ARMY, MARINE CORPS, NAVY, AIR FORCE

MULTISERVICE PROCEDURES FOR NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) DEFENSE OF THEATER FIXED SITES, PORTS, AND AIRFIELDS

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MCWP 3.37.5
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AIR LAND SEA APPLICATION CENTER

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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 document is designed for commanders and personnel responsible for nuclear, biological, and chemical (NBC) defense planning at theater bases/base clusters. These personnel may be responsible for deliberate and/or crisis planning and may be required to execute plans across the conflict spectrum. This publication provides a multiservice reference for planning, resourcing, and executing the NBC defense of fixed sites, ports, and airfields. Specific tactics, techniques, and procedures (TTP) are included in its appendixes. During operations, this publication is subordinate to current joint publications addressing this topic. While this document is focused on operations primarily outside the continental United States (OCONUS), it can be used to address acts of chemical, biological, and radiological terrorism against United States (US) force generation sites.

2. Purpose

This multiservice publication has been prepared as a revision to Field Manual (FM) 3-4-1, Fixed Site Protection. Formerly a single-service manual, this revision has been coordinated and approved by its signatories to address multiservice NBC defense operations and responsibilities at military fixed sites.

3. Application

The procedures in this publication apply throughout the US armed forces as specifically represented by the signatory authorities in the foreword. The use of this document during joint operations is subject to operational guidance and directives from the Joint Chiefs of Staff (JCS).

Additionally, it is not the intent of this publication to restrict the authority of service or joint force commanders (JFCs) from organizing the force and executing their mission in a manner they deem appropriate.

4. Implementation Plan

Participating service command offices of primary responsibility (OPR) will review this publication, validate the information, and reference and incorporate it into service manuals, regulations, and curricula as follows.

Army. The Army will incorporate the procedures in this publication in US Army training and doctrinal publications as directed by the commander, US Army Training and Doctrine Command (TRADOC). Distribution is in accordance with (IAW) Department of the Army (DA) form 12-99-R.

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5. User Information

a. The TRADOC-MCCDC-NWDC Headquarters (HQ) AFDC Air Land Sea Application (ALSA) Center developed this publication with the joint participation of the approving service commands. ALSA will review and update this publication as necessary.

b. This publication reflects current joint and service doctrine, command and control (C^2) organizations, facilities, personnel, responsibilities, and procedures. Changes in service protocol, appropriately reflected in joint and service publications, will likewise be incorporated into revisions to this document.

c. We encourage recommended changes for improving this publication. Key your comments to the specific page and paragraph and provide a rationale for each recommendation. Send comments and recommendations directly to—

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Multiservice Tactics, Techniques, and Procedures for NBC Defense of Theater Fixed Sites, Ports, and Airfields

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EXECUTIVE SUMMARY

Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical (NBC) Defense of Theater Fixed Sites, Ports, and Airfields

- **Discusses NBC Defense of Theater Fixed Sites, Ports, and Airfields**
- **Provides a Fixed Site Threat Overview**
- **Discusses Fixed Site Vulnerabilities and Mitigation**
- **Discusses Fixed Site NBC Defense Planning**
- **Provides Multiservice Tactics, Techniques, and Procedures (MTTP) for NBC Defense Planners**

COMMANDER'S OVERVIEW

Chapters provide broad overview. Appendixes provide more specific TTP.

This MTTP provides a comprehensive approach regarding NBC defense of fixed sites, ports, and airfields. Chapter 1 addresses the *Fixed Site NBC Environment,* Chapter 2 identifies *Fixed Site Vulnerability,* and Chapter 3 provides guidance on *Fixed Site NBC Defense Responsibilities and Execution.* Appendixes A through J support and supplement the chapters.

Chapter 1 introduces concerns such as NBC weapons proliferation, lessons learned during Operations DESERT SHIELD/DESERT STORM, Toxic Industrial Materials (TIM), and worldwide terrorist activities; all driving immediate considerations for fixed site NBC defense. The chapter highlights command responsibilities for protecting the force in today's and tomorrow's NBC environment.

Fixed Site: Developed real estate (facilities and supporting equipment) required to accomplish an operational mission.

Permanently Fixed Sites: Sites that cannot move. In war or conflict, they may be abandoned, but not moved.

Operationally Fixed Sites: Transportable or mobile facilities not moved due to ongoing operational constraints. For example, movement of field hospitals or critical communications nodes just prior to commencing offensive operations.

Base: A locality from which operations are projected or supported. An area or locality containing installations which provide logistic or other support.

Base Cluster: In base defense operations, a collection of bases, geographically grouped for mutual protection and ease of C^2.

Operational environment discussion is modeled on Chairman of the Joint Chiefs of Staff Manual (CJCSM) 3500.04, Universal Joint Task List, Chapter 3, Conditions for Joint Tasks.

During force projection operations, APOD/SPOD pose lucrative strategic chokepoints inviting enemy targeting.

As movement of cargo out of the APOD/SPOD decreases as a result of personnel degradation, logistics throughput and operations are also affected.

Analysis of the operational environment is a critical part of an IPB process supporting effective decision-making.

Avoidance. Active and passive measures for avoiding NBC attacks/hazards.

Additionally, this chapter establishes standard terminology for fixed sites and defines the operational environment for fixed site operations.

Fixed sites include command, control, communications, computers, and intelligence (C^4I) sites; ports/seaports of debarkation (SPODs); airfields/aerial ports of debarkation (APODs); logistics bases (war reserve sites, ammunition storage points/depots, supply depots, maintenance sites, etc.), and medical facilities.

For planning considerations, the fixed site operational environment discussion includes four parameters:

- **Physical Environment.** Conditions and terrain which, in concert with weather, influence NBC targeting, employment, and effects.

- **Military Environment.** Includes strategic chokepoints, sustainment operations, complex C^2 implications at fixed sites, and strategic centers of gravity. Combined, these aspects translate fixed sites into high value targets.

- **Civil Environment.** Cultural influences of religion, nationalism, and ethnic makeup mold civic and political attitudes and economic influences. Industrial and technological capabilities can create and support overt or covert NBC proliferation.

- **Threat Environment.** The NBC threat spans the full spectrum of operations in peacetime and conflict. The NBC threat presents tactical, operational, and strategic implications requiring active and passive countermeasures to address NBC hazards created by nations, terrorists, or by consequence.

Chapter 2 examines fixed site vulnerability, intelligence preparation of the battlespace (IPB), analysis, and mitigation.

IPB supports the analytical process that allows commanders and staffs to disperse the "fog" of the operational environment and anticipate enemy actions before they occur. IPB becomes the "glue" that connects Chapters 1-3 and Appendixes A-J.

Protection. Defensive measures to provide individual, collective, and materiel protection against NBC hazards.

Decontamination. Immediate, operational, and thorough decontamination techniques increase survivability and restore combat power by "absorbing, destroying, neutralizing, making harmless, or removing" contamination.

Vulnerability Analysis. A continuous process of conducting IPB, NBC Risk Assessment, and NBC Vulnerability Analysis procedures to identify specific mitigation measures.

Although this document focuses on passive defense measures, mitigation measures always include active defense measures.

The amount of resources allocated to protect a fixed site should reflect the value of the site to combat effectiveness.

Protect the Force
Sustain C^2
Sustain Combat Support

This chapter relies heavily on JP3-10, Doctrine for Joint Rear Area Operations; JP3-10.1, Joint Tactics, Techniques, and Procedures for Base Defense; and the Joint Operation Planning and Execution System.

The following characteristics contribute to fixed site vulnerability: bottlenecks, large area targets, high value targets, limited defensive capabilities, and limited or no mobility.

Strategic and Operational Impacts. The minimum impact caused by NBC hazards entails a temporary reduction in operational tempo (OPTEMPO) for targeted forces/operations. Under less ideal conditions, NBC hazards may delay fixed site operations for hours or days and result in changes of mission and/or mass casualty scenarios. Impacts will vary based on the functional mission of the fixed site.

Vulnerability Analysis. The basic methodology combines IPB, NBC risk assessment, and NBC vulnerability analysis procedures to identify specific measures to avoid, protect against, or reduce the effects of NBC weapons and hazards. Appendixes C and G provide information to supplement existing service procedures.

Chapter 3 focuses on the three key measures to accomplish fixed site NBC defense goals: protecting the force, sustaining C^2, and sustaining combat support. This chapter's two sections include Fixed Site NBC Defense Roles/Responsibilities (who is responsible), and Resourcing, Deployment, and Execution Guidance (making the plan work).

The appendixes support the planning, resourcing, organizing, and execution process by providing detailed "how to" discussion and tools.

Table Ex-1 summarizes appendix contents.

Table Ex-1. Appendix Summary

APPX	SUBJECT	SUMMATION
A	*Fixed Site NBC Defense Task List*	Demonstrates linkage of the Universal Task List at the strategic, operational, and tactical levels and the integration of NBC considerations into planning.
B	*NBC Defense Assets*	A listing of Department of Defense (DOD), international, and expedient NBC assets that may be available to support the fixed site NBC defense plan.
C	*Vulnerability Analysis and Mitigation*	A "how to" approach for risk assessment and a discussion on friendly vulnerability analysis supported by tables to assist in mitigation planning.
D	*Fixed Site NBC Defense Planning Tools*	Focuses on preparation of NBC defense procedures, considerations, and templates to support planning.
E	*Fixed Site NBC Defense Execution Tools*	Provides examples and blank synchronization matrices for the execution of NBC defense tasks.
F	*Host Nation and Civilian Considerations*	Guides integration of host nation assets and non-combatant considerations and responsibilities into the NBC defense plan.
G	*Toxic Industrial Materials*	Provides tables and templates to assist in situational hazard mitigation planning with emphasis on individual safety.
H	*Fixed Site Decontamination*	Provides decision aids and tables for rapidly addressing NBC contamination and decontamination prioritization.
I	*Retrograde of Equipment with Residual NBC Contamination*	Describes the need for protection from NBC hazards posed by retrograde cargo and equipment. Tables contain available equipment detection sensitivities, maximum exposure limits, and proposed maintenance site controls.
J	*NBC Protection Options*	Describes potential in-place materiel, procedures, and techniques for expedient protection.

