5) Analyze the Necessary Protective Measures. Contingency planning may identify options for evacuating, providing a shelter in place (SIP), or isolating the hazard area and denying entry.

(a) Evacuate or Provide an SIP. When the time and mission allow, evacuation is the best protective response to a TIM hazard. Evacuate personnel closest to the hazard and outdoors (those in direct view of the scene first). The use of evacuation also considers random wind direction changes.

(b) Isolate the Hazard Area and Deny Entry. Isolating the hazard area establishes control and is the first step for protective actions that follow. Exclude personnel who are not directly involved in responding to the hazard, especially responding personnel who are not adequately protected. The initial isolation zone will include upwind distances from the incident that may contain dangerous concentrations.

Chapter IV

NUCLEAR, BIOLOGICAL, AND CHEMICAL VULNERABILITY ASSESSMENT

> "If you know the enemy and know yourself, you need not fear the result of a hundred battles. If you know yourself but not the enemy, for every victory gained you will also suffer a defeat. If you know neither the enemy nor yourself, you will succumb in every battle."
>
> Sun Tzu, The Art of War

1. Background

During the VA, the NBC threat analysis is paired with the NBC vulnerability analysis to develop the NBC VA. Assessing the vulnerability of forces to TIM facility releases uses essentially the same methods as assessing traditional NBC attack vulnerability. In this chapter, NBC VA matrices are also useful for assessing TIM releases.

2. Vulnerability Assessment Deliverables

The end states of VA are the coordinated NBC, medical, and intelligence staff recommendations to the commander on vulnerability reduction measures. The recommendations use the commander's intent and guidance on acceptable risk and vulnerability reduction measures.

3. Vulnerability Assessment Determination

Chapter II provides a sample process for estimating the probability of use (low, medium, or high) for NBC agents or TIM release. Chapter III assesses the potential severity (critical, marginal, or negligible) of the consequences of an NBC attack or TIM release. The output from the threat estimate on the probability of use of NBC agents is used in conjunction with the vulnerability analysis to determine a unit's or activity's overall NBC vulnerability.

a. Vulnerability. The information obtained from Tables IV-1 and IV-2 (page IV-2) is used as the two entry points for Table IV-3 (page IV-2) to obtain the NBC VA. The outcome serves as a planning guide for the execution of vulnerability reduction measures. A vulnerability reduction and RM strategy should try to decrease the probability of attack through passive- and active-defensive measures. Appendixes B, C, and D provide examples of actions that can be taken to reduce risk to the force.

Table IV-1. Probability of the Use of NBC Agents or TIM Release

Risk Level	Probability
High	Likely
Medium	Likely
Low	Unlikely

Table IV-2. Potential Severity of an NBC Attack or TIM Release

Severity Level	Characteristics
Critical	• Significantly degraded mission capability or unit readiness • Permanent partial disability • Extensive (major) damage to equipment or systems • Significant damage to property or the natural or physical environment • Security failure • Significant collateral damage
Marginal	• Degraded mission capability or unit readiness • Minor damage to equipment or systems, property, or the natural or physical environment
Negligible	• Little or no adverse impact on mission capability • Equipment or systems slightly damaged, but fully functional and serviceable • Little or no property or environmental damage

Table IV-3. NBC and TIM VA Risk Matrix

Probability of Use	Potential Severity of an NBC Attack or TIM Release		
	Critical	Marginal	Negligible
High	Extremely high	High	Moderate
Medium	High	Moderate	Low
Low	High	Moderate	Low

b. NBC Vulnerability and Risk Definitions.

(1) Extremely High. Extremely high risk would generally be expected to result in the potential loss of the ability to accomplish the mission if NBC attack or TIM release occurs during the mission or there is a frequent/likely probability of critical loss of equipment of personnel.

(2) High. High risk would generally be expected to result in significant degradation of mission capabilities in terms of the required mission standard, the inability to accomplish all parts of the mission, or the inability to complete the mission to standard if NBC attack or TIM release occurs during the mission.

(3) Moderate. Marginal (degraded) mission capabilities would generally be expected if an NBC attack or TIM release occurs during a mission.

(4) Low. Expected losses would generally be expected to have a negligible effect in the event of an NBC attack or TIM release.

c. Risk Acceptability. The following are general guidelines for commanders on the acceptability of the risk determined during the NBC VA:

(1) Unacceptable. A commander will likely determine that it is unacceptable to confront an extremely high-risk situation without taking an integrated series of FP measures.

(2) Undesirable. A commander may determine that it is undesirable to confront a high-risk situation. Decisions to accept an undesirable risk without vulnerability measures must be made by the commander.

(3) Acceptable. A commander may determine that it is acceptable to confront a moderate risk; however, an integrated series of FP measures will likely still be considered to minimize any degradation in unit or activity mission capabilities.

(4) Minimal Risk. A commander may assess that it is acceptable to confront a low-risk situation; however, an integrated series of FP measures should minimize any degradation in unit or activity mission capabilities.

4. Principles of Vulnerability Reduction and Risk Management

The basic principles that provide a framework for implementing the RM process include the following:

a. Accept No Unnecessary Risk. An unnecessary risk is any risk that, if taken, will not contribute meaningfully to mission accomplishment or will needlessly endanger lives or resources. No one intentionally accepts unnecessary risks. The most logical choices for accomplishing a mission are those that meet all mission requirements while exposing personnel and resources to the lowest acceptable risk. All military operations and off-duty activities involve some risk. The RM process identifies NBC and TIM threats that might otherwise go unidentified and provides tools to reduce or offset the risk. The corollary to this axiom is "accept the necessary risk" required to successfully complete the mission or task.

b. Make Risk Decisions at the Appropriate Level. Anyone can make a risk decision; however, the appropriate level for risk decisions is with the individual who can make decisions to eliminate or minimize the threat, implement controls to reduce the risk, or accept the risk. Commanders at all levels communicate their intent and ensure that subordinates know how much risk they can accept and when to elevate the decision to a higher level. Ensuring that risk decisions are made at the appropriate level will establish clear accountability. The RM process must include those accountable for the mission. After the commander, leader, or individual responsible for executing the mission or task determines that controls available to him will not reduce the risk to an acceptable level, he must elevate decisions to the next level in the chain of command. When a joint force commander (JFC) retains the decision at the joint task force (JTF) to provide a centralized warning of a biological attack, he is exercising this basic principle.

c. Accept Risk When Benefits Outweigh the Consequences. The process of weighing risks against opportunities and benefits helps to maximize mission success.

Balancing risk and mission accomplishment is a subjective process and must remain a leader's decision. The commander's estimate of the tradeoffs between risk (i.e., performance degradation) and mission accomplishment will likely be made without total situational awareness (SA). For example, when a commander decides to establish protective postures in different zones at a fixed site, such as a main operations base (MOB), he is balancing risk against mission accomplishment. Decision aids can support this process of risk assessment.

d. Anticipate and Manage Risk by Planning. Integrate RM into planning at all levels. Commanders must dedicate time and resources to apply RM effectively in the planning process, where risks can be more readily assessed and managed. Integrating RM into planning as early as possible provides leaders the greatest opportunity to make well-informed decisions and implement effective risk controls. During execution phases of operations, the RM process must be applied to address previously unidentified risks while continuing to evaluate the effectiveness of existing risk control measures and modify them as required. When a commander determines that the threat warrants raising the MOPP level of the force to MOPP2, he has effectively anticipated and managed risk based on his planning process.

5. Levels of Nuclear, Biological, and Chemical Vulnerability Assessment and Risk Management

a. The VA and RM processes have two levels of application: crisis action and deliberate. Time is the basic factor that contributes to the selection of the level of application used.

- Crisis Action. Crisis action VA and RM are "on-the-run" mental or verbal reviews of the situation using the basic VA and RM processes. The crisis action processes of VA and RM are employed to consider vulnerabilities and risks while making decisions in a time-compressed situation. This level of VA and RM is used during the execution phase of training or operations as well as in planning and execution during crisis responses. It is particularly helpful for choosing the appropriate COA when an unplanned event occurs.

- Deliberate. Deliberate VA and RM are the applications of the complete processes when time is not critical. They primarily use experience and brainstorming to identify threats/vulnerabilities and develop reduction measures and controls and are, therefore, most effective when done in a group. Examples of deliberate applications include planning upcoming operations, reviewing standard operating procedures (SOPs), performing maintenance, conducting training, and developing damage control or disaster response plans.

b. Whether conducting crisis action or deliberate planning to support VA and RM at the tactical or operational level, OPLANs or OPORDs are prepared and coordinated for the support of assigned missions. To support OPLAN and OPORD development, COAs are developed within the framework of the assigned objective or mission, forces available, and commander's intent.

(1) To develop COAs when confronting a CBRN threat, the staff must focus on the key information necessary to make decisions and assimilate the data in mission

analysis. A complete COA consists of the following information: what type of actions should occur if CBRN weapons are used when the action begins; where the action takes place; why (commander's intent); and how (method of employment for forces—preattack, during-attack, and postattack).

(2) A valid COA at the tactical or operational level should meet the following criteria:

- Suitable: Must accomplish the mission (even in a CBRN environment) and comply with the supported commander's guidance.

- Feasible: Must accomplish the mission within the established time, space, and resource constraints. The commander and staff also assess the potential impact of casualties, contamination, and degradation.

- Acceptable: Must balance the cost with the advantage gained by executing a particular COA. The impact of the vulnerability reduction and mitigation measures are considered in this review.

- Distinguishable: Each COA must be significantly different from others.

- Complete: Must incorporate major operations and tasks to be accomplished to include considerations such as forces required, employment concept, time estimates, and the desired end state.

(3) The COA development and analysis is synchronized within the staff to help ensure the unity of effort and direction.

(4) Appendixes E, F, and G provide tools that can be used when conducting VA. These appendixes include a fixed-site VA checklist, an operational level of war IPB and planning matrix, and a discussion of NBC detection capabilities and associated risk assessments.

Chapter V

NUCLEAR, BIOLOGICAL, AND CHEMICAL VULNERABILITY REDUCTION MEASURES

> "Full Dimensional Protection is the ability of the joint force to protect its personnel and other assets required to decisively execute assigned tasks. Full dimensional protection is achieved through the tailored selection and application of multilayered active and passive measures, within the domains of air, land, sea, space, and information across the range of military operations with an acceptable level of risk."
>
> Joint Vision 2020

1. Background

a. Vulnerability reduction measures occur as part of a US counterproliferation strategy. Counterproliferation is a multitiered, integrated approach intended to deter NBC use and enable US forces to survive, fight, and win in an NBC environment. Counterproliferation is built on four core capabilities: counterforce, active defense, passive defense, and consequence management (CM). Passive defense will be the focus of the vulnerability reduction measures discussed in this chapter.

b. Passive-defense vulnerability reduction measures seek to deter and deny the use of NBC weapons by ensuring that US forces succeed in an NBC environment. The highest priorities for passive defense are force survivability and successful mission accomplishment. Passive-defense operations focus on protecting assets, sustaining mission operations, and minimizing casualties during and after an attack or incident. Passive-defense vulnerability planning is also supported by higher command, providing available information on enemy capabilities and technical reach-back capability.

c. This chapter addresses preattack, during-attack, and postattack vulnerability reduction actions that can be taken in the event of an NBC attack. Because operations in an NBC environment can also include TIM incidents, this chapter also addresses suggested vulnerability reduction actions that can be taken in response to a TIM event. (See Figures V-1 through V-4, pages V-2 through V-5, for examples of vulnerability reduction measures.)