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Chapter I

FIXED SITE NBC ENVIRONMENT

1. Introduction

Significant national security concerns drive the immediate consideration of fixed site NBC defense. These concerns include proliferation of NBC weapons and the lessons learned during armed conflicts such as Operations DESERT SHIELD/DESERT STORM. In addition, terrorist attacks such as the Khobar Towers incident (large conventional explosives) and the Tokyo subway incidents (nerve agent) demonstrated potential vulnerabilities that terrorists may exploit. Commanders must fully consider the requirements for fixed site NBC defense. Our forces require protection from NBC weapons as well as hazards from industrial facilities in our area of operations (AO).

a. Commanders have direct responsibility for protecting their forces against these threats. On future battlefields, failure to properly plan and execute NBC defenses for crucial fixed sites may result in significant casualties, disruption of operations, and even mission degradation. Further, commanders' mission and execution plans must address the implications of NBC weapons if used at critical force projection chokepoints, specifically ports of embarkation and debarkation. Figure I-1 depicts the force projection chokepoints and NBC challenges confronting a commander in a theater of operations. As forces enter the theater, vulnerability concerns heighten significantly. Protecting the force is of equal or greater concern during all entry operations as well as offensive or defensive operations.

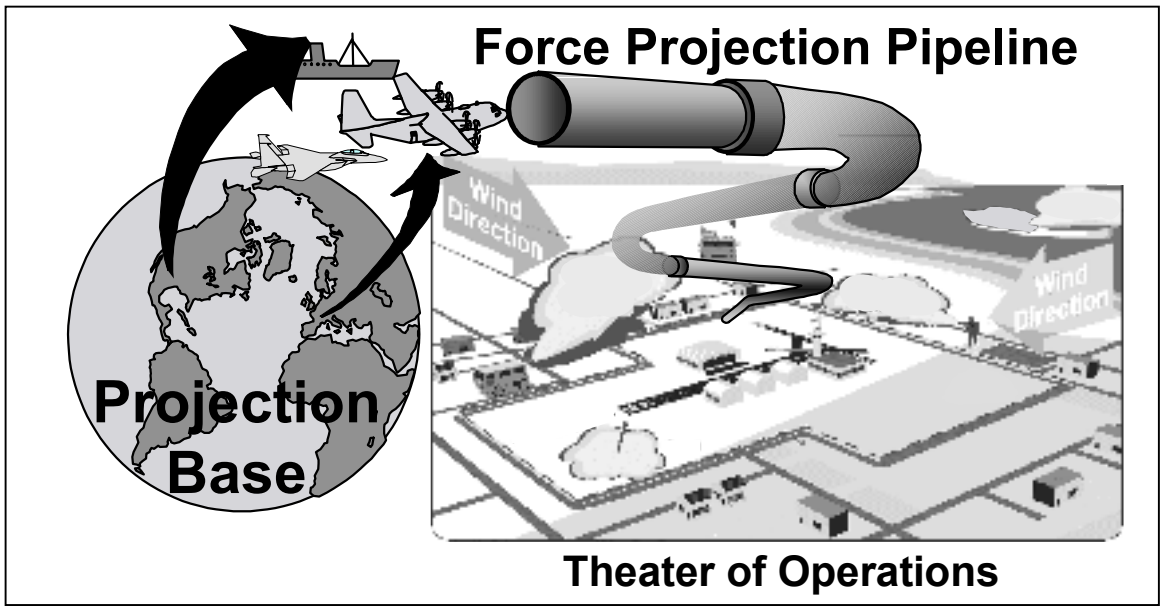

Figure I-1. Force Projection

b. Notice that the force projection pipeline generally originates from the continental United States (CONUS) or from an ally (e.g., North Atlantic Treaty Organization (NATO)). Although still vulnerable, ports of embarkation at the projection

base offer an advantage by allowing additional security, flexibility, and standoff. Therefore, enemy NBC targeting efforts will likely focus on the more vulnerable ports of debarkation (PODs). NBC weapons employed against these PODs as well as forces not yet deployed to forward areas of operations can create significant casualties and bottlenecks in the resource pipeline. As a result, during joint reception, staging, onward movement, and integration (JRSOI) operations, combat power is extremely vulnerable around PODs, at the initial marshalling/staging areas, and at the other reception nodes. Effective JRSOI reduces vulnerability to enemy attacks by quickly moving forces away from fixed sites (see JP 4-01.8, *JTTP for Joint Reception, Staging, Onward Movement, and Integration*). However, fixed sites remain centers of gravity for sustaining, enhancing, and controlling forward combat power; and therefore, they remain high value targets for NBC weapons. It is in the context of this environment that Chapter I defines key fixed site terminology and addresses the operational environment of fixed sites.

2. Terminology

Common terminology is essential for establishing effective communication and coordination, and maintaining focus on the scope of this manual. Specifically, the term "fixed site" is defined as shown below and discussion is focused toward, but not limited to, the subsequent points.

a. **Fixed Site.** Developed real estate (facilities and supporting equipment) required to accomplish an operational mission. Examples include C^4I sites; SPODs; airfields/APODs; logistics bases (e.g., pre-positioned storage facilities, ammunition storage points/depots, supply depots, maintenance sites); and medical facilities.

Fixed sites can be further categorized as permanently or operationally fixed.

(1) **Permanently Fixed Sites.** Facilities that cannot move. If war or conflict comes to these facilities, they may be temporarily abandoned, but not moved. Additionally, NBC hazards can make these facilities unusable, causing them to be abandoned until transition to postconflict operations. These include existing facilities such as ports, airfields, railheads, bridges, and hospitals.

(2) **Operationally Fixed Sites.** Facilities transportable or mobile, but due to ongoing operational constraints, they are not moved. Examples of operationally fixed sites include transportable hospitals, critical mobile communications nodes just prior to commencing offensive operations, and bridging operations.

b. **Base** and **Base Cluster.** Related terms used in this manual.

(1) **Base.** A locality from which operations are projected or supported. An area or locality containing installations which provide logistic or other support. (JP 1-02)

(2) **Base Cluster.** In base defense operations, a collection of bases, geographically grouped for mutual protection and ease of C^2. (JP 1-02)

The functions and services provided by the fixed sites noted above provide critical C^4I, force projection, and sustainment capabilities for the joint forces. Subsequent discussions initially focus on APODs/SPODs during entry operations, and subsequently address the joint rear area (JRA) as well as other critical fixed sites as the theater expands and forces transition to operations.

3. Operational Environment

a. The NBC threat profile and operational constraints of fixed sites are fundamentally different than those associated with mobile (nonfixed) units. Fixed sites in the rear area will likely be targeted with persistent chemical agents and point- or line-source-delivered biological agents, in addition to the possible use of radiological dispersal weapons. Nonfixed units operating throughout the battle space may be exposed to the range of radiological, chemical, and biological weapons, but gain advantages from their mobility and dispersion. Fixed site operations are likely constrained to continuing operations in a contaminated environment due to limited relocation options and impacts of interrupting sustainment operations. This constraint to live, work, and operate in close proximity or within contaminated areas drives requirements for extensive planning and preparations. Table I-1 depicts fixed site information and equipment considerations in relative terms of criticality and their importance to fixed site operations.

Table I-1. Fixed Site Information and Equipment Considerations

ITEM	REQUIREMENTS	REASON
Anticipated Specific Agents	High	Persistency and MOPP Considerations
Anticipated Agent Concentration	Critical	MOPP Considerations
Specific Persistency	Critical	Sustainment
Detector Quantities	High	Establishment of Specific Hazard Footprint
Background Interference Areas	High	Accuracy
Integrated, Automated Detection CB Networks	High	Speed in Establishment of Hazard Footprint and Survivability
Specific Detector Layouts	Critical	Force Survivability and Sustainment
Hardwire Power at Detector Sites	High	Sustainment
Collective Protection	High	Sustainment
Contaminated Waste Disposal Areas	High	Sustainment and Survivability
Extensive Supply of Covers	High	Sustainment w/Limited Decon Requirement
Specific Dispersion and Overhead Cover Plans	High	Limited Space Allocation – Can't Have Units Fighting for Same Space
Individually Issued Decon Materials	Critical	Sustainment and Mission Accomplishment – entire fixed site populace must be a decon team
Division of Base Into "Sectors"	High	Mission Effectiveness – Hazard Isn't Same for All Areas
MOPP Levels Tailored to Sector Hazards	Critical	Sustainment
Fixed Warning & Reporting System	Critical	Survivability
Redundant NBC C2 Operations	High	Sustainment
Interaction of Agents w/all Types of Materials (concrete, soil, brick, wood)	Critical	Sustainment

b. The fixed site operational setting is a diverse and complex environment. This setting includes the physical, military, civil, and threat environment. First, by function,

fixed site operations cross each aspect of the physical battle space: land, sea, air, and space. Secondly, fixed site operations are inherently joint and will likely include joint task force (JTF) operations. Thirdly, in addition to the physical and military environments, fixed site operations, especially aerial and port operations occur within the complex framework of the host nation (HN) civilian environment. Commanders should consider these four fixed site operational environment parameters in the following discussion for inclusion in joint/multiservice plans and exercises.