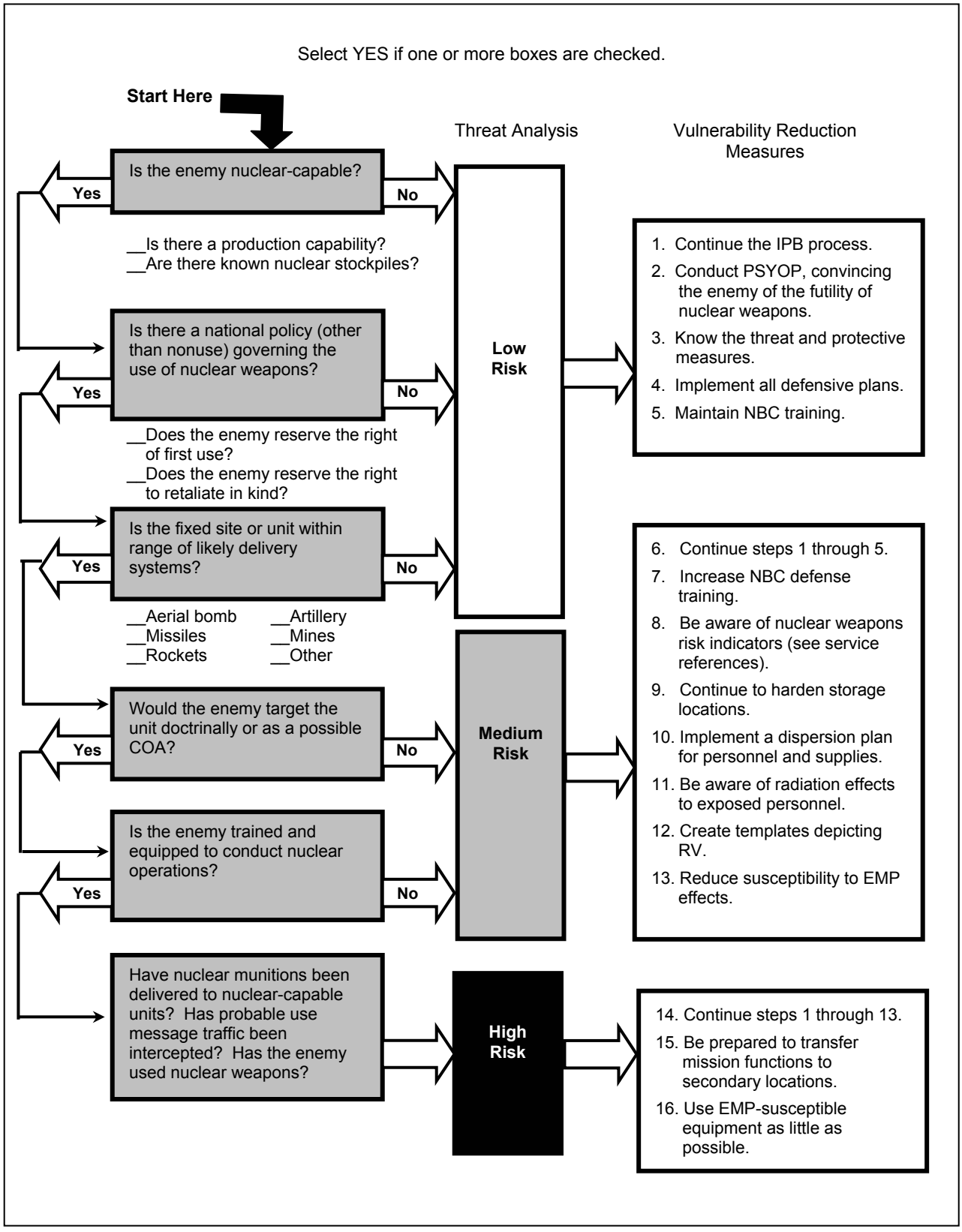

Figure V-1. Nuclear VA

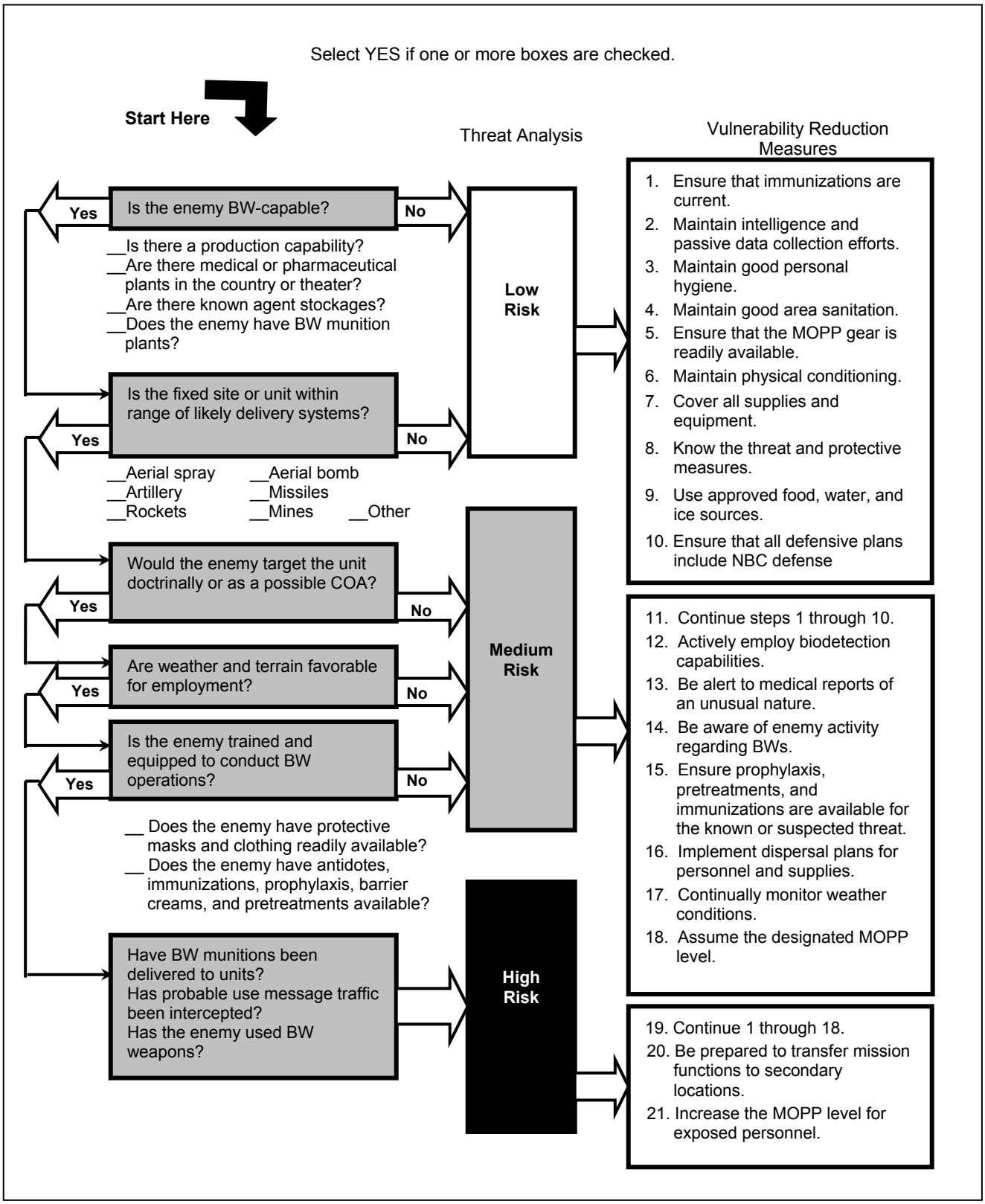

Figure V-2. Biological VA

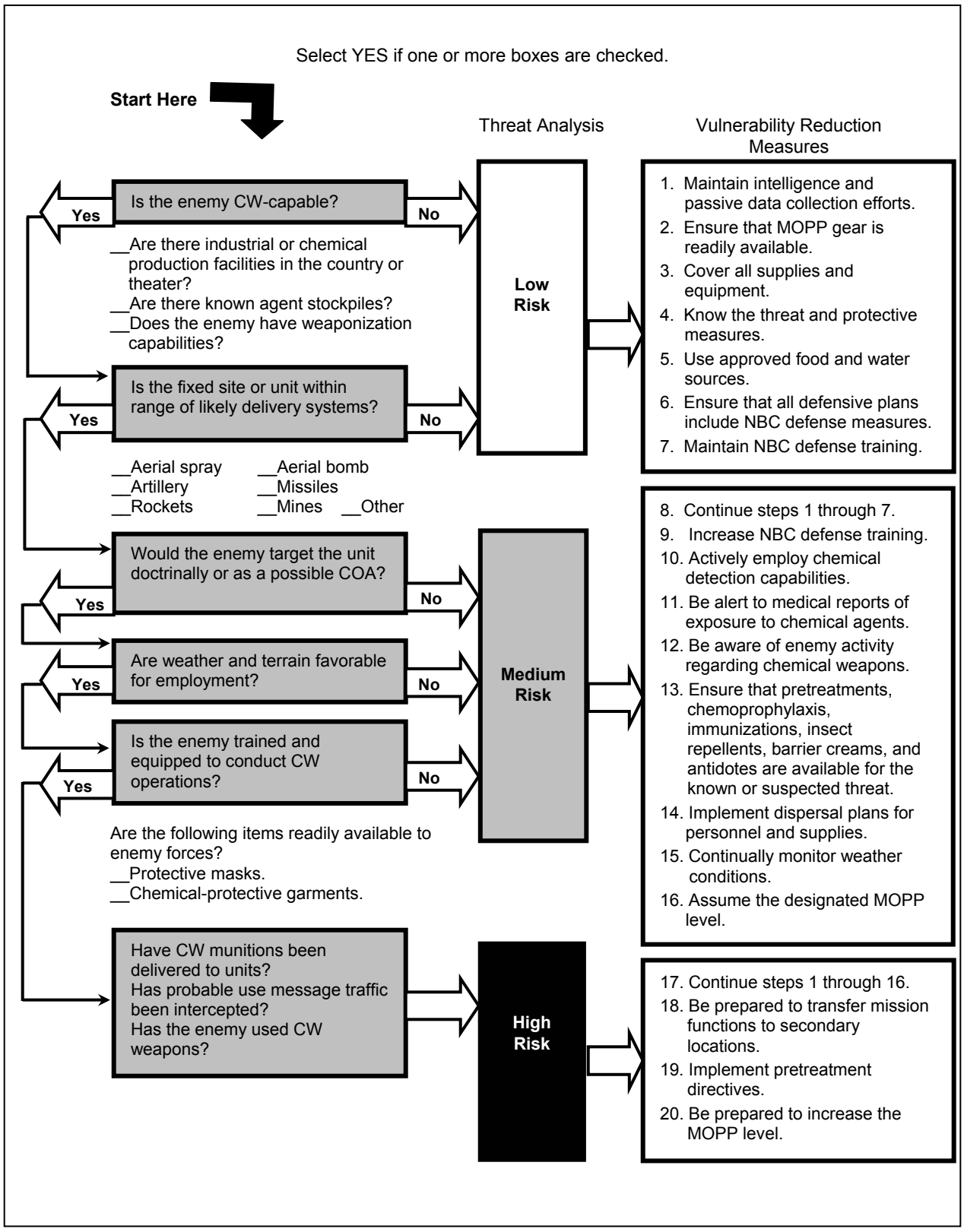

Figure V-3. Chemical VA

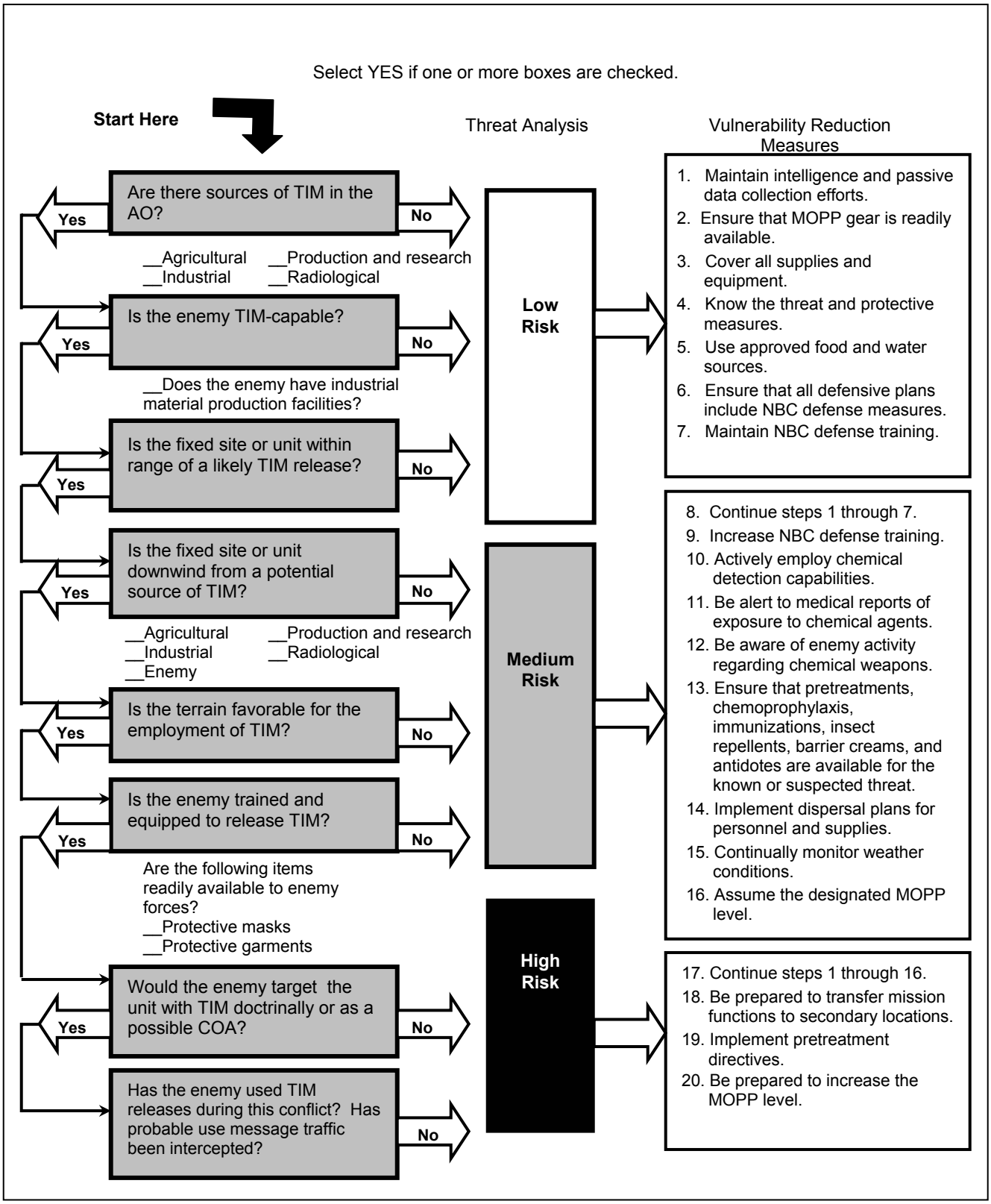

Figure V-4. TIM VA

2. Common Vulnerability Reduction Measures

Personnel will take vulnerability reduction actions before an attack (preattack), during an attack, and after an attack is over (postattack). These actions are based on the type of attack and other factors. There are many common vulnerability reduction passive-defense actions that can be taken to prepare for operations in an NBC environment. A good NBC training program will significantly reduce the overall vulnerability of a unit to an NBC attack. Training provides immediate payback to overall readiness by increasing awareness and reinforcing critical individual and collective skills. These actions could include the following:

- Training personnel.
- Designating proposed decontamination sites.
- Assessing the NBC or TIM threat, potential risk, and likelihood of attack and accomplishing VA.
- Implementing coordinated NBC defense plans.
- Preparing to provide care for casualties.
- Determining and implementing the MOPP level.
- Minimizing skin exposure.
- Continuing good hygiene and sanitation practices.
- Deploying and activating detectors.
- Executing environmental sampling operations.
- Designating and preparing shelters.
- Watching for attack indicators.
- Covering or concealing unprotected, mission-essential equipment.
- Conducting meteorological monitoring.
- Integrating available alarm and warning systems.
- Ensuring that pretreatments, chemoprophylaxis, immunizations, insect repellents, and barrier creams are available and in use as appropriate.
- Using COLPRO.
- Using emergency response (fire and rescue, HAZMAT, and EOD) capabilities.

- Conducting MEDSURV.
- Establishing a baseline MEDSURV.
- Conducting health risk assessments for the population at risk.
- Coordinating NBC defense and medical capabilities.
- Establishing procedures for tracking, raising, and lowering MOPP levels.
- Placing and deploying active defense units.

3. Nuclear Vulnerability Reduction and Mitigation Measures

This paragraph primarily discusses tactical-level vulnerability reduction actions for preattack and during-attack operations. Postattack mitigation actions are also addressed. Checklists for preattack, during-attack, and postattack actions can be found in Appendixes B, C, and D, respectively.

a. Preattack Vulnerability Reduction Measures. Preattack vulnerability reduction actions are critical because they increase the unit's survivability to the greatest possible extent. These actions range from selecting the right individual protective equipment (IPE) and COLPRO, fortifying shelters, establishing procedures for warning and reporting, and protecting vital equipment to increase survivability. Training individuals and units to perform these types of tasks to standard further increases a unit's readiness. Recurring training provides an immediate payback for units or activities as a means to attain and sustain proficiency. Additionally, whenever the tactical situation permits, units prepare defensive positions that vary from individual fighting positions to improved defensive positions. These actions and prior planning protect against nuclear effects. The primary concern should be shielding personnel from gamma and neutron radiation. Gamma radiation protection requires thick layers of dense or heavy shielding material, such as lead, iron, or stone. On the other hand, light, hydrogen-based material (such as water, paraffin, and oil) gives good neutron radiation protection.

b. During-Attack Vulnerability Reduction Actions. A nuclear attack occurring without warning is immediately noticeable. Personnel need to take immediate protective action to prevent exposure, because reaction time will be minimal. Personnel must stay calm, check for injuries, check weapons and equipment for damage, and prepare to continue the mission.

c. Postattack Mitigation Actions. Immediately after an attack, postattack recovery begins. Personnel check for radioactive contamination and reduce the hazard with basic decontamination. For the commander, poststrike actions include damage assessment and the restoration of combat power. (See *MTTP for Nuclear, Biological, and Chemical [NBC] Protection* for guidance on individual protection and COLPRO.)

4. Biological Vulnerability Reduction and Mitigation Measures

This paragraph primarily discusses tactical-level vulnerability reduction measures for preattack and during-attack actions. Postattack mitigation actions are also addressed. Key preparations begin with personal health maintenance followed by NBC defensive training, which all personnel must master. Checklists for preattack, during-attack, and postattack actions can be found in Appendixes B, C, and D, respectively.

a. Preattack Vulnerability Reduction Measures. Leaders must continually follow basic vulnerability reduction methods. These basic vulnerability reduction measures listed below can minimize biological casualties—

- Up-to-date Immunizations. Immunizations reduce the chances of personnel becoming biological casualties. Many diseases are vaccine-preventable, and all military personnel should receive required immunizations. Medical personnel will periodically screen immunization records and document immunizations and prophylaxis as required.

- Pretreatments. Take pretreatments as directed by the appropriate commander.

- Good Hygiene. Protect against the spread of disease by practicing good health habits. The best defense against biological agents is good personal hygiene—keeping the body as clean as possible.

- Area Sanitation. Another way to stop the spread of disease is to keep areas clean.