4. Physical Environment

The physical battle space directly impacts fixed site operations and the physical environment directly influences the impact of NBC weapons and hazards. NBC weapons can impact force projection and combat operations on land, at sea, or in the air. Further, the nuclear component of NBC could also impact the space environment. Nuclear effects severely degrade the C^2 networks relying on this dimension. Still, the most notable influences of the physical environment on fixed site NBC defense are weather and terrain.

a. **Weather.** Weather conditions are the "uncontrollable wildcard" of NBC employment and provide useful cues to probable times and places for NBC use (i.e., employment windows). Diligent tracking of weather conditions aids in the assessment of risks to friendly forces from NBC weapons, as well as TIM hazards.

b. **Terrain.** In concert with weather conditions, terrain influences where NBC effects may concentrate (e.g., chemical agents in low lying areas); and in many cases, it influences enemy NBC targeting (e.g., exploiting or creating chokepoints).

5. Military Environment

The military environment of fixed sites includes strategic chokepoints, sustainment operations, and C^2 centers. With a limited number of PODs serving as the hub for a commander's sustainment and C^2 operations, fixed sites may become a critical center of gravity for joint, multinational, and HN personnel. As a result, they are high value targets for the enemy. These are potential centers of gravity.

a. **Strategic Chokepoints.** The strategic projection of combat power may require air and sea ports of debarkation. Once forward deployed, these forces may require operational sustainment through the same POD. A limited number of useable PODs causes an unavoidable concentration of forces at these sites, thus creating an enticing NBC target.

b. **Combat Power Sustainment.** Continuity of support from fixed sites is the lifeblood for sustaining a force's combat power. NBC hazards can interrupt fixed site operations and decrease our forces' overall combat power. The intensity of combat operations and fixed site activities varies; however, the fixed site OPTEMPO remains constantly high. In addition to personnel casualties, an NBC weapon can be a very efficient and effective means of quickly disrupting and/or halting the flow of information and resources to or from the fixed site. The overall impact is a decrease in combat capability.

c. **Complex C^2.** Multiple services, activities, and organizational structures (e.g., base clusters, airfield/port operations, and HN support) complicate fixed site C^2. Additionally, fixed site personnel (e.g., logistics, reserve, and HN/US civilians) may have less training in passive defense measures and protective equipment than combat forces, further complicating C^2 in an NBC environment.

6. Civil Environment

The cultural and economic aspects of the civil environment significantly influence fixed site NBC defense considerations. These include religious, national, and ethnic values as well as economic, industrial, and, technological capabilities.

a. **Cultural Influences**. Commanders at fixed sites must consider cultural, ethnic, and religious attitudes and behaviors that may impact operations within his area of responsibility. At one extreme, cultural norms in the HN may dictate practices such as religiously mandated wear of facial hair, thereby impeding a proper mask seal. This practice will prove problematic as fixed site commanders attempt to ensure the safety of civilian workers at their locations. At the other extreme, strict adherence to national or religious calls to action may compel zealots to rationalize, embrace, and employ any element of combat power (e.g., NBC) against a high profile target like a fixed site.

b. **Economic Influences**. Industrial and technological capabilities can be a double-edged sword. A nation's industrial base can support defensive strategies as well as create the prolific environment supporting NBC production, stockpiles, and employment. The HN with a developed economic infrastructure and industry can better support redundant lines of communication (LOC) and/or provide protection and decon resources. Conversely, a nation's economic capabilities could support overt or covert development and production of NBC weapons or TIM. An economic climate such as this increases the plausible threat against fixed sites.

7. Threat Environment

The threat environment of today's battle space could span the full range of operations during a conflict. NBC weapons and hazards create tactical, operational, and strategic implications for the commanders and their forces. Commanders must weigh the impact of offensive action against enemy NBC production/storage facilities. For example, the downwind hazard following target destruction must be considered. Additionally, countermeasures must be prepared to negate the threat posed by industrial hazards, i.e., TIM and terrorists.

a. Various countries are known to possess or are suspected of possessing NBC capabilities. Any country with pharmaceutical, agricultural, and/or pesticide research capabilities could easily disguise chemical and biological (CB) weapons development programs. As countries seek to expand their own NBC programs, potential funding is derived from sales of products and/or technologies to other countries or organizations. This practice sustains the NBC proliferation process.

b. Combine the proliferation of NBC weapons with the proliferation of ballistic and cruise missile technology and the increasing threat to offshore assets, rear areas, and fixed sites becomes even more apparent. Since ballistic missiles, smart munitions, or covert and terrorist devices can deliver NBC weapons, the threat environment extends throughout the depth of the battle space and continues to the force projection base.

c. Industrial centers and weapons production/storage facilities can easily become sources of hazards for our forces and their equipment. For example, over 15,000 civilians died following a chemical accident in Bhopal, India. Deliberate targeting of industrial facilities can produce toxic industrial hazards (radiological, biological, or chemical) as lethal as any NBC arsenal. The same results may occur from collateral damage, accidents, or covert/terrorist activity. Therefore, forces operating in or located near these facilities incur higher risk and vulnerability. Not only are the industrial facilities potential hazard producers, but also the transport vehicles used to move industrial products (e.g., phosgene, chlorine), waste products, and munitions.

d. The availability of technology to terrorist organizations provides them the flexibility of using conventional weapons, NBC weapons, and/or exploitation of industrial hazards to accomplish their objectives. As a high-leverage, low-risk form of warfare, terrorism creates a breeding ground for the proliferation of NBC, especially for CB weapons with their low cost per effect ratios. The Tokyo subway incident involving the Aum Shinri Kyu cult's use of the nerve agent sarin (GB) is a prime example of NBC proliferation. The Aum Shinri Kyu cult in Japan was not only involved in chemical weapons research, but also purchased large quantities of *Clostridium botulinum*, the organism that produces the very lethal botulinum toxin. Additionally, in 1992, the cult demonstrated an interest in the Ebola virus by sending a "medical" mission to Zaire.

Chapter II

FIXED SITE VULNERABILITY

1. Overview

Fixed sites provide critical functions that support force projection and sustainment. Discussions of the threat and operational environment always provide insight into friendly vulnerabilities. This chapter specifically examines fixed site vulnerabilities, joint intelligence preparation of the battle space (JIPB), vulnerability analysis, and vulnerability mitigation.

a. The projected force requires points of debarkation. Once projected, these forces require sustainment from logistics bases that are primarily fixed sites. For a projected force, these sites may become centers of gravity for joint, multinational, and HN mission-critical operations. These sites are high value targets for possible use of enemy NBC weapons.

b. Worldwide NBC proliferation and the threatened use of NBC weapons, overt or covert, require commanders and their staffs to have a working knowledge of NBC defense principles, fixed site vulnerabilities, and mitigation techniques. Specifically, a JTF may be established based on a geographical area or functional basis when the mission has a specific limited objective. They are formed from different service assets supporting the commander of a combatant command (CINC). JTFs require trained NBC personnel who fully understand the threat and know how to assess and reduce NBC vulnerability. Additionally, immediate operational requirements may result in the hasty establishment of bases and base clusters within a matter of hours to days. In units without an organic NBC staff, NBC defense experts may be attached after initial planning sessions. Therefore, successful NBC defense planning and execution rely on commanders and their staffs understanding the aspects of NBC defense.

2. Fixed Site Vulnerability

a. Forces are most vulnerable and operations are at the greatest risk during marshalling, staging, and intratheater deployment conducted during force projection operations. NBC protection is especially critical to mission success during this phase of operations. When necessary and/or possible, commanders must ensure they consider and evaluate numerous SPODs and APODs so they can deploy military forces from different locations in case of NBC attack. This vulnerability is magnified when the enemy possesses NBC weapons. Even during war termination and postconflict operations, NBC use could occur and again increase risk to our forces. Protecting the force remains a key mission throughout all operations.

b. Special operations forces (SOF) and missile attacks are the most difficult to profile, predict, or detect. Figure II-1 depicts how enemy NBC effects represent a full spectrum threat, making vulnerability analysis more difficult. Vulnerability analysis plays an increasingly important role in helping the commander focus limited NBC defense assets against the most likely NBC delivery means. It is the enemy's ability to deliver NBC weapons and other existing NBC hazards (e.g., TIM hazards) that causes the commander to assess unit and site vulnerability. However, before discussing vulnerability assessment techniques and mitigation, it's important to understand fixed site characteristics, vulnerability, and the strategic and operational impact of NBC hazards to fixed sites.

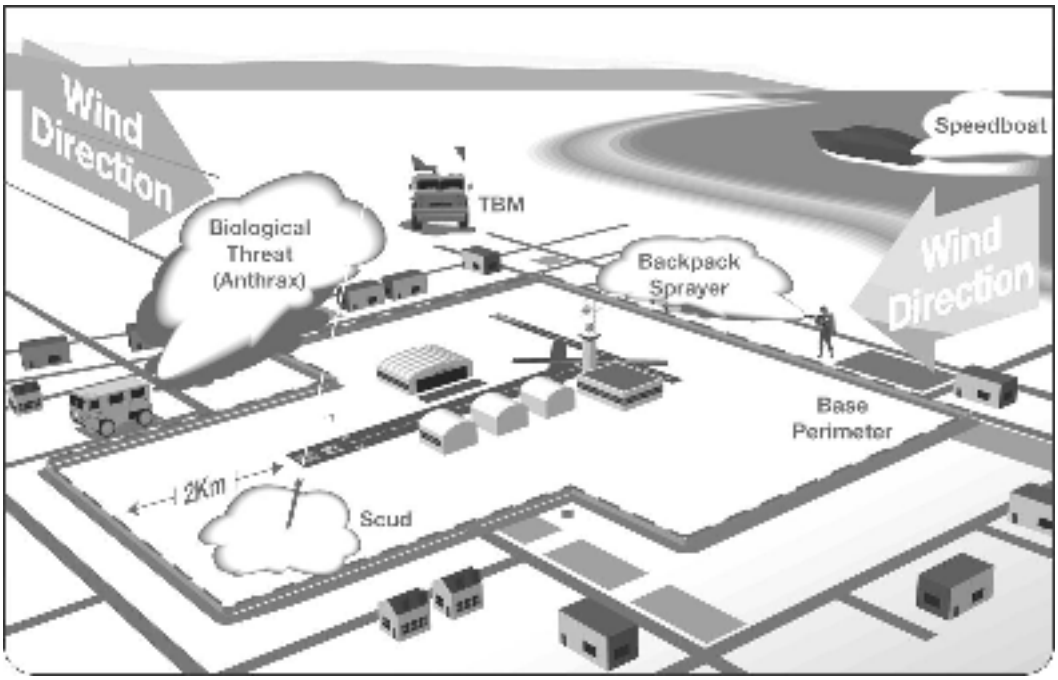

Figure II-1. Fixed Site NBC Threats

3. Fixed Site Characteristics

Commanders recognize that fixed site characteristics make them vulnerable, high value targets. These characteristics include the following:

a. **Bottlenecks.** Intertheater and intratheater movement of resources will burden limited POD throughput capacities and create force and equipment concentrations. Additionally, NBC use could cause civilian panic/flight and clog road networks surrounding fixed sites. Therefore, commanders must consider and evaluate other transportation avenues in case of NBC employment.

b. **Large Area Targets**. Fixed sites such as base clusters may be dispersed over large areas, helping to decrease the conventional theater missile attack risk. However, this same dispersion increases physical security requirements, burdening limited resources. It also encourages enemy selection of NBC weapons because of their large area coverage characteristics. Large area targets are extremely vulnerable to unconventional

SOF attacks. These include CB agents employed from small manned or unmanned aircraft, watercraft, or man-portable devices.

c. **High Value Targets.** Fixed sites represent a series of critical, interrelated functions and concentration of high priority activities. This makes the fixed site a potential center of gravity. Additionally, fixed sites often provide one-of-a-kind critical mission functions that have limited redundancy.

d. **Limited Defensive Capabilities.** Long-range interdiction weapons are most often organized to support combat operations, leaving limited range defensive weapons for active theater missile defense (TMD) of fixed sites. Further, the fixed site operational environment likely possesses limited defensive capabilities.

e. **Limited or No Mobility.** It is easier for the enemy to target fixed sites vice more mobile, tactical targets. Even with extensive camouflage, concealment, and deception (CCD) efforts, the large area nature of fixed sites continues to make them lucrative NBC targets.

f. **Limited Expertise.** Finally, multiple activities, complex organizational structures, and varying levels of expertise in passive defense measures combine to make fixed site NBC defense a challenging, yet manageable task.

4. Strategic and Operational Impacts

Assuming a thoroughly prepared and rehearsed NBC defense plan, the minimum anticipated impact from NBC hazards is a temporary reduction in OPTEMPO for the affected forces. Under less ideal conditions, NBC hazards may delay fixed site operations for hours or days and result in changes of mission and/or mass casualty scenarios. With little or no NBC defense equipment training, Civil Reserve Air Fleet (CRAF) and merchant marine movement assets will be delayed or diverted to alternate PODs. This section is designed to emphasize the strategic and operational impacts of NBC hazards at a specific base/base cluster, namely C^4I nodes, ports, airfields, and logistics bases. Subsequent discussions will outline how to plan effectively.

a. **C^4I Impacts.** Information hubs such as command centers, communications centers/sites, and intelligence collection sites are prime targets for NBC weapons. Information flow drives decisions. Even temporary disruptions of this capability can force modifications of plans and orders at both the strategic and operational levels. This could lead to catastrophic consequences at the tactical level. Disrupting the C^4I nodes through use of NBC weapons will severely hinder a commander's responsive and timely support for mission operations; therefore, subordinate commanders must clearly understand the strategic objectives and intent.

b. **Port Impacts.** When NBC contamination is present, JRSOI operations, terminal discharge, transfer, storage, and clearance operations are immediately complicated or temporarily halted by increased protective posture, reduced HN and contract support, and decontamination operations. Without plans for redundant facilities, transportation assets, and/or logistics over-the-shore, the logistics flow decreases and over

time, results in decreased combat power. During port operations, NBC attacks may force a heavier reliance on ports at a significant distance from established logistics nodes and staging areas. This increase in distance will adversely affect transportation requirements and the delivery time of supplies and personnel. Additionally, port support personnel must be trained and equipped to operate in an NBC environment.

c. **Airfield Impacts.** Short of a nuclear attack, the main NBC impact on airlift and combat aircraft is decreased sortie rates and increased landing constraints. These decreases result primarily from degradation of ground support crews in extended mission-oriented protective posture (MOPP) levels. As cargo aircraft contamination control, contaminated payload control area measures, and decon operations intensify, payload throughput decreases.

Like ports, diversion of combat loads to alternate or redundant facilities may result in significant delays in employment of combat forces or delivery of priority payloads. Intertheater and intratheater airlift assets operate most effectively in uncontaminated environments. Exposure of airlift assets to contamination may restrict use of that aircraft. Contingency air planning must address procedures for using contaminated air facilities, transload locations, and alternate sites to support continued air operations. This is especially true for civil aircraft. Once contaminated, civil aircraft will not be flown again due to legal concerns and the inability of civil aircrews to fly contaminated aircraft. The inability to fly contaminated civil aircraft may also cause parking maximum on the ground (MOG) problems if large numbers of civil aircraft are contaminated at the same airfield. CRAF will not deliver cargo to contaminated airfields. Intratheater airlift to contaminated areas is typically conducted for critical mission exceptions. In-flight refueling allows combat aircraft to support from outside theater missile (TM) range for limited periods.

d. **Logistics Base Impacts.** NBC hazards will primarily influence logistics base transportation capabilities, exposed supply inventories, and work rates. Contamination of vehicles or ground transport routes creates delays/detours at best and contaminates transporters at worst. Contaminated uncovered supplies and ammunition create exposure risks and work rates decrease as personnel operate in increased MOPP levels. Exposed material which cannot be decontaminated may have to be replaced. This loss of supplies may create an increased logistical burden.

e. **Medical Treatment Facility (MTF).** NBC hazards will create an environment in which an MTF without collective protection will be limited in its patient care capabilities. The treatment facility can be provided a temporary level of protection using techniques discussed in Appendix J and service specific guidance.

5. Vulnerability Analysis

The basic methodology for vulnerability analysis is shown in Figure II-2. This section expands on this basic methodology, while Appendix C provides detailed “how to” instructions for risk assessment and analysis.

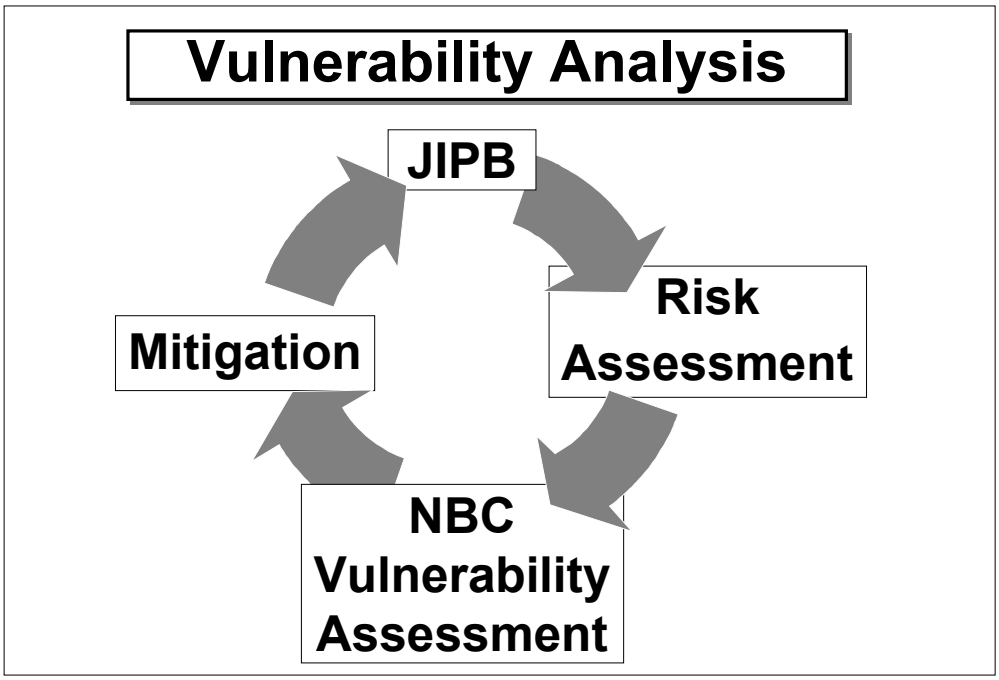

Figure II-2. Basic Methodology

a. **Joint Intelligence Preparation of the Battle Space.** JIPB is a systematic, continuous process of analyzing the threat and environment in a specific geographic area to support staff estimates and military decision-making. Every commander and staff conducts JIPB to anticipate enemy actions. In other words, JIPB is overlaying facts and assumptions about the operational environment with enemy information about a specific operation. The JIPB process provides a logical procedure for predicting adversary courses of action (COA) and their impact(s) on friendly operations. The four continuous steps of JIPB are as follows:

(1) Define the battle space environment.