- Physical Conditioning. Good physical conditioning requires maintaining the body in a well-rested, well-fed, and healthy state. If kept healthy, personnel will be better able to fight off germs. A high level of physical fitness also reduces the likelihood of heat stress when MOPP gear is worn for extended periods.

- Pest Control. Use the DOD Insect Repellent System and other preventive measures, such as mosquito nets, to prevent the spread of insect-borne diseases.

- Training. Conduct individual and collective training to maintain proficiency on the use of measures, such as individual protection and COLPRO.

- Surveillance. Conduct MEDSURV.

- Report Procedures. Establish local procedures for reporting and declaring an "all clear."

b. During-Attack Vulnerability Reduction Actions. If threat forces attack with biological agents, there may be little or no warning. This may depend on the IPB assessment. Immediate actions include assuming MOPP because some toxins require the same amount of protection as chemical agents. Since no wide-scale, immediate-warning biological agent detection device has been fielded, any unknown agent cloud can be considered the beginning of a biological attack. The actions prescribed in Appendix C should be taken.

c. Postattack Mitigation Actions. A biological attack may not be detected until symptoms appear. The use of biological agents can be effective because the attack may have occurred days in advance of any disease being apparent. Due to the lag between exposure and the onset of signs and symptoms, if an attack is successful on unprotected personnel, there should still be time to take action and reduce morbidity and mortality. Actions after a biological attack include submitting NBC reports, beginning postattack recovery, taking samples, identifying casualties by the symptoms they exhibit, and treating those symptoms. This may include the administration of postexposure prophylaxis for those potentially exposed but without symptoms. Early recognition of symptoms and treatment are essential when trying to limit the effects. Biological-agent attacks will not likely be directly detected until sentinel casualties appear and MEDSURV systems respond. Additionally, personnel should decontaminate immediately after an attack, with decontamination kits or soap and water.

5. Chemical Vulnerability Reduction and Mitigation Measures

This paragraph primarily discusses tactical-level vulnerability reduction measures for preattack and during-attack operations. Postattack mitigations are also addressed. Checklists for preattack, during-attack, and postattack actions can be found in Appendixes B, C, and D, respectively.

a. Preattack Vulnerability Reduction Measures.

(1) Assess the chemical threat, potential risk, and likelihood of attack.

(2) Implement a coordinated chemical-defense plan.

(3) Prepare to provide first aid for unit personnel.

(4) Determine and implement the appropriate MOPP level.

(5) Minimize skin exposure.

(6) Continue good hygiene and sanitation practices.

(7) Deploy and activate detectors.

(8) Designate and prepare shelters.

(9) Watch for attack indicators (e.g., observing a chemical cloud, smelling a distinctive odor, observing the release of an agent).

(10) Cover unprotected mission-essential equipment.

(11) Conduct individual and collective training to maintain proficiency for operations in a possible chemical environment.

(12) Evacuate the area if the mission permits.

(13) Self-administer pretreatments as directed.

(14) Establish local procedures for reporting and declaring an "all clear."

b. During-Attack Vulnerability Reduction Actions.

(1) Adhere to Attack Warnings. The attack warning signal directs personnel to take cover and use protective measures.

(2) Use MOPP4. All personnel should assume MOPP4 in the absence of any other information and remain in MOPP4 until directed by the chain of command to reduce their MOPP level.

(3) Conduct unmasking procedures (all clear). Commanders should revert to an appropriate MOPP level based on the current threat and in conjunction with the all clear signal. Personnel engaged in passive-defense functions should repair and resupply defense equipment in preparation for follow-on attacks. All personnel should return their IPE to a ready status in anticipation of the next attack warning.

NOTE: See *Nuclear, Biological, and Chemical (NBC) Protection* for further guidance on individual protection and COLPRO.

c. Postattack Mitigation Actions.

(1) If an adversary uses an air-bursting chemical munition and the mission permits, personnel will avoid outside activities to the maximum extent possible after an attack during the chemical droplet fall phase. The chemical droplet fall phase could last up to 1 hour. The length of time depends on meteorological data and the height of burst (HOB).

(2) Avoid potentially contaminated surfaces and areas.

(3) Obtain and report observations or evidence of an attack.

(4) Survey, control, and mitigate health hazards. Ensure that personnel perform immediate decontamination and perform self- and buddy-aid.

(5) Adjust MOPP. Commanders should adjust MOPP to the lowest possible level consistent with the threat assessment.

(6) Document exposure. Medical staffs should clearly document exposure in the medical records of personnel who have been exposed.

(7) Sample, monitor, and analyze the area for residual hazard. Once the situation permits, the detection efforts determine the extent and duration of the residual hazards.

(8) Plan and implement decontamination and contamination containment actions. These actions are planned and implemented to minimize the operational impacts of contamination.

(9) Conduct mask filter exchange as required.

(10) Provide updates to the higher-level commander and staff.

(11) Provide immediate real-time updates to control centers.

6. Toxic Industrial Material Vulnerability Reduction and Mitigation Measures

US forces frequently operate in physical environments where TIM are present. They must be prepared to respond to the accidental or intentional release of TIM. This paragraph primarily addresses tactical-level attack and during-attack vulnerability reduction measures. Postattack mitigation actions are also addressed. Checklists for preattack, during-attack, and postattack actions can be found in Appendixes B, C, and D, respectively.

a. Preattack Vulnerability Reduction Measures for an Incident or Accident. Before any operation, the activity or unit should consider the following key actions:

(1) Identify all possible industrial plants, storage sites, pipelines, and shipment depots.

(2) Identify TIM routinely produced, used, or processed in the area.

(3) Assess the effects of the release of TIM as a result of collateral damage, accident, or terrorist or belligerent actions.

(4) Assess the potential for the deliberate release of TIM.

(5) Identify local hazard management procedures and civilian agencies responsible for handling incidents.

(6) Identify local hazard identification labeling and placarding systems.

(7) Assess the need for special detectors and modifications of detectors.

(8) Assess the impact of TIM on detector capabilities.

(9) Assess unit training requirements and contingency planning and providing recommendations on how to attain and sustain the required capabilities.

(10) Assess unit capabilities and the need for specialized detection and protection equipment, such as SCBA or special, impermeable chemical suits.

(11) Assess the unit capability to support and sustain specialized detection and protection equipment.

(12) Conduct TIM evacuation planning.

(13) Establish local procedures for reporting and declaring an “all clear.”

b. During-Attack Vulnerability Reduction Actions for an Incident or Accident.

(1) Unit Actions (TIC or toxic industrial biological [TIB] material). Actions can include—

(a) Alerting higher, adjacent, and subordinate units.

(b) Starting monitoring with available detection devices and ensuring that results are reported.

(c) Assuming MOPP4 and moving to a safe distance as quickly as possible.

(d) Establishing a security zone around the area.

(e) Evacuating casualties (casualties should be considered as contaminated and should be contained in one central location) and initiating emergency decontamination of personnel.

(f) Identifying witnesses for questioning.

(g) Establishing a downwind hazard zone.

(2) Unit or Source Level Actions (toxic industrial radiological [TIR] material). Actions could include—

(a) Taking protective action.

(b) Assessing casualties and damage.

(c) Identifying potential locations of TIR materials.

(d) Beginning continuous monitoring and reporting the arrival of fallout.

(e) Reporting increasing, decreasing, or peak dose rates and reporting the completion of fallout.

(f) Receiving an NBC2 nuclear report from higher HQ, preparing a simplified fallout prediction, and informing the commander of the results.

NOTE: See *Nuclear, Biological, and Chemical (NBC) Protection* for further guidance on individual protection and COLPRO.

c. Postattack Mitigation Actions for an Incident or Accident. Key actions following an incident or accident can include—

(1) Controlling the situation.

(2) Protecting yourself.

(3) Preventing the situation from claiming more casualties.

(4) Rescuing, protecting, and treating victims.

(5) Decontaminating exposed victims and minimizing the spread of contamination.

(6) Conducting early hazard identification.

(7) Preserving evidence as required by current regulations.

(8) Following emergency response SOPs and OPLANs.

(9) Conducting coordination interaction with local, state, federal, and HN agencies as required.

(10) Establishing control measures, such as entry control points (ECPs).

Appendix A

POSSIBLE THREAT NUCLEAR, BIOLOGICAL, CHEMICAL, OR TOXIC INDUSTRIAL MATERIAL RELEASE INDICATORS

This appendix furnishes potential indications of an adversary's intent to use NBC weapons or TIM. There are many other possible indicators of an NBC attack, and all other available intelligence sources can provide key data to support the commander's IRs. Individual services provide communications architectures for the dissemination of NBCWRS information through the chain of command. The Global Command and Control System (GCCS) provides information dissemination across service boundaries.

1. General Nuclear, Biological, and Chemical Employment Indicators

The following are general indicators that an enemy may be preparing offensive use of NBC material or TIM:

- Enemy personnel wearing protective masks.
- The widespread or simultaneous issue of special protective masks or filters.
- The enemy MOPP status increased in forward areas.
- Nonartillery units in protective gear.
- NBC units colocated with artillery units or aviation units.
- The enemy conducting NBC training.
- Decontamination supplies cached in forward areas.
- Chemical-protective units sighted moving forward or in forward areas.
- Chemical reconnaissance units sighted moving forward or in forward areas.
- Surface-to-surface missile (SSM) units in position to fire or have fired.
- Enemy multiple launch rockets (MLRs) within two-thirds of their maximum range.
- Enemy artillery within two-thirds of its maximum range.
- Artillery, rocket, or missile crews in protective gear.
- A heavily guarded convoy sighted or convoy personnel sighted wearing protective gear.

- Unguarded convoys sighted in protective gear.
- The movement of small convoys from munitions storage sites.
- The evacuation of civilians from possible NBC storage or delivery sites.
- An enemy with committed strategic reserves.
- Intelligence reports (through radio intercepts, defectors, enemy prisoners of war [EPWs], or other sources) show intentions of NBC weapon use.
- The activation of special C2 channels that could be used to oversee NBC weapons employment.
- Protective gear or CB medical supplies issued to civilians.
- Increased propaganda or warnings of NBC use to civilians.
- The movement of trailers with rockets or missile bodies.
- The evacuation or exclusion of civilians from specific areas suitable for NBC storage or delivery sites.
- The construction of free rockets over ground (FROGs) or SSM launch sites.
- Transporter-erector-launchers (TELs) moving to launch sites.
- The passage of wind data from midrange position to a command or technical element.
- The passage of a "nonsense" word on command and selected fire control nets. These words may be used as execution orders or code words to initiate an NBC attack.
- Unusual radio silence by enemy units.
- The movement of small convoys from warhead storage areas.
- Missile or free rocket units within striking ranges.
- The loss of known locations of identified missile units.
- Air defense weapons deployed to cover possible warhead storage areas.
- A significant increase in physical security afforded certain train movements from rear to forward areas.
- Forward deployment of large numbers of decontamination vehicles or equipment capable of mass volume agent delivery.

- The availability of dual-purpose research and production equipment.

- Stolen or hijacked spray devices, such as crop dusters, agricultural sprayers, or insect foggers or sprayers.

- The attempted purchase or theft of precursor chemicals.

- The attempted purchase or theft of TIM manufacturing equipment.

- Attempts to recruit engineers, scientists, or technicians with NBC or TIM knowledge.

- Reports of imminent threat via news media or propaganda.

- Unusual attempts by suspected individuals to be licensed as HAZMAT operators.

- Abnormal purchases of protective equipment.

- Fund transfers from potential threat governments.

- Intelligence of increased terrorist training in NBC skills.

2. Nuclear- and Radiological-Specific Indicators

The following are general indicators that an enemy may be preparing offensive use of nuclear or radiological operations:

- Enemy hardening shelters with overhead cover.

- Enemy placing sandbags on vehicles to increase shielding.

- Enemy operating radiac devices.

- Recently stolen or unaccounted-for quantities of industrial or medical radioactive source material or equipment.

3. Biological-Specific Indicators

The following are general indicators that an enemy may be preparing offensive use of biological operations:

- Unusual or widespread biological defense activities, such as prophylaxis or vaccinations.

- Biological prophylaxis or chemoprophylaxis issued to populations at large.

- Widespread biological defense exercises in the civilian sector, including the activation of civil defense forces.

- An increase in the number of sick or dying animals or plants for no apparent reason.

- The deployment of biological-weapon loading teams to delivery systems or platforms.

- Biological-detection equipment providing triggers in response to suspected biological event.

4. Chemical-Specific Indicators

The following are general indicators that an enemy may be preparing offensive use of chemical operations:

- Movement forward of chemical defense equipment (CDE) and decontamination supplies.

- Chemical medical supplies issued to enemy troops.

- Chemical munitions cached in forward areas.

- Enemy using or emplacing chemical-agent detectors.

- The confirmation of chemical munitions delivery to artillery or missile units.

- The movement of chemical munitions to unknown locations or firing units.

- The disappearance of chemical munitions from known storage sites.

- The filling of munitions with chemical agents.

- Unusual activity around suspected or known chemical storage sites.

- Chemical munitions release authority given to field commanders.

5. Toxic Industrial Material-Specific Indicators

The following are general indicators that an enemy may be preparing offensive use of TIM operations:

- Attempts by known terrorist groups to obtain commercial driver's licenses.

- Surveillance or unusual activity in or around industrial facilities with TIM storage or production facilities.

- Intelligence reports of theft of HAZMAT, presence of TIM storage facilities, etc.

- Surveillance or unusual activity in or around LOCs for TIM, to include routes in and out of TIM facilities.

- The purchase of TIM-protective equipment by suspicious individuals or groups or suspected terrorist groups.

- Stolen TIM containers and transporters.

Appendix B

PREATTACK READINESS AND ACTION CHECKLIST (SAMPLE)

This appendix provides a sample passive-defense preattack checklist that assists in preparation for an NBC/TIM attack. Figure B-1 provides a sample preattack checklist for NBC and TIM hazards. The sample checklist items are not prioritized or furnished in sequential order.

- ☐ Establish and activate primary and alternate C2 centers, including the NBC reporting system and control center.
- ☐ Review the NBCWRS plan.
- ☐ Activate the NBCWRS.
- ☐ Recall and account for all personnel, and brief them on the latest intelligence or threat information. Report the status to applicable C2 echelons.
- ☐ Reassess and verify the NBC and TIM threat and potential risk.
- ☐ Monitor nonmedical and medical NBC intelligence indicators.
- ☐ Maintain a watch for covert attack indicators.
- ☐ Arm or selectively arm personnel according to local procedures.
- ☐ Suspend noncritical activities, and shelter or evacuate nonessential personnel.
- ☐ Check serviceability and interoperability of primary and redundant communications systems, such as—
  - ✓ Radios.
  - ✓ Phones.
  - ✓ Computers.
  - ✓ Sirens and PA systems.
  - ✓ Flags.
- ☐ Prepare to implement and activate air and ground attack warning systems (sirens, flags, etc.) when required.

Figure B-1. Preattack Checklist for NBC and TIM Hazards (Sample)

- ☐ Report any suspected or actual MIJI activities to the appropriate C2 echelons and centers, suspend noncritical activities, and shelter nonessential personnel.
- ☐ Review during- and postattack actions, checklists, plans, and concepts, such as—
  - ✓ Postattack reconnaissance.
  - ✓ Decontamination.
  - ✓ Contamination avoidance.
  - ✓ CCAs and TFAs.
  - ✓ HSS.
  - ✓ Casualty handling.
  - ✓ The processing of contaminated remains and hazardous wastes.
  - ✓ The replacement of personnel.
- ☐ Implement blackout procedures for areas, sectors, facilities, buildings, airfields, vehicles, flashlights, aircraft, weapons systems, etc.
- ☐ Review quarantine, restriction of movement, and isolation plans.
- ☐ Disperse NBC reconnaissance, surveillance, and monitoring assets, to include detectors and detector teams.
- ☐ Disperse or shelter critical equipment and vehicles, such as—
  - ✓ Aircraft and weapons systems.
  - ✓ Maintenance equipment.
  - ✓ Fire and crash vehicles and systems.
  - ✓ Base recovery equipment and systems.
  - ✓ Security equipment, vehicles, and systems.
  - ✓ Casualty and patient care medical equipment.
  - ✓ Fuel trucks.
  - ✓ Munitions trailers.
  - ✓ Generators.