(2) Describe the battle space effects.

(3) Evaluate the adversary.

(4) Determine adversary COA.

These four steps form a continuous process integral to fixed site risk assessments and vulnerability analysis. During friendly COA development, JIPB progresses to a wargaming process helping the commander identify anticipated enemy actions and friendly responses to minimize their impact. This wargaming is conducted in an "action/ counteraction" fashion (i.e., If this COA…then this response…with this potential impact.). Refer to JP 2-0, *Joint Doctrine for Intelligence Support to Operations*, Appendix A for a complete intelligence estimate.

b. **NBC Risk Assessment.** NBC risk assessments allow commanders to identify areas of NBC risk and potential mitigations for those risks. Appendix C furnishes detailed NBC risk assessment guides. These guides include JIPB related questions concerning the battle space and the threat environment. The answers to those questions impact risk assessments that are associated with recommendations for various NBC defensive measures.

NOTE: These guides are generic and other questions should be added or risk levels upgraded based on unique situations.

c. **NBC Vulnerability Analysis.**

(1) **Nuclear Vulnerability Analysis.** Nuclear vulnerability analysis addresses the impact(s) from blast (shock wave), thermal radiation (high intensity light and heat), initial radiation (within first minute after detonation), residual radiation (fallout and induced radiation), and electromagnetic pulse (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 defensive measures taken to reduce vulnerability. Subsequent discussion and Appendix C address these defensive measures in detail.

(2) **Biological Vulnerability.** Biological vulnerability analysis relies heavily on thorough intelligence to assist commanders with decision-support information for the following considerations:

(a) Immunization levels/availability of prophylaxis (with respect to anticipated agents).

(b) MOPP levels.

(c) Detection posture (deployed biological detection capability).

(d) Maneuver (mobility) status (fixed sites are static).

(e) Hygiene practices.

(f) General health of the population.

Using the biological vulnerability rating matrix in Appendix C provides a subjective degree of vulnerability: high, medium, or low. Combined with assessments of agent selection, employment "windows", and medical intervention response times, the matrix outlines a basic decision-related process that supports vulnerability reduction measures for the commander.

(3) **Chemical Vulnerability Analysis.** Chemical vulnerability analysis focuses specifically on casualty estimates. Figure II-3 identifies the basic steps that are addressed in Appendix C. The casualty estimate process relies on thorough JIPB, enemy and physical environment 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 and collective protection as well as specific response actions.

Chemical Vulnerability Analysis

- **Estimate the Delivery Capability**
  - **Determine Risk Windows (Threat/Weather)**
  - **Estimate Delivery Capabilities**
- **Generate Effects Information**
  - **Casualty Effects**
  - **Downwind Effects**
- **Estimate Casualties/Sortie Production**
  - **Determine Target Size**
  - Determine Probable Agent
  - Estimate Casualties
- Estimate Downwind Risk

Figure II-3. Chemical Vulnerability Analysis

It's important to note that in many cases the enemy's primary objective may not be casualty generation. The primary objective may be target contamination and degradation to our mission capabilities. When critical equipment, facilities, or terrain are contaminated, OPTEMPO may slow dramatically. This is caused not only by casualties, but from MOPP degradation, decon requirements, psychological impacts, and mission adjustments in response to the attack or anticipated attacks.

(4) **TIM Vulnerability Analysis**. TIM vulnerability analysis relies on intelligence and observation to determine potential hazards. TIM location and amount of material in and around the area of interest will determine the degree to which the fixed site is vulnerable. Appendix G discusses TIM hazards in detail.

d. **Vulnerability Reduction (Mitigation).** Fundamental to mitigating NBC effects on fixed sites is understanding applicable principles of war such as security, economy of force, unity of command, and objective. They are defined as:

(1) **Security.** Enhance freedom of action by reducing vulnerability to hostile acts. To be successful, fixed site commanders must take necessary protection and physical security measures to preserve their capabilities.

(2) **Economy of Force.** Ensure distribution of assets to accomplish assigned missions while reducing the vulnerability of fixed sites through split-based operations, off-shore operations, and/or maintaining mobility.

(3) **Unity of Command.** The force is under one responsible commander with the authority to direct required fixed site operations including TMD and NBC defense.

(4) **Objective.** Mutual objectives at fixed sites are focused on key, common goals such as protecting the force, C^2, and combat sustainment.

At a more practical level, mitigating fixed site vulnerability includes active and passive defense measures that reduce the probability of NBC attack and minimize their effects. With the possible exception of a strategic or operational level C^4I node, fixed site commanders have limited or no direct control of active defense assets capable of interdicting NBC delivery systems. However, active defense measures throughout the battle space and their associated warnings should trigger passive defense responses. Therefore, the remainder of this chapter will address fixed site considerations relative to passive defense measures.

6. Passive Defense Measures

The Joint Rear Area Coordinator (JRAC) and base cluster commanders recognize that passive defense represents a critical aspect of NBC protection. Commanders integrate intelligence and warning requirements into the total collection plan. This intelligence support will provide early indications of possible NBC use in theater, allowing the JRAC time to implement active defense measures. The JRAC and base cluster commanders understand the relationship of NBC defense principles (shown in Figure II-4) to supporting their overall passive defense plans. Figure II-5 summarizes the principal measures used to accomplish passive defense.

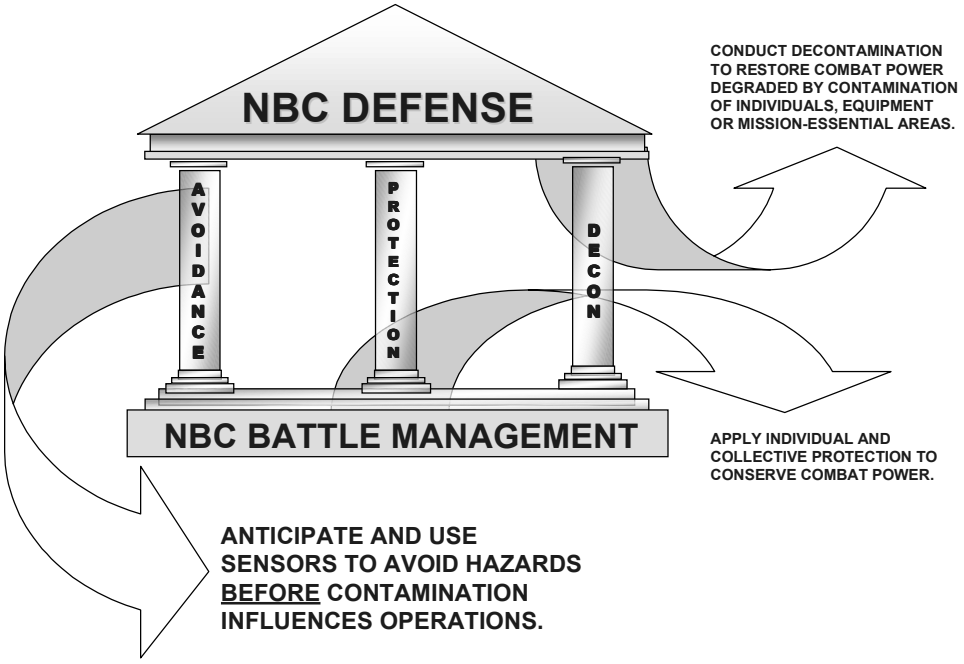

Figure II-4. NBC Defense Principles

Passive Defense Measures

- **Tactical Warning**
- **Reducing Targeting Effectiveness**
- **Mobility**
- **Training/Discipline**
- **Dispersion**
- **Hardening**
- **Covering Supplies/Equipment**
- Limiting Exposure
- Preventing Contamination Spread
- Seeking Protection
- Functional Redundancy

Figure II-5. Passive Defense Measures

a. **Tactical Warning.** Established warning procedures (e.g., preattack, attack, and postattack) help commanders and staffs acquire, process, and disseminate warning information that minimizes NBC impact. Timely warnings trigger critical individual and collective protection actions as well as contamination avoidance activities. Warnings are both general (missile launches are imminent or have occurred) and specific (specific units or areas are in danger of attack), or provide notification of an all clear.

b. **Reducing Targeting Effectiveness.** Communications security and signature reduction deny enemy sensor and reconnaissance assets key data inputs for acquisition and identification of friendly targets. Friendly measures include camouflage, emission control, cover, concealment, smoke, and local unit security measures to deny enemy key targeting data. Deception misleads enemies by manipulating, distorting, and falsifying friendly actions. Use of decoys or false electronic signatures can also deny an enemy key targeting information.

c. **Maintaining Mobility.** Although fixed sites are essentially immobile, commanders can sustain force mobility by maintaining flexibility in their operations plans and orders. A theater commander may decide to use an alternate SPOD, APOD, or joint logistics over-the-shore to maintain required throughput. Throughput and capacity considerations may also drive pre-positioning mission-essential assets, thus keeping resources mobile and containerized.