Figure B-1. Preattack Checklist for NBC and TIM Hazards (Sample) (Continued)

- ✓ Special-purpose vehicles.
- ✓ General-purpose vehicles.
- ✓ NBC reconnaissance team vehicles.
- ✓ EOD vehicles.
- ✓ Ambulances.
- ✓ Damage assessment team vehicles.

☐ Disperse or shelter personnel, to include—

- ✓ Leadership.
- ✓ Intelligence support.
- ✓ Base recovery teams (EOD, medical, NBC reconnaissance, damage assessment, etc.).
- ✓ Security teams.
- ✓ Active defense teams and batteries.

☐ Disperse, issue, or shelter critical supplies, to include—

- ✓ Food.
- ✓ Water.
- ✓ Medicine, NBC pretreatment drugs, prophylaxis medications, antidotes, and other medical supplies, as directed.
- ✓ NBC prophylaxis, as directed.

☐ Establish and implement exposure control systems.

☐ Establish and implement clear guidance on when pretreatments, prophylaxis, and antidotes will be administered.

☐ Protect and harden NBC C2 centers, CCAs, and sites where NBC assets have been dispersed.

☐ Implement CCD operations as required, to include—

- ✓ Smoke and obscuration.
- ✓ Camouflage netting.
- ✓ Decoys.

Figure B-1. Preattack Checklist for NBC and TIM Hazards (Sample) (Continued)

- ✓ Radar reflectors.
- ✓ Other systems and methods.

☐ Harden or splinter-protect vital assets using steel bin revetments, sandbags, earth berms, concrete revetments, or other expedient methods, to include—

- ✓ C4I systems, operations, and centers.
- ✓ COLPRO facilities.
- ✓ Utility generation and distribution systems.
- ✓ War reserve materiel.
- ✓ POL storage and distribution points.
- ✓ Munitions storage, assembly, and loading assets and centers.
- ✓ Supply storage.
- ✓ Medical facilities.
- ✓ CCAs.

☐ Inspect all NBC equipment, such as—

- ✓ NBC detection and COLPRO systems.
- ✓ IPE.
- ✓ Decontamination.
- ✓ CCAs and contamination avoidance gear.

☐ Have protective gear immediately available.

☐ Establish duress codes, if applicable.

☐ Pre-position NBC detection equipment, and activate detection systems, such as—

- ✓ M8 paper on facilities, vehicles, revetments, bunkers, defensive fighting positions, etc.
- ✓ M9 tape on chemical-protective overgarments.
- ✓ Detector kits at designated locations (with designated teams).
- ✓ Other CB detection equipment at designated locations.

Figure B-1. Preattack Checklist for NBC and TIM Hazards (Sample) (Continued)

- ☐ Secure all entry and egress points to areas, facilities, checkpoints, gates, etc.
- ☐ Implement contamination avoidance procedures for facilities, vehicles, personnel, aircraft, etc.
- ☐ Develop work-rest cycles.
- ☐ Implement applicable FP conditions.
- ☐ Implement applicable attack warning conditions.
- ☐ Brief personnel on hydration standards.
- ☐ Brief leaders, supervisors, and personnel on work-rest cycles.
- ☐ Brief personnel on CCA and casualty collection point locations.
- ☐ Brief personnel on contaminated waste disposal locations according to applicable environmental considerations and procedures.
- ☐ Brief personnel on emergency destruction and methods for critical equipment (nonmedical) and information.
- ☐ Brief all personnel on designated relocation or assembly points, if applicable.
- ☐ Brief personnel on LOAC considerations, to include protection of EPWs.
- ☐ Brief personnel on practicing good COMSEC, OPSEC, and physical security.
- ☐ Check the secure food, water, and medical supplies according to local procedures.
- ☐ Coordinate with HN and other services to ensure proper communications and roles and responsibilities that are mutually understood.
- ☐ Don protective gear according to directed MOPP levels.
- ☐ Prepare shelters and COLPRO facilities for occupancy and operations.
- ☐ Report shelter status (stocking, number of personnel, and problems) to command centers.
- ☐ Consider protective actions for military working dogs using COLPRO and contamination avoidance procedures.
- ☐ Establish mortuary-processing stations and systems.

Figure B-1. Preattack Checklist for NBC and TIM Hazards (Sample) (Continued)

- ☐ Implement exposure control systems.
- ☐ Identify NBC defense required capabilities for assigned missions.
- ☐ Prepare sample evacuation plans.
- ☐ Exercise contingency plans.
- ☐ Determine the locations of all known nuclear facilities and radioisotope resources (e.g., hospitals and clinics with nuclear medicine capability and industries with isotopic weld-testing sources).
- ☐ Determine the locations of hospitals, clinics, and medical treatment facilities.
- ☐ Determine what radiation detection equipment is within the AO and who it belongs to (commercial vendor, government, government agency, or HN).
- ☐ Determine the distribution of military radiation measuring instruments to deploying units.
- ☐ Determine the disposition of specialized radiation survey teams. Identify the contractual expertise available to negotiate any required civil medical or technical support.
- ☐ Determine if friendly or enemy equipment and ammunition containing DU or other radioactive materials are likely to be present.
- ☐ Determine the locations and functions of high-priority TIM facilities and associated chemical product lines and storage.
  - ✓ What are the operational levels, security, and infrastructure associated with these TIM facilities.
  - ✓ What storage volumes are associated with these TIM facilities?
  - ✓ What possible or potential environmental contamination exists?
  - ✓ What hydrological, meteorological, and topographical geospatial data exist for these facilities?
- ☐ Determine the local hazard management procedures and civilian agencies responsible for handling incidents.
- ☐ Determine what local hazard identification labeling and placarding systems exist.
- ☐ Determine the status of the distribution of military NBC detection equipment to deploying units.
- ☐ Determine the disposition of specialized NBC and TIM reconnaissance teams and equipment.
- ☐ Determine the disposition of IPE and CPE.
- ☐ Identify the need for special or modified NBC or TIM detection equipment or protective equipment.

Figure B-1. Preattack Checklist for NBC and TIM Hazards (Sample) (Continued)

Appendix C

DURING-ATTACK READINESS AND ACTION CHECKLIST (SAMPLE)

This appendix provides a sample during-attack checklist (Figure C-1) that assists during an NBC attack or TIM release.

- ☐ Don remaining protective gear according to the SOP or command direction.
- ☐ Perform NBC immediate actions and NBC defense measures as required or directed by the SOP (move to designated shelters, take cover, perform immediate decontamination, etc.).
- ☐ Perform first aid (self-aid, buddy aid, and combat lifesaver) procedures.
- ☐ Conduct mission-essential operations as applicable.
- ☐ Report known or suspected enemy movement or activity.
- ☐ Provide NBC reports.
- ☐ Monitor, document, warn, and report contamination information.
- ☐ Immediately convey warnings to others in the AO.

Figure C-1. During-Attack Checklist for NBC and TIM Hazards (Sample)

Appendix D

POSTATTACK READINESS AND ACTION CHECKLIST (SAMPLE)

This appendix provides a sample postattack checklist (Figure D-1) to be used after an NBC attack or TIM release.

- ☐ Remain in the during-attack protective posture until directed to do otherwise.
- ☐ Practice good COMSEC.
- ☐ Perform first aid (self-aid, buddy aid, and CLS), rescue, and firefighting operations.
- ☐ Check zones and AORs for NBC and TIM indicators, such as—
  - ✓ Dead or injured animals or personnel.
  - ✓ Suspicious liquids, mists, or powders.
  - ✓ Color changes on M8 paper and M9 tape.
  - ✓ Indications from other NBC detectors.
  - ✓ Leaking munitions.
- ☐ Check areas, buildings, facilities, equipment, vehicles, fighting positions, ditches, etc.; and report the status (including mission impact) to C2 centers for the following:
  - ✓ Casualties.
  - ✓ UXO.
  - ✓ Damage.
  - ✓ Fires.
  - ✓ Enemy activity or suspicious personnel using the SALUTE format.
  - ✓ Enemy casualties and abandoned weapons.
- ☐ Report the impact of NBC attack or TIM release on the mission.
- ☐ Check for secondary explosive devices.

Figure D-1. Postattack Checklist for NBC and TIM Hazards (Sample)

- ☐ Verify the integrity of COLPRO systems.
- ☐ Verify the integrity of facilities and operations with expedient COLPRO and hardening.
- ☐ Verify the operation of NBC detectors, to include the changing of batteries if necessary.
- ☐ Verify the operation of communications and warning and reporting systems.
- ☐ Treat casualties and potential victims as required.
- ☐ Mark and avoid UXO and contaminated areas.
- ☐ Decontaminate personnel and critical equipment and vehicles.
- ☐ Take contaminated waste to designated disposal points according to environmental considerations.
- ☐ Restock critical operations with munitions, ammunition, POL, first aid items, food, water, clothing, batteries, etc.
- ☐ Process human remains using mortuary-processing stations and systems.
- ☐ Execute base denial and emergency destruction (nonmedical) procedures as required.
  - ✓ Weapons.
  - ✓ Classified material.
  - ✓ Communications gear.
  - ✓ Sensitive equipment.
- ☐ Transport samples to labs as required (chain-of-custody rules apply).
- ☐ Be aware of additional NBC or TIM attack indicators, such as an unusual number of personnel reporting to medical facilities.
- ☐ Monitor the area for NBC and TIM contamination.
- ☐ Implement exposure control operations.
- ☐ Implement contamination control procedures.
- ☐ Notify appropriate command elements, to include the impact on the ability to execute the mission.
- ☐ Decide if the installation, port, area, etc. should be evacuated; and notify all affected personnel via warning systems to avoid the area, evacuate, or SIP.
- ☐ Notify local, state, federal, or HN authorities as applicable.
- ☐ Increase FPCONs as needed.
- ☐ Recall and activate specialized personnel and teams as required.
- ☐ Conduct active- and passive-defense measures.

Figure D-1. Postattack Checklist for NBC and TIM Hazards (Sample) (Continued)

- ☐ Submit required reports.
- ☐ Request assistance from local, state, federal, or HN authorities as necessary.
- ☐ Respond to the incident scene, and identify safe routes for follow-on forces.
- ☐ Establish the on-scene C2 structure and system.
- ☐ Designate an assembly point for follow-on forces.
- ☐ Approach the incident site from an upwind or crosswind direction.
- ☐ Search the area for victims.
- ☐ Conduct immediate lifesaving actions.
- ☐ Move victims to safety.
- ☐ Decontaminate victims.
- ☐ Conduct firefighting operations.
- ☐ Establish hot, warm, and cold zones.
- ☐ Determine evacuation requirements.
- ☐ Establish communications with the appropriate C2 centers and local, state, federal, and HN authorities.
- ☐ Look for NBC and TIM use indicators and evidence.
- ☐ Look for IEDs or triggering devices.
- ☐ Be aware of potential hostile forces.
- ☐ Conduct medical intelligence estimates.
- ☐ Sample water supplies for NBC or TIM contamination.
- ☐ Assess increased, unexplained, or unusual illnesses; health complaints; or large numbers of people reporting to medical facilities.
- ☐ Perform detection, sampling, and presumptive identification procedures. Prepare samples for shipment (with documentation and chain of custody established). Transport samples to the supporting medical laboratory for field confirmatory identification.
- ☐ Identify incident site coordinates.
- ☐ Determine the size of and establish a cordon.

Figure D-1. Postattack Checklist for NBC and TIM Hazards (Sample) (Continued)

- ☐ Protect classified material and equipment.
- ☐ Provide advice concerning the appropriate level of PPE.
- ☐ Conduct hazard predictions and toxic corridor calculations.
- ☐ Perform render-safe procedures on IED and triggering devices.
- ☐ Report positive, negative, and unknown NBC and TIM indicators.
- ☐ Identify or categorize the incident as CBRNE.
- ☐ Monitor the stay times for entry teams, if applicable.
- ☐ Conduct occupational and environmental health surveillance and health risk assessments.
- ☐ Determine personnel exposure levels.
- ☐ Develop work-rest cycles.
- ☐ Implement patient-tracking systems.
- ☐ Transport patients as necessary.
- ☐ Conduct detailed monitoring and sampling operations as required.
- ☐ Adjust the cordon as necessary.
- ☐ Control, contain, and dispose of contaminated waste according to applicable environmental considerations.
- ☐ Develop and implement recovery and reconstitution activities.
- ☐ Develop AARs.
- ☐ Conduct decontamination and collection site closeout, marking, and reporting.

Figure D-1. Postattack Checklist for NBC and TIM Hazards (Sample) (Continued)

Appendix E

FIXED-SITE NUCLEAR, BIOLOGICAL, AND CHEMICAL VULNERABILITY CHECKLIST

This appendix provides a sample unit or activity NBC defense vulnerability checklist (Figure E-1, page E-2). Functional areas include—

- Information and planning.
- Communications.
- NBC defense response.
- Security.
- Firefighting and specialized emergency support.
- HSS.
- Mass-casualty management.
- HN and national support functions.
- Resource support.
- Public works and fixed-site military engineers.

This checklist can be used as a basic template when conducting fixed-site NBC VAs of an installation. Each functional area includes examples of subtasks that should be checked.

Information and Planning
☐ Review the VA for content, procedure, and applicability to NBC defense. The VA should reference NBC defense in the AT plan. Known hazards and vulnerabilities at the installation, especially those unique to the installation, should be properly identified. The data should be current and readily available to all response agencies.
☐ Ensure that the NBC defense plan is an appendix to the AT plan and includes information and planning, communications, legal, NBC defense, security, firefighting, HSS, resource support, mass-casualty management, public works and fixed-site military engineers, decontamination procedures, and HN and national support functions.
☐ Include NBC defense protocols in the AT plan. Additionally, the plan should be coordinated to reflect HN and national NBC response capabilities.
☐ Review the AT plan for and include NBC defense threat indicators.
☐ Include the NBCWRS, alert notification, and sheltering and evacuation procedures in the EOC SOP and the emergency response plan.
☐ Establish agreements between the installation commander and tenant units for notification procedures, personnel tasking, equipment taskings, etc. (as appropriate).
☐ Ensure that the NBC defense plan identifies those facilities and transportation routes that are near the installation, have significant amounts of TIM, and would pose a health hazard or threat to personnel.
☐ Ensure that the NBC defense plan identifies the characteristics and symptoms of local TIM substances, which may impact the selection of monitoring and detection devices.
☐ Ensure that the NBC defense training and exercise program includes incident response and CM exercises.
☐ Ensure that the NBC defense plan identifies an alternate EOC. The alternate EOC should be a fixed-site or mobile command post. It should be equipped with items such as radios with interoperable capabilities, cellular phones for backup communication, laptops equipped with plume projection capabilities, detection and monitoring devices, local and regional maps, and any additional requirements from higher HQ.
☐ Ensure that the NBC defense plan identifies those units with the capability of processing NBC agents in a laboratory or by other means. This should include technical escort procedures or POCs, if required, for sample preparations and evacuation.
☐ Ensure that the EOC has procedures in place to provide current meteorological data, coupled with real-time plume projection capabilities to the OSC. Installations should have emergency personnel equipped and trained to use plume projection models.
☐ Review the evacuation procedures of the installation; and ensure that it includes EOC notification, predesignated transportation and designated route evacuation, assembly area designation, personnel accountability, traffic control points and security patrols, and off-post coordination (if necessary).
☐ Ensure that the development of emergency response and contingency plans includes coordination between appropriate staff and response activities (e.g. disaster preparedness, medical, fire department, and EOD). In addition to developing plan content, these activities should be included in exercise preparation and planning.
☐ Ensure that the development and integration of military and civil response follows fire and rescue ICS procedures. Typically, first-response organizations establish on-scene command, which seeks to preserve life. Only through preincident coordination and exercises can proper interoperability occur during incidents.

Figure E-1. Installation NBC Defense Vulnerability Checklist (Sample)

Information and Planning (Continued)
□ Determine the local TIM that may require detailed planning and the acquisition of specialized protection, detection, and decontamination equipment.
□ Assess and estimate the protection afforded by standard military IPE and CPE against the possible local TIM release.
Communications
□ Ensure that the EOC (or ROC for Navy installations) has procedures in place to initiate recall procedures of all essential personnel and to activate the IRT.
□ Ensure that the OSC is capable of providing the EOC a current assessment of the incident site.
□ Ensure that the communication equipment used in conjunction with NBC defense provides interoperability between various local, state, federal, and HN organizations. Additionally, backup systems and methods of communication should be identified.
NBC Defense Response
□ Train the initial responders to identify NBC and TIM agents that may have been used. This training should ensure that all responding personnel, including augmentation forces, are capable of performing routine and emergency duties quickly and efficiently. The initial training should include weapons handling and qualification, ROE, use of deadly force, detection and marking procedures, emergency response procedures, equipment usage, and the implementation of FPCON measures at a minimum.
□ Ensure that the installation is capable of establishing appropriate decontamination stations for the responders and decontaminating personnel and key equipment on the installation.
□ Ensure that the initial response agencies are equipped with sufficient equipment (type and quantity) to provide effective execution of prescribed duties and ensures effective response to emergencies. Equipment should include proper vehicles and PPE. Minimum PPE includes a protective mask with a sealed canister. **NOTE: PPE for contract personnel should be included in their contract. This might require that some commands renegotiate contracts to provide for this requirement.**
□ Ensure that designated emergency responders have the capability to rapidly identify NBC defense agents or TIM that may have been employed.
□ Train and certify all emergency responders at the awareness, operational, and technical levels, as applicable. Furthermore, medical responders must be capable of performing triage and the initial treatment of injured personnel. The NBC-IST, with augmentation, should be capable of accomplishing the initial decontamination of personnel.
□ Include preparation for the emotional and mental health impact of a terrorist incident into the training of emergency responders.
□ Ensure that ICS familiarization training occurs for military response forces and supporting military staffs. Initial civil first response to incidents will likely be under the ICS. Military support to civil responders must consider the ICS as an established C2 system and plan on its full function and interoperability.
Security
□ Ensure security forces (to include contract forces) are equipped with sufficient equipment to provide for an effective execution of their prescribed duties. Equipment should include weapons, ammunition, communications equipment, protective masks, and PPE. Additionally, specialized equipment such as identification, monitoring, and detection devices; explosive detection equipment; vehicle inspection equipment; and NVDs should be readily available.

Figure E-1. Installation NBC Defense Vulnerability Checklist (Sample) (Continued)

Firefighting and Specialized Emergency Support
□ Ensure that specialized emergency support is available for NBC response operations. Emergency support consists of EOD, bomb detection, special response teams, negotiators, HAZMAT, etc. If external support is used by the installation, formal MOUs/MOAs must be promulgated if possible. If formal agreements are not possible (for various reasons in different countries) FFRs should be created to maintain an historical record in order to document verbal agreements or reasons for nonsupport. □ Ensure that response plans indicate the sources of EOD or bomb squad support, alert procedures, and response times. The plan should also reference the formal written agreements with those agencies providing EOD or bomb squad support.
HSS
□ Ensure that the medical contingency plans and annexes identify the capabilities (to include IPE requirements) of HSS activities and organizations to respond to an NBC event. □ Ensure that the plans and annexes include protocols required to check food and water supplies for contamination. □ Ensure that the installation surgeon, medical center, and medical activity establish response team membership and prepare a specific equipment list for each team. Teams may include incident site emergency medical treatment response teams, medical evacuation response teams, PVNTMED response teams, a veterinary response team, a mental health response team, an operations response team, a medical logistics response team, and a medical laboratory to receive samples or specimens. □ Ensure that medical planning provides for reach-back contact information for USAMRICD, USAMRIID, AFRRI, CDC, and USACHPPM for technical guidance and support. □ Ensure that liaison is established (as required) with local, municipal, state, and federal agencies in the plan. The plan provides guidance to response teams on their relationships with local, municipal, and state agencies as they relate to CBRNE event response. □ Include procedures in the plan for medical response teams to obtain support from the USAMEDCOM SMART. □ Ensure that medical contingency plans and annexes address— ✓ The availability of mass prophylaxis. ✓ Evacuation and SIP plans. ✓ Prophylaxis and vaccination distribution plans. ✓ The ability to develop surge capacity. ✓ Decontamination and evacuation capabilities. □ Ensure that planning provides the establishment of a staging area for all response teams. □ Ensure that the plan provides for alerting response teams, establishing medical C2 staff for the response, establishing liaison, briefing response teams, dispatching response teams, monitoring response activities, and requesting additional support as required.

Figure E-1. Installation NBC Defense Vulnerability Checklist (Sample) (Continued)

HSS (continued)

- Ensure that plans provide for—
  - ✓ Closing all response team locations.
  - ✓ Ensuring that all response personnel and equipment are decontaminated and that contaminated expendables are placed in the contaminated waste area for disposal.
  - ✓ Debriefing all response personnel.
  - ✓ Directing each response team to prepare an AAR.
  - ✓ Ensuring that all teams replenish all expended equipment and supplies.
  - ✓ Ensuring that all controlled materials in storage are safeguarded and maintained at required temperatures.
  - ✓ Ensuring that all dated drugs are rotated through the supporting MTF to prevent exceeding expiration dates.
  - ✓ Releasing teams not involved in the postincident site decontamination operations and beginning preparation in case another incident occurs.
  - ✓ Providing medical advice to the installation commander and incident site restoration teams and personnel as required.
  - ✓ Providing assignments to designated teams.
  - ✓ Receiving response team duty assignments.
  - ✓ Assembling supplies and equipment into functional sets or as directed by the commander or planning staff.
  - ✓ Storing supplies and equipment as directed, ensuring that all supplies and equipment are safeguarded, and ensuring that all antidotes, anticonvulsants, and other medications are stored in the proper area and at the correct temperatures.
  - ✓ Rotating dated medications through the supporting MTF to maintain the current stockage.
  - ✓ Requesting training material and doctrinal publications and guidance on incident response activities.
  - ✓ Training teams to meet response requirements.
  - ✓ Terminating operations and preparing for the closure of response site activities.
  - ✓ Decontaminating nonexpendable supplies and equipment, and disposing of contaminated expendable items in the designated contaminated dump area.
  - ✓ Decontaminating response personnel before departing the incident site.
  - ✓ Decontaminating nonexpendable material and equipment, placing contaminated expendable items in the designated contaminated disposal site, and closing the decontamination site.
  - ✓ Continuing to monitor operations during the postincident site decontamination operations, and providing recommendations on findings during the monitoring process.

Figure E-1. Installation NBC Defense Vulnerability Checklist (Sample) (Continued)

Mass-Casualty Management
☐ Ensure that the mass casualty plan (or equivalent medical annex) identifies the medical care providers in the area who will accept NBC casualties and identifies the level of treatment that they can provide.
HN and National Support Functions
☐ Ensure that off-installation agencies that will perform mutual assistance in the event of an NBC defense incident are included in the installation NBC training and exercise events. ☐ Ensure that MOUs and MOAs for additional emergency augmentation are coordinated and established.
Resource Support
☐ Designate an MADCP in the NBC response plan for the temporary storage of contaminated fatalities. ☐ Acquire refrigerator vans for the temporary storage of remains. ☐ Establish procedures to ensure that all NBC defense equipment is properly inspected and maintained on a regular basis. ☐ Outline the procedures for emergency resupply and measures for the reconstitution of IPE in areas of higher NBC threat. Sufficient quantities and sizes should be available for all necessary personnel. ☐ Ensure that procedures are addressed for repairing and servicing NBC defense identification and detection equipment. ☐ Maintain and identify a local source of additional decontamination solutions and materials to be stored in predesignated areas for the installation. ☐ Institute procedures to effectively manage and maintain NBC defense supplies (protective equipment, Level A protective suits, SCBA, JSLIST, overboots, gloves, protective masks, CB filters, decontamination solutions, and any other NBC supplies). ☐ Ensure that the installation stores adequate amounts of decontamination supplies and ensure that the various types of equipment and solutions are maintained and available for immediate use by the contamination control and decontamination teams. ☐ Ensure that adequate stocks of chemoprophylaxis are effectively managed and stored. If the installation is not capable of stocking adequate amounts of NAAK kits and auto injectors, it should have procedures for obtaining them. ☐ Ensure that installations have procedures in place for the emergency transport of additional logistical supplies after an NBC or TIM incident. ☐ Ensure that supplies and equipment, relative to the threat, are available to decontaminate casualties. Decontamination plans should include contingencies for technical and mass decontamination. ☐ Ensure that installation NBC defense response training programs provide necessary initial and periodic retraining (consistent with the threat).

Figure E-1. Installation NBC Defense Vulnerability Checklist (Sample) (Continued)

Public Works and Fixed-Site Military Engineers
□ Identify the installation COLPRO and ensure that it is designed and installed for the most likely NBC defense threat.
□ Ensure that the maintenance of the detection and filter systems occurs on a regular basis and is properly maintained by a certified system technician.
□ Ensure that the installation is capable of performing SIP procedures in the event of an NBC defense incident. These procedures should include closing, locking, and sealing all doors and windows; turning off and closing all ventilation systems (including bathroom exhaust fans); and remaining in place for specific instructions in case of evacuation.
□ Ensure that outside air intakes for HVAC systems are located above the first floor or are provided with appropriate physical security measures to prevent the introduction of airborne contaminants.
□ Ensure that installation personnel review all new construction and major renovation projects to ensure NBC protective measures are addressed.
□ Ensure that buildings identified as NBC defense COLPRO facilities have chemical detectors installed in the duct systems to automatically close the outside air intake when contaminants are detected.
□ Ensure that permanent COLPRO is available and existing permanent COLPRO is certified to be operational.
□ Ensure that an outline of the procedures for the use, maintenance, and support of COLPRO is addressed in the AT plan.
□ Assess and monitor the integrity of deep water wells, pumping stations, water system treatment facilities and equipment, storage tanks, distribution system, etc.
□ Ensure that the installation conducts VA and appropriate tests of all potable water generated locally or obtained from outside sources. The installation should perform additional treatment and tests as recommended by government and local authorities.
□ Ensure that each water system component (e.g., tank hatches, valves) is secured to prevent tampering or the introduction of a toxic substance.
□ Inspect all utilities on a regular basis for tampering, to include subsurface (sewer, drains and runoffs, and utility access areas from off base or unsecured access on base), surface (all areas actually attached to the earth), and above surface (e.g., power lines). This should include blueprints of underground utilities and passages.
□ Install a gas detection system in all facilities that utilize gas.
□ Ensure that the installation has a plan that describes the measures necessary to respond to and recover from a terrorist incident, including terrorist use of NBC. This plan should include emergency response and contingency planning. The plan should be reviewed annually and updated accordingly.

Figure E-1. Installation NBC Defense Vulnerability Checklist (Sample) (Continued)

Appendix F

OPERATIONAL LEVEL OF WAR INTELLIGENCE PREPARATION OF THE BATTLESPACE AND PLANNING MATRIX (SAMPLE)

This appendix provides a sample IPB planning matrix that can be used to support vulnerability analysis and NBC and TIM defense planning. Commanders and NBC staffs must continuously assess the threat posed by an adversary's use of NBC weapons and TIM. Commanders and NBC staffs can use the sample IPB planning matrix (see Figure F-1) to address tactical and operational-level planning.

1. Identify and Disseminate the NBC or TIM Threat.

a. Determine the threat.

(1) What is the threat?

(2) What types of and how many delivery systems does the enemy have?

(3) What threat does the enemy pose to the HN, and how will that impact coalition operations?

(4) Are HN emergency response and reporting agencies included in NBC data reports?

(5) What NBC preventive or protective capabilities does the enemy have?

(6) Does the enemy have an ROTA capability?

(7) Are "collateral damage" hazards posed by TIM?

(8) What type of strike is likely to occur early in the deployment process?

(9) What is the priority of attack against ports, airfields, and similar locations?

b. Can enemies use NBC or TIM agents to increase their regional "prestige" or alter the psychological balance?

c. Does the enemy pose a credible threat throughout the deployment period?

d. Have friendly or neutral population centers been identified as potential targets?

e. Have critical, pre-positioned storage areas been identified and targeted?

f. What are the enemy's intentions toward noncombatant US citizens in theater?

g. What are the impacts of psychological, medical, and logistical operations?

2. Incorporate the NBC or TIM Threat into Plans and Operations.

a. Do theater OPLANs accurately identify the current threat?

(1) What are the US operational response options to confirm NBC or TIM use on US forces?

(2) Have planners included the environmental aspects of industry and potential enemy weapon storage areas in targeting plans?

Figure F-1. NBC Attack or TIM Release IPB Planning Matrix (Sample)

(3) What are the plans and priorities for distributing FP assets?

(a) Decontamination units and material.

(b) NBC reconnaissance units and equipment.

(c) Biological defense (detection, protection, and decontamination).

(d) Smoke and obscurants (units and munitions).

(e) Medical (prophylaxis and support).

(f) Engineer (equipment).

(g) Individual protection material.

(h) COLPRO material.

(i) The adequacy of COLPRO and individual protection against likely regional and local TIM of concern.

(j) Necessity to acquire and train forces on specialized, commercial TIM detection, protection, and decontamination equipment.

(4) What are the plans for distributing FP assets to—

(a) Combatants?

(b) Noncombatants (US, HN, and others), as directed?

(c) EPWs?

(d) Personnel in US custody?

(5) Do plans address the handling and evacuation of contaminated human remains?

(6) What contamination avoidance measures are required by the theater commander?

(7) Does NBC protection guidance address the entire spectrum of operations, from operations other than war to general war?

b. Do COCOM plans address NBC and TIM threats to forward-deployed forces?

(1) Are NBC and TIM detectors available and used?

(2) What is the standard to confirm enemy use of NBC or TIM?

(3) Which staging areas are most critical to our success?

(4) What alternate staging areas have been identified?

(5) What priorities are enemy NBC and TIM delivery and storage units being given in the targeting sequence?

(6) What steps are planned to eliminate enemy capability to target ports, airfields, etc.?

(7) What protective and defensive measures are being used throughout the coalition depth of deployment?

(8) What active and passive measures have been instituted to protect key points of entry?

(9) Will NBC units deploy early to help deter enemy use of NBC or TIM at points of entry?

(10) Which warning systems have digitization connectivity?

(11) What “risk analysis” methods are in place to determine decontamination requirements?

(12) What steps have been taken to ascertain the NBC defensive readiness of coalition partners?

(13) What means are available to alleviate shortcomings in NBC defense postures and capabilities of coalition partners?

(14) What protective measures are planned for reinforcements when deploying over an extended period of time?