d. **Training/Discipline.** DOD military personnel by training and ethic maintain good order and discipline; however, many mission-essential civilian personnel (US and HN) will require training and personal protective equipment in order to ensure a disciplined, safe response to a crisis situation.

e. **Dispersion.** Dispersion decreases concentration and makes a target less lucrative. Commanders should consider physical security needs and the effect NBC weapons could have on their area of operation. Difficult choices will confront them as they consider mission requirements, available terrain, and dispersion requirements. For

example, site selection for mission-critical assets may result in split-based logistics operations or support from remote areas.

f. **Hardening.** Hardening reduces the effect of NBC attack. Careful site, terrain selection, field fortification, and other field expedient or construction methods support increased individual and collective protection.

g. **Covering Supplies and Equipment.** COA considerations include identifying what resources require protection and/or covering. Critical resources receive priority for limited NBC covers specifically designed to prevent liquid agent contamination.

h. **Limiting Exposure**. Limiting exposure will require active leadership. Networks of NBC detection and identification devices provide input as to what assets/locations are or may become contaminated. If possible, curtail or limit operations in these areas use other redundant capabilities or surge mission operations in other sectors to sustain operations until the contamination levels are reduced.

i. **Preventing Contamination Spread.** Effective mission orders, tactical warning, and reporting may reduce and/or preclude the spread of contamination. The integration of NBC detectors into the site's reporting network provides key inputs to prevent contamination. Control measures (e.g., traffic control points, barriers, markings) serve to minimize inadvertent entry into contaminated areas or use of contaminated resources. Additionally, the establishment and use of contamination control areas (CCAs) and toxic-free areas (TFAs), along with their corresponding procedures, helps minimize the spread of an agent. Both rotary and fixed wing aircraft movement (taxiing) at airfields can cause contamination spread. Rotor-wash, prop-wash, and jet blast pick up dust, sand, leaves, and other contaminated debris that can contaminate the exterior, and sometimes the interior, of nearby aircraft.

j. **Seeking Protection.** Planning identifies protection requirements for personnel, equipment, and the assets available to meet those requirements. Take action to identify and resource individual/collective protection equipment requirements, search for terrain features or manmade structures for equipment protection, identify and request support not immediately available in the AO.

k. **Functional Redundancy.** Preserving capability may necessitate duplicating functions that are particularly vulnerable.

l. **Postattack Recovery and Reconstitution.** Following an attack, units conduct area damage control measures using available resources to reestablish/reinforce C^2; reallocate or replace communications, personnel, supplies, or equipment; and repair battle damage. This may also include operational and/or thorough decon operations. The coordination and operations supporting area damage control at fixed sites includes joint service involvement, HN participation, and third nation interaction.

All of these considerations are critical to fixed site NBC defense preparedness. These factors must be incorporated into plans/orders, leveraged for requesting resources, and used to identify mission-essential tasks.

Chapter III

FIXED SITE NBC DEFENSE RESPONSIBILITIES AND EXECUTION

The primary purpose of this chapter is to provide the doctrinal tools for planning and executing NBC defense tasks to the JRAC, the base cluster/base commanders, and their staffs. With this focus in mind, this three-section chapter outlines fixed site NBC defense goals, fixed site NBC defense roles/responsibilities, and resourcing, deployment, and execution guidance.

1. Fixed Site NBC Defense Goals

Fixed site NBC defense supports three basic operational functions: NBC protection, sustainment of C^2, and combat support.

a. **NBC Protection.** Protection is a priority at all levels of war; thus, the supporting principles of NBC defense become a threat-driven priority at all levels and across the full spectrum of operations from peacetime deployments to war. Commanders direct MOPP procedures to provide individual NBC protection and establish collective protection priorities.

b. **C^2 Sustainment.** Sustainment of C^2 is imperative. The impact of NBC weapons requires that C^2 provide timely decision making and general/specific warnings to mitigate and/or preclude NBC catastrophic effects.

c. **Combat Support Sustainment.** Without sustained combat support, combat force OPTEMPO grinds to a halt. Chapter 1, Figure I-1 depicts the deployment pipeline of support and its associated chokepoints points. The implementation of fixed site NBC defense plans reduces NBC weapons or TIM interruptions to the combat support effort.

2. Fixed Site NBC Defense Roles/Responsibilities

As shown in Figure III-1, many decision makers influence the planning and support of fixed site NBC defense; however, primary execution of these plans relies heavily on the JRAC and base cluster commanders. These responsibilities may change based on specific command and/or mission requirements. Refer to JP 3-0, *Doctrine for Joint Operations*; JP 3-10, *Joint Doctrine for Rear Area Operations*, and JP 3-11, *Joint Doctrine for Operating in a Nuclear, Biological, and Chemical Environment* for responsibilities of combatant commanders, JFCs, and component commanders.

a. **Joint Rear Area Coordinator.** The JRAC, as defined in JP 3-10, is responsible for coordinating the overall security and area damage control efforts of the JRA. Specifically, the JRAC incorporates provisions and procedures for NBC defense to include warning and reporting procedures. Figure III-2 depicts a possible organizational structure with the United States Air Force (USAF) component commander as the JRAC.

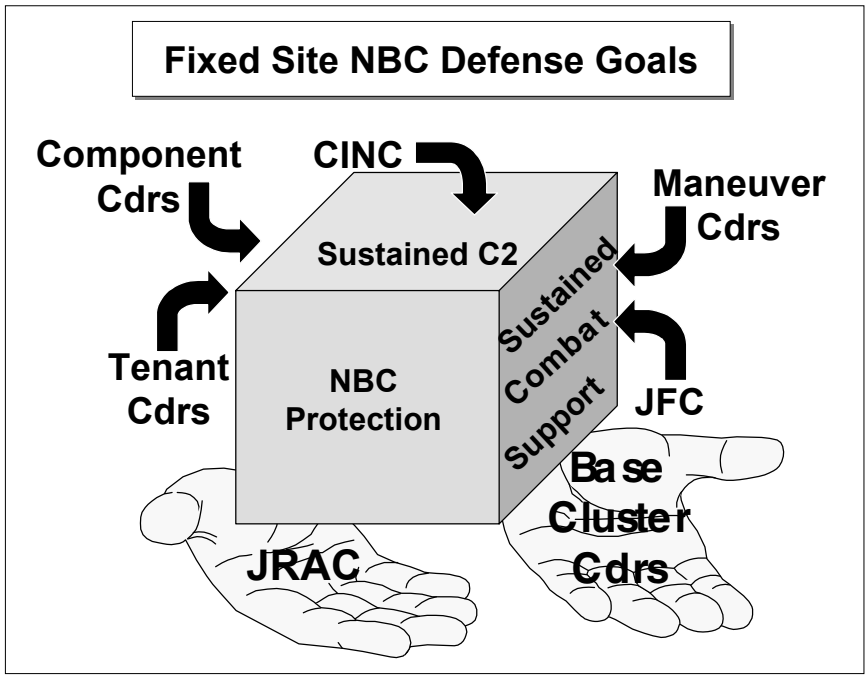

Figure III-1. JRAC and Base Cluster Influence

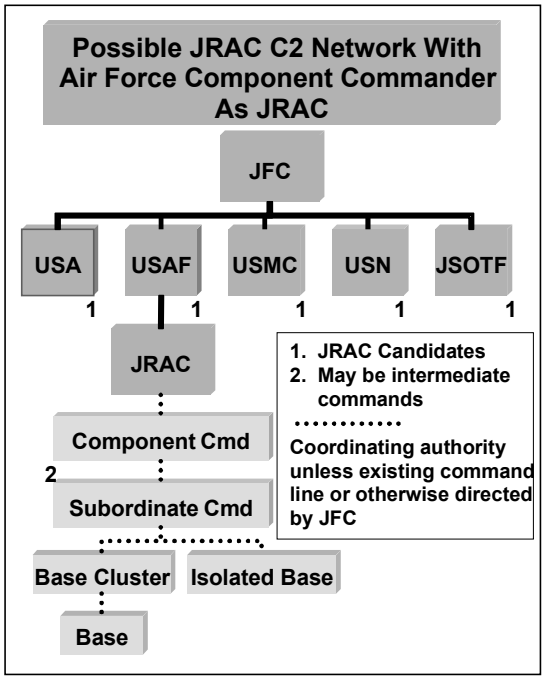

Figure III-2. JRAC from JF HQs

(1) **General Coordination Responsibilities.**

(a) Coordinates JRA security.

(b) Positions NBC protection assets:

- Integrates security.
- Conserves resources.
- Prevents support degradation.

(c) Establishes joint rear tactical operations center (if required) with joint intelligence center interface.

(2) **Specific Coordination Responsibilities.** The JRAC ensures that JRA commanders and staffs incorporate appropriate NBC planning, exercises, equipment, personnel decontamination measures, and preventive measures into overall security planning and operations throughout the JRA. Table III-1 shows other specific responsibilities. Component commanders should also ensure appropriate memorandum of understanding (MOU) and interservice support agreements (ISSA) address NBC and force protection matters including specific military unit responsibilities under varying conditions. In addition, appropriate MOU and ISSA should be in place prior to actual operations. Component commanders are also required to incorporate NBC defense planning, exercises, equipment, personnel decontamination measures, and preventive measures into the overall security planning and operations throughout the JRA.