(15) What is the frequency of movement for combat, combat support, and CSS unit activities?

(16) What steps have been taken to mitigate NBC and TIM effects on OPTEMPO?

Figure F-1. NBC Attack or TIM Release IPB Planning Matrix (Sample) (Continued)

(17) Are component forces trained in NBC defense?

c. What key staff considerations must be addressed?

(1) Medical.

(a) What is the level of medical protection in the AO (how many personnel require protection)?

- What plans guide their use?
- What plans address the significant implications concerning medical assistance after the use of NBC or TIM agents or weapons?

(b) What PVNTMED guidance is provided to subordinate units to medically protect against NBC attacks, medical threats, and environmental hazards?

(c) Do campaign plans include military medical assistance to nonmilitary personnel?

(d) Do plans address shortfalls caused by providing medical support to nonmilitary personnel?

(e) What steps provide medical assistance to units and activities, US and HN civilian workers, dependents, and EPWs?

(f) Are hospitals (component, HN, and coalition) equipped to care for NBC casualties?

(g) What vaccines are available in theater, and what storage facilities are available for vaccines and medications?

(h) What is the protocol for determining who receives vaccination if sufficient vaccines are not available to inoculate all personnel?

(i) What are the procedures for decontaminating and evacuating wounded personnel?

(j) Have plans been made for combating the indigenous medical threat within the theater?

(k) What medical force structure is available to the theater?

(l) What specialized TIM equipment and personnel can be provided to assess TIM release hazards?

(2) Logistics.

(a) Do logistics plans address exposure to NBC attacks and measures to protect personnel and supplies from NBC contamination?

(b) What C2 procedures are established to ensure the effective NBC defense of multiservice, HN, coalition, and major logistics bases, including ports and airfields?

(c) Do plans address IPE availability for US civilians, HN personnel, and allies?

- Is IPE on order or on hand and in sufficient quantities?
- Is IPE properly stored?

(d) Is NBC defense equipment on hand in each subordinate unit?

(e) Are procedures in place to conduct decontamination operations?

(f) Do plans provide essential medical supplies on hand to execute the mission? Are procedures in place for the emergency resupply of medical supplies (to include blood) and medical equipment?

(g) Do plans address alternate supply routes for logistical operations?

(h) Do plans address NBC equipment resupply?

(i) Are there specialized TIM detection, protection, and decontamination material requirements to meet local, possible, or actual TIM release threats and scenarios?

(3) Civil-Military Operations.

(a) Do plans include protecting or replacing the noncombatant work force if evacuation is ordered?

(b) Do plans address evacuation operations?

(c) Are military personnel trained to perform sustaining activities if the civilian workforce is released?

(d) Have evacuation routes been designated for noncombatants?

Figure F-1. NBC Attack or TIM Release IPB Planning Matrix (Sample) (Continued)

(e) Is information communicated to noncombatants concerning potential environmental hazards?

(f) What steps are taken to protect nonmilitary personnel from environmental hazards?

(g) Do plans address NBC-related duties and responsibilities of the various SOF and/or CA units deployed in support of the OPLAN (e.g., identifying TIM locations and TIM-contaminated areas)?

(h) Are local HAZMAT and TIM facility hazard assessment experts available to assist in assessing possible TIM release effects, and are there methods available to mitigate release effects?

(i) Do plans address transportation, storage, handling, and disposal of contaminated and hazardous waste according to applicable environmental considerations?

(4) Public Affairs Office. Do plans address deterring NBC use?

(5) Legal. Are ROE developed for employing RCAs or determining eligibility for medical care?

d. Does guidance exist to synchronize all service component NBC defense plans?

e. Are DST available to assist the unit commander in determining proper protective postures and decontamination?

f. Is the NBC or TIM threat adequately considered in the OPLAN?

(1) Are alternate ports and airfields available?

(2) What protective and defensive measures are in effect at ports and airfields?

(3) How is the information transmitted?

(4) What is the arrival time for medical units in theater?

(5) What is the mechanism for making needed NBC assets available more quickly?

(6) Do plans prioritize and resource NBC FP units for early entry operations, based on priorities?

(7) Are contingency plans reviewed to ensure that NBC assets are included in the time-phased force deployment plan?

(8) Are there TIM facilities located near critical operating areas? Are possible releases of material estimated to be of any operational consequence?

g. What is the deployment sequence for the following components?

(1) Reconnaissance units?

(2) Biological detection units?

(3) Decontamination units?

(4) Medical units and personnel?

(5) Escort units?

(6) Field confirmatory labs?

h. Are NBC defense measures integrated into the overall FP plan?

(1) What measures are taken to protect deep-strike capabilities?

(2) What methods of NBC warning and reporting have been established to ensure that information is disseminated to subordinate components and coalition forces?

(3) Have decontamination priorities been established in theater?

(4) What provisions are made to ensure knowledge of all joint force unit locations?

Figure F-1. NBC Attack or TIM Release IPB Planning Matrix (Sample) (Continued)

(5) Have contamination avoidance priorities been established in theater?

(6) What is the plan for deploying NBC detector capabilities to the AOR?

(7) Are there specific and identified TIM areas of concern, and are plans established to minimize the likelihood of potential releases and their effects on friendly operations?

i. Do supporting component OPLANs adequately address NBC defense?

j. Are supporting component assets organized to dedicate efforts to NBC functions?

k. What is the status of supporting component command?

(1) Plans?

(2) Equipment?

(3) Training?

(4) Personnel?

l. What methods are used to monitor the NBC readiness of component forces?

m. Are component NBC defense assets incorporated into a comprehensive theater NBC defense plan?

n. Has NBC warning and reporting been integrated into the JF C2 systems?

(1) Are requests for NBC defense forces incorporated into OPLANs?

(2) Where are reconnaissance assets located?

(3) Are NBC reconnaissance units protected during offensive and defensive operations?

(4) Are real-time updates and the analysis of impact on the mission occurring?

o. Are NBC readiness shortfalls adequately addressed?

3. Develop NBC Defense Guidance.

a. What enemy NBC employment concepts are considered in plans?

b. How is specific standardized NBC defense guidance to all COCOMs worded in the strategic planning guidance and later in campaign plans?

c. Has TIM-release hazard event guidance been prepared and disseminated?

4. Train and Exercise the Force in NBC Defense.

a. Have the COCOM staff and service senior leaders established and disseminated a theater NBC defense strategy?

(1) What steps are necessary to negate the operational difficulties of an NBC attack or TIM release?

(2) What steps are necessary to minimize casualties?

(3) What steps are necessary to improve leader awareness of and counter the NBC attack or TIM release threat?

(4) What steps are necessary for power projection operations?

b. Are models and simulations sufficient to address COCOM training and exercise needs?

(1) What computer models and simulations are used to train the combatant commander's staff and subordinate services?

(2) Do the models thoroughly address COCOM needs?

Figure F-1. NBC Attack or TIM Release IPB Planning Matrix (Sample) (Continued)

c. Is the NBC threat adequately addressed in joint exercises and training?

(1) What is the COCOM goal for NBC defense in joint exercises?

(2) Are UJTL tasks incorporated into joint exercises?

(3) Are modern computer-based tools used to exercise NBC tasks?

(4) Are personnel exercising and training realistically while wearing IPE? What are the combatant commander's expectations?

(5) What training objectives are mandatory for major JTF and COCOM level exercises?

(6) What NBC defense training is specified in command directives?

(7) Are leaders trained in hazards and protective measures associated with DU on the battlefield?

(8) Are unit leaders trained to distinguish between an environmental hazard and a chemical agent attack?

d. Have plans and responses been adequately exercised against NBC attacks or TIM releases?

(1) What action plans are in place to ensure quality NBC exercises?

(2) Can the command maintain OPTEMPO following enemy use of biological or chemical weapons?

(3) Do exercises include NBC coalition readiness planning?

(4) Is a policy established regarding self-sustaining decontamination operations (without a chemical unit available)?

(5) Are exercises designed to ensure that NBC warnings protect other services and coalition partners?

(6) Do exercises incorporate active and passive measures to protect key ports of entry from NBC hazards?

(7) Do joint exercises measure the proper use of dispersion and movement as preventive measures against NBC attacks?

(8) Is targeting of enemy NBC capabilities exercised?

(9) Are exercises planned, coordinated, and exercised with local jurisdictions?

(10) How is the need for additional medical support in an NBC war exercised?

(11) Do exercises evaluate a medical unit's ability to decontaminate wounded personnel?

(12) Do exercises evaluate the use of military personnel in place of key civilian personnel?

(13) Do exercises test massive evacuations?

(14) Do exercises assess NEO plans?

(15) Do exercises guide realistic NBC defense decision making? Do exercise scenarios anticipate the use of decision support tools?

(16) Do exercises test the use and wear of NBC IPE by EPWs?

(17) Do exercises adequately account for the time-phased arrival of NBC and medical support?

(18) Do exercises adequately incorporate environmental considerations when dealing with contaminated or HAZMAT?

Figure F-1. NBC Attack or TIM Release IPB Planning Matrix (Sample) (Continued)

5. Assess Readiness and Identify Needs.

a. Are COCOM concerns, issues, and shortfalls incorporated into exercises? What process is used for resolution?

b. Are plans updated to reflect exercise lessons learned?

c. What mechanisms do the COCOM and staff use to determine unit NBC readiness?

d. What are the actions being taken to address any NBC readiness status shortcomings?

e. Has the staff disseminated resolved NBC readiness issues to all subordinate commands?

f. What NBC defense standards does the COCOM expect all deploying units to meet? What steps are being taken to ensure compliance?

g. What is the COCOM's criterion for determining NBC readiness?

h. Do the COCOM and staff encourage technological developments related to NBC defense individual protection?

i. Have COCOMs elevated the requirement for uniform NBC readiness standards and reporting to CJCS?

j. What measurement standards do the COCOM and staff use to ensure uniform standards and the assessment of NBC readiness among the assigned forces?

k. What is the system to ensure the identification of issues that cannot be resolved at service component or COCOM staff level?

l. What mechanisms exist for providing theater NBC defense readiness needs to service chiefs for their information and action?

Figure F-1. NBC Attack or TIM Release IPB Planning Matrix (Sample) (Continued)

Appendix G

NUCLEAR, BIOLOGICAL, AND CHEMICAL DETECTION CAPABILITIES AND THE ASSOCIATED RISK ASSESSMENTS

This appendix provides information on radiation detectors and the associated risk assessment that is concerned with the operational exposure guide (OEG). It also provides information on biological agents and the potential risks involved in assessing presumptive identification results. It addresses NBC detectors and their capabilities.

1. Radiation Risk Assessment Guidance

Selected radiation detection equipment supports the monitoring of dose rate and total dose information. Monitoring radiation exposure is a key element for the FP program.

a. Radiological Protection. Radiological protection involves using the OEG as a critical factor in protecting the force. Radiation exposure can create casualties and must be monitored as another critical element of the force health protection program.

(1) The OEG gives the commander a flexible system of radiation exposure control. The OEG procedures aid in the successful employment of a unit while keeping the exposure of personnel to a minimum. Radiation exposure must be controlled to the maximum extent possible, consistent with the mission. If exposure control is ignored, unwarranted risks to units and personnel will occur. Establishing and using the OEG helps the commander keep radiation exposures to a minimum and still accomplish the mission. The OEG is the key for reducing casualties in a radiological environment. Any exposure should be as low as reasonably achievable to minimize exposures that would exceed established OEG levels.

(2) Establishing an OEG must be based on a unit's prior exposure because of the cumulative effect of radiation exposure. The commander establishes an OEG for each operation. Maintaining accurate historical OEG records is crucial in tracking previous exposure levels.

(3) An OEG must be established for each unit and each operation. It must be based on the radiation exposure status (RES) of the unit at that time and on the current and projected operational situation.

(4) The effective use of radiation exposure records permits rapid determination of a unit's potential to operate in a radiologically contaminated area. Dose criteria have been established in four categories: RES-0, RES-1, RES-2, and RES-3 (see Table G-1, page G-2). This information is based on the best available estimates for predicting the effects of radiation exposure, the RES of the unit at that time, and the operational situation. The commander can decide which unit to select for a given mission based on the OEG. Each level of command can use the OEG system to select the best unit to conduct a mission. The commander is assured that personnel will receive the least exposure possible. Commanders include OEG guidance in OPORDs, and units use OEG and RES guidance to accomplish the mission, while minimizing radiation exposure.

Table G-1. Operational RES

RES[1]	Total Past Cumulative Dose in cGy[2]	Exposure Criteria for a Single Operation Which Will Not Result in Exceeding the Dose Criteria for the Stated Risk[3]
RES-0	The unit has not been exposed to radiation.	Negligible Risk: <75 cGy Moderate Risk: <100 cGy Emergency Risk: >125 cGy
RES-1	The unit has been exposed to >0 cGy and ≤75 cGy.	Negligible Risk: <35 cGy Moderate Risk: <60 cGy Emergency Risk: <85 cGy
RES-2	The unit has been exposed to >75 cGy and ≤125 cGy.	Any further exposure exceeds the negligible or moderate risk.
RES-3	The unit has been exposed to >125 cGy.	All further exposure exceeds the emergency risk.

[1] RES categories are based on previous exposure to radiation. The reclassification of units from one RES category to a less serious one is made by the commander, upon advice of the surgeon, after ample observation of the actual state of health of exposed personnel.

[2] All exposures to radiation are considered total body and simply additive. No allowance is made for body recovery from radiation injury.

[3] Risk levels are graduated within each status category to provide more stringent criteria as the total radiation dose accumulated becomes more serious. The exposure criteria given for RES-1 and RES-2 should be used only when the numerical value of a unit's total past cumulative dose is unknown.

NOTES:

1. **Each of the degrees of risk can be applied to radiation hazards resulting from enemy and/or friendly weapons and from initial nuclear radiation resulting from planned friendly supporting fire.**

2. **Nuclear RES guidelines specify units in cGy; however, the USN is required by the CFR to conduct radiation monitoring in classic radiation units such as rad or rem (1 cGy = 1 rad).**

b. Risk Criteria. The degree-of-risk concept helps the commander establish an OEG for a single operation and minimize the number of radiation casualties. By using the RES categories of subordinate units and the acceptable degree of risk, the commander establishes an OEG based on the degree of risk. There are three degrees of risk: negligible, moderate, and emergency. Each risk can be applied to radiation hazards from enemy and/or friendly weapons. The degrees of risk are defined in percentages of casualties or performance degradation. A casualty is defined as an individual whose performance effectiveness has dropped by 25 percent from normal. Specific measures of performance depend on the task. Degradation (nuisance) effects can range from vomiting to skin burns to eardrum rupture. These symptoms, at low radiation levels, may take hours to develop. Individuals thus exposed should be able to function in the important hours after a nuclear attack and after the first set of symptoms abate. The casualty data presented in this section is based on a 50 percent confidence level that the unit is at a 75 percent performance decrement.

(1) Negligible Risk. Negligible risk is the lowest risk category. The dose is greater than 75 centigray (cGy) for personnel in RES-0 (with no previous exposure); this dose will not cause any casualties. Personnel receiving a negligible risk dose should experience no more than 2.5 percent degradation (nuisance) effects. Negligible risk is acceptable when the mission requires units to operate in a contaminated area. Negligible risk should not be exceeded unless a significant advantage will be gained.

(2) Moderate Risk. Moderate risk is the second risk category. The dose is greater than 100 cGy for personnel in RES-0 (with no previous exposure). This dose generally will not cause casualties. Troops receiving a moderate risk dose should experience no more than 5 percent nuisance effects. Moderate risk may be acceptable in close support operations. Moderate risk must not be exceeded if personnel are expected to operate at full efficiency.

(3) Emergency Risk. Emergency risk is the final risk category. The dose is any exposure greater than 125 cGy for personnel in RES-0 (with no previous exposure). In this category, not more than 5 percent casualties are expected. Nuisance effects may exceed the 5 percent level. The emergency risk dose is only acceptable in rare situations, termed "disaster situations." Only the commander can decide when the risk of the disaster situation outweighs the radiation emergency risk. The risk criteria for RES-1 and RES-2 categories are based on assumed average exposures for units in RES-1 and RES-2; this should be used only when the numerical value of the total past cumulative dose of a unit is unknown. When the cumulative dose within a category is known, subtract the known dose from the maximum allowed dose for the appropriate risk category. For example, if a unit in RES-1 received 30 cGy, it may receive an additional dose of 70 cGy before exceeding the moderate risk (maximum is 100cGy).

c. Low-Level Radiation (LLR) Exposure.

(1) Adversaries can use LLR sources in a number of ways to disperse radioactive material. Such dispersal can range from arming the warhead of a missile with active material from a nuclear reactor, to releasing LLR material intended for use in industry or medicine, to disseminating material from a research or power-generating nuclear reactor. The dispersal of radioactive materials represents an inexpensive capability that requires limited resources and technical knowledge.

(2) The LLR may be composed of dispersed radioactive material (in solid, liquid, gaseous, or vapor form), or it may be in the form of discrete sources. Alpha, beta, gamma, and neutron radiation may present LLR hazards.

(3) When planning or implementing operations where LLR may be (or may become) a factor for consideration, commanders must be capable of making informed and balanced judgments between their operational obligations at the time and their responsibilities to those exposed. As such, RES-1 has subcategories as described in Table G-2, page G-4.

Table G-2. LLR Guidance for Military Operations

Total Cumulative Dose[1, 2]	RES Category	Recommended Actions
0 to 0.05 cGy	0	None
0.05 to 0.5 cGy	1A	Record individual dose readings. Initiate periodic monitoring.
0.5 to 5 cGy	1B	Record individual dose readings. Continue monitoring. Initiate rad survey. Establish dose control measures as part of operations. Prioritize tasks.
5 to 10 cGy	1C	Record individual dose readings. Continue monitoring. Update survey. Continue dose control measures.
10 to 25 cGy	1D	Record individual dose readings. Continue monitoring. Update survey. Continue dose control measures. Execute priority tasks only.[3]
25 to 75 cGy	1E	Record individual dose readings. Continue monitoring. Update survey. Continue dose control measures. Execute critical tasks only.[4]

[1]The use of the measurement mSv is preferred in all cases. However, military organizations normally only have the cGy capability. If the ability to obtain measurements in mSv is not possible, US forces will use cGy. For whole-body gamma irradiation, 1 cGy = 10 mSv. The USN is required by the CFR to conduct radiation monitoring in classic radiation units such as rad or REM (1Cgy = 1 rad).

[2]All doses should be kept as low as reasonably achievable. This reduces individual risk and retains maximum operational flexibility for the future employment of exposed persons.

[3]Examples of priority tasks are those that avert danger to persons and prevent damage from spreading.

[4]Examples of critical tasks are those that save lives and support the organization JMETL.

2. Biological Warfare Detection Assaying and Associated Risk

Presumptive identification testing for BW agents is fairly reliable and accurate; however, some technological limits may surface with regard to immunochromatographic color identifier assays (used in most of the presumptive identification components) that could affect the accuracy of an analysis. An understanding of these limits helps decrease their occurrence and mitigate possible detrimental effects on the accuracy of a sample analysis. If the user stays within the technological limits of the assay, it will be more reliable and accurate.

a. Sensitivity Cutoff. Biological assays have a sensitivity cutoff. This means that for each different agent assay, there is a threshold below which the assay will not be able to detect the presence of its intended agent. Although the presumptive identification process is very sensitive, the infective dose for some pathogens is lower than the sensitivity of the

presumptive identification testing process. Therefore, if a sample is tested and the result appears to be negative (false negative), there may still be enough biological agent in the sample to cause illness.

b. Matrix Effect. The matrix effect is often encountered when assaying environmental samples. It cannot be predetermined what type of sample will have to be analyzed prior to an incident. Sometimes a sample will not be compatible with a presumptive identifier, such as a handheld assay (HHA). This can result in false negatives or false positives. A false negative will occur if there is a biological agent in the sample, but something else in the sample or a property of that sample causes the detector and captured antibodies to bind together nonspecifically. The HHAs are screened using several common matrices (dust, tap water, sewage, human sera, and soil) to ensure that they will be less likely to pose a problem. Typically, the substance causing the matrix effect can be diluted out while leaving enough of the specific antigen to react in the HHA to see a true positive. If a matrix effect is suspected, the operator can prepare a 1:10 dilution of the sample in the HHA buffer to be run on a second HHA.

c. Cross-Reactivity. Cross-reactivity usually occurs when an antibody binds to the species it was designed for, but it also binds specifically to close relatives of that species. This occurs when two closely related species share a common antigenic epitope, allowing the antibodies in the HHA to bind to both species. Cross-reactivity can occur with the *Bacillus anthracis* HHA in which the antibodies bind not only to *Bacillus anthracis,* but also to other bacillus such as *Bacillus thuringinsis.*

d. Hook Effect. The hook effect occurs when too much antigen is added to the HHA, which could result in a false negative. What occurs is that the amount of antigen exceeds the finite amount of colloidal gold antibody. The excess, unbound antigen migrates across the nitrocellusose membrane more rapidly than the heavier labeled antigen where it saturates all the binding sites on the captured antibodies. When the labeled antigen arrives, there are no binding sites remaining on the capture line, so it continues on to the sample wicking pad. Fortunately, this problem can be easily overcome as long as the operator is aware of it and takes the appropriate steps.

3. Chemical Detector Capabilities and Interferents

a. Chemical-agent detectors provide the capability to detect and identify CW agents (see Table G-3, page G-6) at different levels of sensitivity. (See Table G-4, page G-7, for information on selected chemical-agent detector systems and their sensitivities.) However, chemical detectors may react to materials other than CW agents and produce false positives. Table G-5, page G-8, depicts many of the interferent materials that will cause false positives.

b. The physical environment also plays a role in the ability of detectors to perform and sometimes complicates the issue when analyzing results.

Table G-3. Chemical-Agent Detector Capabilities

Detector or Monitor	Agent Form	Chemical Agent		
		Detection	Identification	Response Time[1]
M8 Chemical-Agent Detector Paper	Liquid	G, V, H	G, V, H	Within 30 seconds
M9 Chemical-Agent Detector Paper	Liquid	G, V, H	None	Less than 30 seconds
M256A1 CADK[2]	Vapor	G, VX, HD, L, CX, AC, CK	Classifies as nerve, blood, or blister	15 minutes
M8A1 ACAA	Vapor	GA, GB, GD, VX	None	Less than 2 minutes
M90 Automatic Mustard-Agent Detector	Vapor	GA, GB, GD, GF, VX, HD, L, AC, CK	Classifies as nerve, blister, or blood	4–5 seconds
M21 RSCAAL	Vapor	GA, GB, GD, HD, L	Nerve or blister	Less than 1 minute scan cycle
M22 ACADA	Vapor	GA, GB, GD, GF, VX, H, L	Classifies as nerve or blister	30–120 seconds
CAM/ICAM	Vapor	GA, GB, GD, VX, HD, HN	Classifies as mustard or nerve	Less than 1 minute
M272 Water Testing Kit	Liquid	G, VX, HD, L, AC	Distinguishes between agents	20 minutes
M18A2 CADK	Vapor	G, V, H, HD, HT, HL, CX, ED, PD, MD, AC, CK, CG	G, V, H, HD, HT, HL, CX, ED, PD, MD, CK, AC, CG	1–4 minutes
MM1 (NBCRS)	Liquid	All CWAs, some TIM	All CW agents and some TIM	Less than 45 seconds
CAPDS	Vapor	GA, GB, GD, GF, VX	None	Seconds under normal conditions (after warm-up)
IPDS	Vapor	G, V, H	Classifies as G, V, nerve, or blister	Less than 60 seconds
AN/KAS-1 CWDD	Vapor	GA, GB, GD, GF, VX	None	Based on operator skill and experience and vapor cloud density

[1]The response time may vary with the agent, agent concentration, temperature, and droplet size.

[2]The M256A1 also contains one book of M8 paper.

Table G-4. Selected Chemical-Agent Detector Systems Detection Limits and Miosis Levels

Detector or Monitor	GA	GB	GD	GF	VX	HD
M8 Chemical-Agent Detector Paper	0.2 mL	0.2 mL	0.2 mL	0.2 mL	0.2 mL	0.2 mL
M9 Chemical-Agent Detector Paper	110 microns	110 microns	110 microns	110 microns	100 microns	110 microns
M256A1 CADK	0.005 mg/m^3	0.005 mg/m^3	0.005 mg/m^3	0.005 mg/m^3	0.02 mg/m^3	2 mg/m^3
M8A1 ACAA	0.1–0.2 mg/m^3	0.1–0.2 mg/m^3	0.1–0.2 mg/m^3	N/A	0.4 mg/m^3	N/A
M90 Automatic Mustard-Agent Detector	0.04 mg/m^3	0.04 mg/m^3	0.04 mg/m^3	0.04 mg/m^3	0.04 mg/m^3	0.2 mg/m^3
M21 RSCAAL	90 mg/m^2	90 mg/m^2	90 mg/m^2	N/A	N/A	1500 mg/m^2
M22 ACADA	0.1 mg/m^3	0.1 mg/m^3	0.1 mg/m^3	0.1 mg/m^3	0.04 mg/m^3	2.0 mg/m^3
CAM/ICAM	0.1 mg/m^3	0.1 mg/m^3	0.1 mg/m^3	N/A	0.1 mg/m^3	0.1 mg/m^3
M272 Water Testing Kit	0.02 mg/L	0.02 mg/L	0.02 mg/L	0.02 mg/L	0.02 mg/L	2.0 mg/L
M18A2 CADK	*	0.1 mg/m^3	*	*	0.1 mg/m^3	0.5 mg/m^3
MM1 (NBCRS)	0.1–1 $\mu g/m^2$	0.1–1 $\mu g/m^2$	0.1–1 $\mu g/m^2$	0.1–1 $\mu g/m^2$	0.1–1 $\mu g/m^2$	0.1–1 $\mu g/m^2$
CAPDS	*	0.3 mg/m^3	0.3 mg/m^3	*	0.3 mg/m^3	N/A
IPDS	*	*	*	*	*	*
AN/KAS-1 CWDD	*	*	*	*	*	N/A
Miosis Levels (Inhalation/Ocular, 2-minute exposure)	0.4 mg-min/m^3	0.4 mg-min/m^3	0.2 mg-min/m^3	0.2 mg-min/m^3	0.1 mg-min/m^3	N/A

* Information not available.

Table G-5. Interferents[1]

Detector or Monitor	Detects	Agent Form	Sources of False Readings
M8 Chemical-Agent Detector Paper	G, V, H	Liquid	Antifreeze and petroleum-based products
M9 Chemical-Agent Detector Paper[2]	G, V, H	Liquid	Antifreeze and petroleum-based products
M256A1 CADK	G, VX, HD, L, CX, AC, CK	Vapor	HC smoke, decontaminants, and smoke from burning brush
M8A1 ACAA	GA, GB, GD, VX	Vapor	Engine exhaust, rocket propellant smoke, and screening or signaling smoke
M90 Automatic Mustard-Agent Detector	GA, GB, GD, GF, VX, HD, L, AC, CK	Vapor	Diesel exhaust
M21 RSCAAL	GA, GB, GD, HD, L	Vapor	The presence of sun in the field of view, insecticide, halon, and alcohol
M22 ACADA	GA, GB, GD, GF, VX, H, L	Vapor	Brake fluid, signaling smoke, malathion, petroleum products (JP8), aqueous firefighting foam (concentrated), oil of wintergreen muscle rub, and tear gas
CAM/ICAM	GA, GB, GD, VX, HD, HN	Vapor	Perfume, diesel fuel additives, and paint fumes
M272 Water Testing Kit	G, VX, HD, L, AC	Liquid	Some battlefield interferents
M18A2 CADK	G, V, H, HD, HT, HL, CX, ED, PD, MD, AC, CK, CG	Vapor	Some battlefield interferents (including smoke and decontaminants)
MM1 (NBCRS)	All known agents and some TIM	Liquid	Petroleum-based hydrocarbons and some naturally occurring substances
CAPDS	GA, GB, GD, GF, VX	Vapor	Some shipboard vapors at high concentrations
IPDS	G, V, H	Vapor	Paint vapors
AN/KAS-1 CWDD	GA, GB, GD, GF, VX	Vapor	Based on operator skill and experience

[1] The use of insecticides around chemical-agent detectors, alarms, monitors, and papers is not recommended.

[2] M9 paper detects, but does not identify, all CW agents.

c. Recognizing Contamination.

(1) Many personnel expect to see large “splashes” of agent on pre-positioned M8 paper and throughout an area. Recognizing agent deposition composed primarily of very small droplets (50–100 microns) will be especially challenging (if not impossible) at night or during periods of limited visibility.

(2) At temperatures below 0°C, the M8 paper may take up to 2 minutes to change color. This delayed reaction can cause personnel to mistakenly believe that an item is clean when it is not.

4. Toxic Industrial Material Detection

The TIM detection materiel should be obtained and used based on the exact nature of the TIM threats in the AOs. Most TIM detection equipment is commercially based and most frequently found in civil first responder HAZMAT teams and other specialized teams such as—

- TEUs.
- Weapons of mass destruction–civil support teams.
- Installation support teams.