Table III-1. JRAC Specific Responsibilities

• **Security Plan/Posture**	• **Chain of Command** (if granted)
• **Threat Estimates/Threat Response Forces**	• **Base Criticality and Vulnerability Assessments**
• **NBC Defense Plans/NBCWRS**	• **Area Air Defense Commander Coordination**
• **Unit and Facilities Positioning and Stationing**	• **Infrastructure Development and Positioning**
• **Multinational and HN Liaison**	• **US and HN Legal Guidelines**
• **Key LOC Security**	• **Additional Security Forces** (as required)
• **Prioritize Security for Key Operations**	• **Adjacent Force Coordination**
• **Civil Affairs and Judge Advocate Support**	• **Tactical Combat Force (if established)**
• **Intelligence, Counterintelligence, and Law Enforcement Networks**	
• **Liaison with Naval Coastal Warfare Commander**	

b. **Base Cluster/Base Commanders.** Fixed sites will fall into a base or base cluster category depending on geographical dispersion, activities, and functions. For example, a port designated as a base cluster might consist of berthing, railhead, and marshaling area bases; all part of a synchronized port NBC defense plan. In turn, the base cluster commander controls and coordinates the base defense plans of separate base commanders. Each base commander develops plans that include an NBC defense annex and may also include a CCD or smoke annex. Further details on base defense are addressed in JP 3-10 and JP 3-10.1, *Joint Tactics, Techniques, and Procedures for Base Defense.*

(1) **Base Cluster Commander.** When designated, the base cluster commander is responsible for coordinating the defense of the bases within his base cluster and integrating base defense plans into a base cluster defense plan. Unless specifically

delegated to him, the base cluster commander does not have tasking authority except as provided during emergency situations addressed in JP 0-2, *Unified Action Armed Forces*. The base cluster commander is specifically responsible for the following actions:

(a) Establishes a base cluster operations center (BCOC). A BCOC should be established only if delegated authority to plan, direct, coordinate, integrate, and control base cluster defense activities is granted. The BCOC becomes the primary focus for controlling and coordinating base cluster NBC defense and for tracking NBC resource status and task execution. A USAF wing operations center or a United States Navy (USN) emergency operations center could also be designated as the BCOC.

(b) Establishes an alternate BCOC.

(c) Maintains linkage with JRAC.

(d) Supports base liaisons.

(2) **Base Commander.** In an emergency, the base commander is considered an area commander with authority and command for execution of base defense actions to include the employment of transient forces in the base area (JP 0-2, *Unified Action Armed Forces*). The base commander also performs the following actions:

(a) Establishes a base defense operations center (BDOC) with linkage to the base cluster commander and JRAC as required.

(b) Establishes an alternate BDOC.

(c) Augments defenses with transient forces in the base area.

Fixed site operations are directly influenced by the speed at which NBC reconnaissance is accomplished. Toward that end, the entire base populace should be involved. Each individual is responsible for surveying their immediate work area. Shelter management teams (SMTs) are responsible for checking pre-positioned NBC detection assets (M8/M9 paper, automatic liquid agent detectors, etc.) in and around their facility. Specialized teams or personnel complete preassigned reconnaissance.

c. **Transient Commanders.** IAW JP 0-2, transient commanders in the vicinity of fixed sites may be required to support base defense with their organic assets, including NBC defense capabilities. In force projection operations, commanders quickly move combat power away from the POD to reduce force vulnerability (e.g., dispersing rotary-wing assets shortly after arrival at POD during Operation DESERT SHIELD). However, since combat sustainment flows through the POD, the transient commander has a vested interest in assisting with NBC defense emergencies.

d. **Tenant Commanders and Personnel.** Tenant commanders of forces assigned to a base cluster/base retain responsibility for unit protection and NBC defense. However, tenant commanders may also be tasked to:

(1) Help prepare/integrate base defense plans.

(2) Conduct and/or support individual, unit, or US/HN civilian NBC defense training.

(3) Provide BDOC/BCOC staff with NBC expertise.

(4) Provide NBC defense support.

(5) Provide tenant-sector or base NBC emergency response teams (ERT) and support (e.g., NBC survey and monitoring teams, NBC casualty collection points, contamination control teams (CCTs), MOPP exchange points, and medical CB incident response teams/emergency medical teams).

e. **NBC Defense Staff Planner.** NBC staff planners are NBC defense trained officers or noncommissioned officers (NCO) with either occupational specialty training or additional duty familiarization training. As with other military duties, the experience level required is directly related to the size and complexity of the staff and mission requirements. For example, a less experienced staff planner might suffice for a small single-function fixed site, such as a maintenance shop repairing contaminated equipment. A more complex operation such as a port, airfield, or joint forces command headquarters would likely require an officer or senior NCO trained and experienced in NBC functional operations, planning and coordination. United States Army (USA) and United States Marine Corps (USMC) NBC defense planners are chemical officers and NCO. United States Navy (USN) base NBC defense planning functions are conducted by the disaster preparedness officer (DPO). The USAF NBC defense planners are civil engineer readiness personnel. NBC defense planners' duties and responsibilities include:

(1) Identifying and communicating the NBC threat in conjunction with the intelligence community.

(2) Incorporating the NBC threat into an operation plan (OPLAN)/operation order (OPORD).

(3) Identifying NBC defense requirements.

(4) Conducting NBC risk and vulnerability assessments.

(5) Developing and recommending NBC defense guidance.

(6) Recommending appropriate personnel training.

(7) Monitoring execution of NBC defense operations.

As the NBC functional specialist at the site or headquarters, the NBC planner normally supports the plans and operations officer, but also has extensive interaction with the surgeon, intelligence, and logistics staff officers as well. All of the staff officers track

the current and developing NBC situation for the commander and provide critical inputs during the plans and orders process.

3. Resourcing, Deployment, and Execution Guidance

With the OPLAN approved, staff officers then convert the plan into an effective OPORD for crisis planning/execution. Critical staff tasks involve follow-up and supervision to ensure mission support resources are deployed and synchronized to successfully execute the NBC tasks identified in the OPLAN. Periodic reassessments of the JIPB, facts, assumptions, and "details" such as unit/resource availability provide necessary updates for improving the NBC defense annex(es) to the OPORD.

a. **Fixed Site NBC Defense Resources.** This section focuses on NBC defense resource considerations and deployment planning, including task organization techniques and employing NBC defense assets for specific mission execution. Operational planners track and maintain asset availability and visibility during planning, deployment, and execution. Resourcing begins during COA development by recommending the best combination of resources to support the mission and COA. As the situation develops, planners identify required functions and recommendations for the time-phased force deployment list (TPFDL) emerge. These recommendations should heed basic resource considerations and should not be restricted by current task organization. Basic resource considerations include mission requirements, resource capabilities, and resource availability/visibility.

(1) **Mission Requirements.** Specified, implied, and essential tasks require force allocation and resource planning for task execution. NBC defense tasks require that all forces maintain individual protection, detection, and decon capabilities.

(2) **Resource Capabilities.** As planners develop force allocation and resourcing plans, they assess force and equipment capabilities from a broad, practical, expedient viewpoint versus a narrow definition of "published" capability. For example, 125 gallons per minute (gpm) pumps found in numerous fuel support units are not defined as decon support equipment; however, adding a hose with fire fighting nozzle provides an ability to support operational decon capability. This operational approach expands the commander's employment options and adds flexibility during mission execution.

(3) **Resource Availability/Visibility.** Planning and execution of fixed site defense measures involves all base/base cluster activities. Failure to provide prompt support adversely impacts base defense activities. Total asset visibility (the near-real-time knowledge of where assets are located and when they will reach the destination) is critical, and this task is made especially difficult due to the many transient tenants found on or near fixed sites. Command emphasis, staff planning/supervision/follow-up, and asset visibility can help eliminate most resource availability issues such as—

(a) Deployment priorities.

(b) Mission priorities.

(c) Time/space factors.

(d) Maintenance status.

(e) Inventory status.

(f) Resupply rates.

(g) Requisition status.

Understanding force and resource capabilities, including those outside the current task organization or DOD, provides operational planners with flexibility of NBC defense support and available resources.

(4) **Resource Types and Sources.** Primary sources of NBC defense assets include DOD units and NBC defense equipment. Functionally, NBC defense equipment can be classified IAW the NBC defense principles: avoidance, protection, and decontamination. Since thorough decon requirements may exceed support capabilities, these decon assets must be aggressively managed and prioritized. Additionally, fixed site NBC defense resource needs may require international/coalition or HN support. Appendix B provides detailed resourcing information and options for use during planning. It is designed to address capabilities useful for fixed site NBC defense. The appendix does not address all the specialized variations of some NBC defense equipment, (i.e. variations of aircraft protective masks). Table III-2 provides an example operational status chart for fixed site commanders to track NBC defense requirements.

Table III-2. NBC Defense Requirements Example

THREAT (From Intelligence Assessment)		NBC REQUIREMENTS (Not Organic To Organization)	STATUS	REMARKS
Operational Phase	High: Biological	Biodetection Capability	RED	Requested biological detection support
	Med: Chemical	Detector Networks Collective Protection	AMBER	Requested additional collective protection assistance to accommodate surge in base population
	Low: Radiological		GREEN	

b. **Fixed Site NBC Defense Execution.** The fixed site environment requires clear, concise mission guidance for effective NBC defense execution. However, a clear, concise mission order does not guarantee successful mission execution. Certain measures support critical preparation for the successful conduct of NBC defense, including the following.