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GLOSSARY

PART I—ABBREVIATIONS AND ACRONYMS

A

AAR	after-action report
AB	airbase
ABM	antiballistic missile
AC	hydrogen cyanide (blood agent)
ACAA	automatic chemical-agent alarm
ACADA	automatic chemical-agent detection and alarm
ACAMS	Automatic Continuous Air Monitoring System
AEP	Allied Engineering publication
AERP	aircraft eye/respiratory protection
AF	Air Force
AFB	Air Force base
AFDD	Air Force doctrine document
AFH	Air Force handbook
AFI	Air Force instruction
AFJMAN	Air Force joint manual
AFM	Air Force manual
AFMAN	Air Force manual
AFPAM	Air Force pamphlet
AFPD	Air Force policy directive
AFR	Air Force regulation
AFRRI	Armed Forces Radiobiology Research Institute
AFTTP	Air Force tactics, techniques, and procedures
AO	area of operations
AOI	area of interest
AOR	area of responsibility
APC	armored personnel carrier
AT	antiterrorism
ATTN	attention

B

BIDS	Biological Integrated Detection System
BW	biological warfare

C

C	Celsius
C2	command and control

C4I	command, control, communications, computers, and intelligence
CA	civil affairs
CADK	chemical-agent detection kit
CAIRA	chemical accident/incident response and assistance
CAM	chemical-agent monitor
CAPDS	Chemical-Agent Point Detection System
CAPE	contamination avoidance protective entrance
CB	chemical-biological
CBIAC	Chemical and Biological Defense Information Analysis Center
CBR	chemical, biological, and radiological
CBRN	chemical, biological, radiological, or nuclear
CBRNE	chemical, biological, radiological, nuclear, and high yield explosives
CBPS	chemical-biological protective shelter
CBR	chemical, biological, and radiological
CCA	contamination control area
CCD	camouflage, concealment, and deception
CCP	casualty collection point
CDC	Centers for Disease Control and Prevention
CDE	chemical defense equipment
CDM	chemical downwind message
CE	civil engineer
CFM	cubic feet per minute
CFR	Code of Federal Regulations
CG	commanding general, phosgene (choking agent)
cGy	centigray
cGyph	centigray per hour
CHEMTREC	Chemical Transportation Emergency Center
CJCS	Commander of the Joint Chiefs of Staff
CK	cyanogen chloride (blood agent)
CLS	contracted logistics support
CM	consequence management
COA	course of action
COCOM	combatant command (command authority)
COG	center of gravity
COLPRO	collective protection
COMM	communications
COMSEC	communications security
CONUS	continental United States
CPE	collective protection equipment
CSS	combat service support
CST	civil support team
CW	chemical warfare

D

DA	Department of the Army
DA PAM	Department of the Army pamphlet
DFU	dry filter unit
DKIE	decontaminating kit, individual equipment
DOD	Department of Defense
DODD	Department of Defense directive
DODI	Department of Defense instruction
DOT	Department of Transportation
DSN	Defense Switched Network
DST	decision support tools
DU	depleted uranium

E

ECP	entry control point
EDM	effective downwind message
EMP	electromagnetic pulse
EMS	emergency medical services
EOC	emergency operations center
EOD	explosive ordnance disposal
EPW	enemy prisoner of war
ERG	Emergency Response Guidebook

F

F	Fahrenheit
FBI	Federal Bureau of Investigation
FFR	for future reference
FL	Florida
FM	field manual (Army)
FMFM	Fleet Marine Force Manual
FP	force protection
FPCON	force protection condition
FROG	free rocket over ground

G

g	gram(s)
GA	tabun (nerve agent)
GB	sarin (nerve agent)
GCCS	Global Command and Control System
GD	soman (nerve agent)
GF	cyclosarin (nerve agent)
GZ	ground zero

H

H	Levinstein mustard (blister agent)
ha	hectares
HAZMAT	hazardous materials
HD	distilled mustard (blister agent)
HHA	handheld assay
HN	host nation, nitrogen mustard (blister agent) (HN-1, HN-2, HN-3)
HOB	height of burst
HQ	headquarters
HSS	health service support
HT	mustard-T mixture
HVAC	heating, ventilation, and air conditioning
HVT	high-value target

I

IBADS	Interim Biological Agent Detection System
ICAM	improved chemical-agent monitor
ICS	incident command system
IED	improvised explosive device
IPB	intelligence preparation of the battlespace
IPDS	improved point detection system
IPE	individual protective equipment
IR	intelligence requirement
IRT	initial response team
ISR	intelligence, surveillance, and reconnaissance

J

JBPDS	Joint Biological Point Detection System
JF	joint force
JFC	joint force commander
JIPB	joint intelligence preparation of the battlespace
JMETL	joint mission-essential task list
JP	joint publication
JSLIST	Joint Service Lightweight Integrated Suit Technology
JTF	joint task force
JWARN	Joint Warning and Reporting Network

K

kg	kilogram(s)
km	kilometer(s)
kph	kilometers per hour
kt	kiloton(s)

L

L	lewisite (blister agent)
LLR	low-level radiation
LOAC	law of armed conflict
LOC	line of communications

M

m	meter(s)
m^2	square meters
MADCP	mortuary affairs decontamination collection point
MANSCEN	Maneuver Support Center
MCCDC	Marine Corps Combat Development Command
mcg	microgram(s)
MCRP	Marine Corps reference publication
MCWP	Marine Corps warfighting publication
MD	Maryland
MEDSURV	medical surveillance
METT-TC	mission, enemy, terrain and weather, troops available and civilian
mg	milligram(s)
mg/L	milligrams per liter
mg/m^2	milligrams per square meter
mg/m^3	milligrams per cubic meter
$mg\text{-}min/m^3$	milligrams per minute, cubed
mL	milliliter(s)
MIJI	meaconing, intrusion, jamming, or interference
MILSTRIP	Military Standard Requisitioning and Issue Procedures
MLR	multiple launch rocket
MLRS	Multiple Launch Rocket System
mm	millimeter
MO	Missouri
MOA	memorandum of agreement
MOB	main operations base
MOPP	mission-oriented protective posture
MOU	memorandum of understanding
mph	miles per hour
mrad	millirads
mSv	millisieverts
MTF	medical treatment facility
MTTP	multiservice tactics, techniques, and procedures

N

NAAK	nerve-agent antidote kit
NAI	named area of interest
NATO	North Atlantic Treaty Organization
NAVFAC	Naval Facility
NAVMED	Naval Medical Command
NAVMEDCOMINST	Navy medical command instruction
NBC	nuclear, biological, and chemical
NBC-IST	nuclear, biological, and chemical installation support team
NBCRS	Nuclear, Biological, and Chemical Reconnaissance System
NBCWRS	Nuclear, Biological, and Chemical Warning and Reporting System
NCO	noncommissioned officer
NEO	noncombatant evacuation operation
NOFORN	not releasable to foreign nationals
NSC	National Security Council
NSTM	Naval Ships technical manual
NTTP	Navy tactics, techniques, and procedures
NVD	night vision device
NWDC	Navy Warfare Development Command
NWP	Naval warfare publication

O

OEG	operational exposure guide
OPCEN	operations center
OPCON	operational control
OCONUS	outside the continental United States
OPLAN	operation plan
OPNAV	Office of the Chief of Naval Operations
OPORD	operation order
OPR	office of primary responsibility
OPREP	operational report
OPSEC	operations security
OPTEMPO	operating tempo
OSC	operations support center

P

PA	public address
PDD	Presidential decision directive
PIR	priority intelligence requirement
PMCS	preventive-maintenance checks and services
POC	point of contact
POL	petroleum, oil, and lubricants
PPE	personal protective equipment

PSYOP	psychological operations
PVNTMED	preventive medicine

R

R&S	reconnaissance and surveillance
RADIAC	radiation detection, identification, and computation
RCA	riot control agent
RDECOM	Research Development and Engineering Command
RES	radiation exposure status
RI	Rhode Island
RM	risk management
ROC	regional operations center
ROE	rules of engagement
ROTA	release other than attack
RSCAAL	Remote-Sensing, Chemical-Agent Alarm
RV	radius of vulnerability

S

SA	situational awareness
SALUTE	size, activity, location, unit, time, and equipment
SBCCOM	US Army Soldier and Biological Chemical Command
SCBA	self-contained breathing apparatus
SIP	shelter in place
SIR	special information requirement
SMART	special medical augmentation response team
SME	subject matter expert
SOF	special operations forces
SOP	standard operating procedure
SRD	secret restricted data
SSM	surface-to-surface missile
STANAG	standardization agreement
STB	super tropical bleach

T

TA	target acquisition
TAP	threat assessment and planning
TB	technical bulletin
TEL	transporter-erector-launcher
TEU	technical escort unit
TFA	toxic-free area
TGD	thickened soman
TIB	toxic industrial biological
TIC	toxic industrial chemicals
TIM	toxic industrial material
TIR	toxic industrial radiological

TM	technical manual
TPFDL	time-phased force and deployment list
TRADOC	United States Army Training and Doctrine Command
TSP	training support package
TTP	tactics, techniques, and procedures
TX	Texas

U

UJTL	Universal Joint Task List
US	United States
USA	United States Army
USACHPPM	United States Army Center for Health Promotion and Preventive Medicine
USACMLS	United States Army Chemical School
USAF	United States Air Force
USAMEDCOM	United States Army Medical Command
USAMRICD	US Army Medical Research Institute for Chemical Defense
USAMRIID	United States Army Medical Research Institute of Infectious Diseases
USMC	United States Marine Corps
USN	United States Navy
UXO	unexploded ordnance

V

VA	Virginia, vulnerability assessment
VB	vapor barrier
VHA	vapor hazard area
VX	a nerve agent

W

WMD	weapons of mass destruction
WMD-CST	weapons of mass destruction—civil support team

PART II – TERMS AND DEFINITIONS

Aerosol. A liquid or solid composed of finely divided particles suspended in a gaseous medium. Examples of common aerosols are mist, fog, and smoke. (JP 1-02)

Avoidance. Individual and/or unit measures taken to avoid or minimize nuclear, biological, and chemical (NBC) attacks and reduce the effects of NBC hazards. (JP 1-02)

Biological agent. A microorganism that causes disease in personnel, plants, or animals or causes the deterioration of materiel. (JP 1-02)

Biological defense. The methods, plans, and procedures involved in establishing and executing defensive measures against attacks using biological agents. (JP 1-02)

Biological threat. A threat that consists of biological material planned to be deployed to produce casualties in personnel or animals or damage plants. (JP 1-02)

Biological weapon. An item of materiel which projects, disperses, or disseminates a biological agent including arthropod vectors. (JP 1-02)

Blister agent. A chemical agent which injures the eyes and lungs and burns or blisters the skin. Also called vesicant agent. (JP 1-02)

Blood agent. A chemical compound, including the cyanide group, that affects bodily function by preventing the normal utilization of oxygen by body tissues. (JP 1-02)

Chemical agent. Any toxic chemical intended for use in military operations. (JP 1-02)

Chemical ammunition. A type of ammunition, the filler of which is primarily a chemical agent. (JP 1-02)

Chemical defense. The methods, plans, and procedures involved in establishing and executing defensive measures against attack utilizing chemical agents. (JP 1-02)

Chemical dose. The amount of chemical agent, expressed in milligrams, that is taken or absorbed by the body. (JP 1-02)

Chemical environment. Conditions found in an area resulting from direct or persisting effects of chemical weapons. (JP 1-02)

Collective nuclear, biological, and chemical protection. Protection provided to a group of individuals in a nuclear, biological, and chemical environment which permits relaxation of individual nuclear, biological, and chemical protection. (JP 1-02)

Combatant command. A unified or specified command with a broad continuing mission under a single commander established and so designated by the President, through the Secretary of Defense and with the advice and assistance of the Chairman of the Joint Chiefs of Staff. Combatant commands typically have geographic or functional responsibilities. (JP 1-02)

Contamination. (1) The deposit, absorption, or adsorption of radioactive material, or of biological or chemical agents on or 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, the byproduct of the growth of bacteria or organisms, the decomposing material (to include the food substance itself), or waste in the food or water. (JP 1-02)

Contamination control. Procedures to avoid, reduce, remove, or render harmless (temporarily or permanently) nuclear, biological, and chemical contamination for the purpose of maintaining or enhancing the efficient conduct of military operations. (JP 1-02)

Decontamination. The process of making any person, object, or area safe by absorbing, destroying, neutralizing, making harmless, or removing chemical or biological agents, or by removing radioactive material clinging to or around it. (JP 1-02)

Detection. In nuclear, biological, and chemical (NBC) environments, the act of locating NBC hazards by use of NBC detectors or monitoring and/or survey teams. (JP 1-02)

Host nation support. Civil and/or military assistance rendered by a nation to foreign forces within its territory during peacetime, crises, or emergencies, or war based on agreements mutually concluded between nations. Also called HNS. (JP 1-02)

Identification. 1. The process of determining the friendly or hostile character of an unknown detected contact. 2. In arms control, the process of determining which nation is responsible for the detected violations of any arms control measure. 3. In ground combat operations, discrimination between recognizable objects as being friendly or enemy, or the name that belongs to the object as a member of a class. Also called ID. (JP 1-02)

Individual protection. Actions taken by individuals to survive and continue the mission under nuclear, biological, and chemical conditions. (JP 1-02)

Individual protective equipment. In nuclear, biological, and chemical warfare, the personal clothing and equipment required to protect an individual from biological and chemical hazards and some nuclear effects. (JP 1-02)

Mission-oriented protective posture. A flexible system of protection against nuclear, biological, and chemical contamination. This posture requires personnel to wear only that protective clothing and equipment (mission-oriented protective posture gear) appropriate to the threat level, work rate imposed by the mission, temperature, and humidity. Also called MOPP. (JP 1-02)

Mission-oriented protective posture gear. Military term for individual protective equipment including suit, boots, gloves, mask with hood, first aid treatments, and decontamination kits issued to soldiers. Also called MOPP gear. (JP 1-02)

Nerve agent. A potentially lethal chemical agent which interferes with the transmission of nerve impulses. (JP 1-02)

Nonpersistent agent. A chemical agent that when released dissipates and/or loses its ability to cause casualties after 10 to 15 minutes. (JP 1-02)

Nuclear, biological, and chemical-capable nation. A nation that has the capability to produce and employ one or more types of nuclear, biological, and chemical weapons across the full range of military operations and at any level of war in order to achieve political and military objectives. (JP 1-02)

Nuclear, biological, and chemical defense. Defensive measures that enable friendly forces to survive, fight, and win against enemy use of nuclear, biological, or chemical (NBC) weapons and agents. US forces apply NBC defensive measures before and during integrated warfare. In integrated warfare, opposing forces employ nonconventional weapons along with conventional weapons (NBC weapons are nonconventional). (JP 1-02)

Nuclear, biological, and chemical environment. Environments in which there is deliberate or accidental employment, or threat of employment, of nuclear, biological, or chemical weapons; deliberate or accidental attacks or contamination with toxic industrial materials, including toxic industrial chemicals; or deliberate or accidental attacks or contamination with radiological (radioactive) materials. (JP 1-02)

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. (JP 1-02)

Persistency. In biological or chemical warfare, the characteristic of an agent which pertains to the duration of its effectiveness under determined conditions after its dispersal. (JP 1-02)

Persistent agent. A chemical agent that, when released, remains able to cause casualties for more than 24 hours to several days or weeks. (JP 1-02)

Protection. Measures that are taken to keep nuclear, biological, and chemical hazards from having an adverse effect on personnel, equipment, or critical assets and facilities. Protection consists of five groups of activities: hardening of positions, protecting personnel, assuming mission-oriented protective posture, using physical defense measures, and reacting to attack. (JP 1-02)

Protective mask. A protective ensemble designed protect the wearer's face and eyes and prevent the breathing of air contaminated with chemical and/or biological agents. (JP 1-02)

Residual Contamination. Contamination which remains after steps have been taken to remove it. These steps may consist of nothing more than allowing the contamination to decay normally. (JP 1-02)

Survey. The directed effort to determine the location and the nature of a chemical, biological, and radiological hazard in an area. (JP 1-02)

Toxic chemical. Any chemical which, through its chemical action on life processes, can cause death, temporary incapacitation, or permanent harm to humans or animals. This includes all such chemicals, regardless of their origin or of their method of production, and regardless of whether they are produced in facilities, in munitions or elsewhere. (JP 1-02)

Toxic industrial biological—Biological materials (bacteria, viruses, and toxins) found in medical research or pharmaceutical and other manufacturing processes that are toxic to humans and animals or cause damage to plants. (FM 4-02.7)

Toxic Industrial Chemical. Chemical compounds used or produced in industrial processes that are toxic to humans and animals, or cause damage to plants. (FM 4-02.7)

Toxic Industrial Materials. Toxic industrial materials may be toxic industrial chemical (TIC), toxic industrial biological (TIB), and toxic industrial radiological (TIR) materials. (FM 4-02.7)

Toxic Industrial Radiological. Radiation emitting materials used in research, power generation, medical treatment, and other non-weapon developmental activities that are harmful to humans and animals if released outside their controlled environments. (FM 4-02.7)

Weapons of mass destruction. Weapons that are capable of a high order of destruction and/or of being used in such a manner as to destroy large numbers of people. Weapons of mass destruction can be high explosives or nuclear, chemical, biological, and radiological weapons, but exclude the means of transporting or propelling the weapon where such means is a separable and divisible part of the weapon. Also called WMD. (JP 1-02)

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