(1) **Anticipate Enemy COA.** Wargame the NBC defense plan periodically. Continue to "What if" the probable COA as new intelligence develops, and modify friendly mission requirements appropriately. Just like friendly forces, the enemy desires the least predictable COA that supports his objectives.

(2) **Evaluate the Plan.** After evaluating your plan, ask another staff officer of a different specialty or service to assess the NBC defense plan. If he were the enemy, what weaknesses would he target? If he were a subordinate commander or tenant unit, could he execute the plan without additional guidance?

(3) **Continuously Update Resource Status.** Asset visibility is a critical component of NBC defense. Locating resources following a NBC attack creates a reactive environment supporting enemy intent. Implement proactive measures to ensure all base personnel, including civilians, have personal NBC protection or have a nearby consolidated issue point for quick distribution. Do not hesitate to seek command assistance with stalemated issues.

(4) **Conduct Frequent Rehearsals and Exercises.** Prior to deployment or arrival in country, forces train to perform individual and collective NBC defense tasks as units and joint forces. However, once alerted or mobilized for deployment, all training is a rehearsal for executing assigned combat missions. Units will move in and out of the fixed site, sometimes daily, creating new, unknown variables that may hinder successful execution. HN civilians supporting base operations need frequent rehearsals and refresher training.

(5) **Track the Battle.** Appendixes D and E provide tools for implementing the NBC defense plan and for synchronizing NBC defense actions based on identified threat "triggers", events, or decision points. These tools become ineffective for maintaining a proactive NBC defense unless the NBC defense staff tracks the friendly and enemy situation.

(6) **Plan and Execute Redeployment as Thoroughly as Deployment Operations.** NBC defense and environmental aspects of redeployment, retrograde of personnel and equipment, and postconflict remediation are extensive and are addressed separately in Appendix I.

(7) **Mission Focus.** Frequently ask, "Does this support the mission?" and "Will this support the commander's intent and criteria for success?" Stay alert to intelligence indicators reflecting possible changes in enemy objectives and anticipate their mission implications. If the commander, chief of staff, plans officer, or operations officer is deciding COA, be there to provide NBC defense recommendations or to determine current NBC defense plan implications.

(8) **Other Considerations**.

(a) HN language differences.

(b) HN/joint training levels.

(c) Equipment differences.

(d) Tactics, techniques, and procedures (TTP) development.

(e) Quality of equipment and personnel.

(f) Maintenance support.

Regardless of how well the plan has addressed enemy COA, our forces must respond to NBC hazards quickly, precisely, and as a team. Referring to Operation DESERT STORM, Joint Pub 1, *Joint Warfare of the US Armed Forces*, says, "...the most striking feature of this campaign was the high degree of teamwork...for the cohesion and efficiency in the components were blended into a higher order of trust and confidence in the joint team...." This citation goes beyond command and support relationships established in plans/orders and hinges on trust, cohesion, and common objectives.

Appendix A

FIXED SITE NBC DEFENSE TASK LIST

This appendix provides a common starting point for identifying requirements to conduct fixed site NBC defense. Unique situations will generate unique mission requirements that preclude a "text book" solution. However, the thought process in the discussion and examples, combined with experience using the referenced documents, should provide staff focus during operational planning.

The *Universal Joint Task List (UJTL)*, Version 3.0, CJCSM 3500.04A provides an interoperability tool for JFCs to communicate mission requirements in terms of joint tasks, conditions, and standards. It also serves as a common language and reference system for the JFC, operational planners, combat developers, and trainers. When synchronized with service-specific universal task lists (UTL), the UJTL becomes a tool for ensuring interoperability and integration down to the tactical level of task execution. UTLs allow commanders to develop their mission-essential task list (METL) and help focus training and mission requirements.

The following example demonstrates the application of the UJTL task analysis process to derive specified and implied NBC defense tasks. These tasks become mission requirements that must be resourced in subsequent plans/orders and supplemented with thorough staff supervision and follow-up. Although not demonstrated, the same fundamental approach carries through service UTL application as well.

1. Persian Gulf Illustration

In the early hours of August 2, 1990, an Iraqi force of more than 100,000 personnel, spearheaded by three armor divisions, invaded Kuwait. On August 7, the US National Command Authority directed the deployment of US forces in response to Saudi Arabia's request for assistance. US Central Command responded rapidly, placing the first US forces on the ground within 31 hours of the initial alert order.

Operation DESERT SHIELD was a two-phase operation. The first phase involved the initial deployment of forces to deter further Iraqi aggression and to defend Saudi Arabia. The second phase included the subsequent deployment of forces to resource a coalition with a robust counteroffensive capability that could evict the Iraqi Army from Kuwait. Although some units did not begin to deploy until late November, they were in place and combat-ready by early February 1991.

The tailoring of a proper force mix for this operation required the mobilization of thousands of guardsmen and reservists—the largest mobilization since World War II. During this force-projection operation, the services deployed nearly a half-million personnel, their supporting equipment, and 60 days of supplies from the US and Europe. All this was pipelined through fixed sites, ports, and airfields within a period of six months.

During this operation, the existing NBC threat influenced commanders' selection of mission-essential tasks. The focus at each level of command was mission accomplishment and protecting the force; however, the specific TTP used at the various echelons differed.

2. Persian Gulf Example

Using the Persian Gulf illustration, Table A-1 illustrates how application and use of the NBC warning and reporting system (NBCWRS) varied from the strategic to the tactical level.

a. *Tactical level* NBCWRS used at the fixed sites emphasized reacting and reporting key information.

b. *Operational level* focus emphasized attack confirmation and/or issuance of selective or general TMD warnings.

c. *Strategic theater* considerations emphasized establishment of—

(1) Interoperable theater warning network.

(2) Theater level assessments.

(3) Forwarding of applicable national level intelligence.

d. *Strategic national* concerns involved—

(1) Providing forward deployed forces with requisite resources (e.g., personnel, equipment, units).

(2) Forwarding NBC related intelligence information.

(3) Assessment of evaluated report information.

(4) Political-military concerns with regard to targeting and/or potential retaliatory strikes.

Table A-1. UJTL Task Analysis Persian Gulf Example

	STRATEGIC NATIONAL	STRATEGIC THEATER	OPERATIONAL	TACTICAL
APPLICABLE TASKS	SN 3.4 Protect Strategic Forces & Means	ST 6.2.8 Establish NBC Protection in Theater ST 6.1.5 Provide TMD	OP 6.2.8 Establish NBC Protection in Theater of Operations/JOA	TA 6.2 Protect Individuals and Systems
Example				
SUPPORTING OR IMPLIED TASKS	Implement NBCWRS	Develop Passive TMD Maintain Situation Awareness	Detect/Verify NBC Hazard Warn Units in Hazard Area	Warn Personnel & Units of Contaminated Areas
ACTIONS	Provide Intel Reports Evaluate NBC Report Input	Establish Theater Warning Network Conduct Interoperability Assessments	Confirm Attack Issue Selective/ General TMD Warning	React/Report

Appendix B

NBC DEFENSE ASSETS

The following series of tables provides a guide for identifying service, unit organization, and/or international resources that may be available to support fixed site NBC defense. Where joint service assets may be called upon to respond to an NBC situation, commanders are encouraged to develop base defense OPLANs supported by necessary Memorandum of Agreement (MOA) to facilitate NBC defense training, assembling of resources, and execution. Where applicable, these tables address specific items of NBC defense equipment, as well as the corresponding unit's capabilities.

This appendix does not provide an all-inclusive NBC defense listing, but intends to cue planners to additional resources and capabilities. As a resource cue, referenced international data is a compilation of both commercially produced and military equipment found in the countries listed.

NOTE: This UNOFFICIAL, international equipment listing is from open literature sources.

1. Department of Defense

Throughout the DOD, different items of NBC defense equipment are routinely used by one or more service components. These items consist of individual as well as collective protective systems and various detection and decontamination devices. Table B-1 depicts potential fixed site NBC defense resources. Items with asterisks are under near-term development and fielding.

Table B-1. NBC Defense Equipment

Individual Protection Equipment	Description
Nerve Agent Antidote Kits (NAAK)	Auto injector set consisting of atropine and pralidoxime chloride.
Convulsant Antidote, Nerve Agent (CANA) Automatic Injector	Diazepam auto injector.
Pyridostigmine Bromide (PB) Tablets (NAPP)	Nerve Agent Pyridostigmine Pretreatment (NAPP); an Investigation New Drug.
Chemical protective (CP) cover, Helmet	CP helmet cover.
Suit, CP: Battle Dress Overgarment (BDO)	Military Standard CB protective overgarment.
Joint Service Lightweight Integrated Suit Technology (JSLIST)	Will replace current BDO. Washable up to 6 times. Reduces heat stress.
Suit Contamination Avoidance Liquid Protective (SCALP)	Inexpensive, lightweight, disposable. Worn over BDO or Combat Vehicle Crewman uniform if Chemical Protective Undergarment (CPU) is worn.
Toxicological Agent Protective (TAP) Apron	Impermeable butyl rubber apron.
CPU	Two-piece undergarment. CPU and uniform constitute MOPP1. Washable one time.
Gloves, CP Rubber	CB protective gloves.
Overboot, Black Vinyl	CP overboot.
Overboot, Green Vinyl	CP overboot.
Cover, Footwear, CP, Rubber	CP footwear covers.

Table B-1. NBC Defense Equipment (Continued)

Individual Protection Equipment	Description
All M40, M42, M45, M48 Series Mask, CB Protective: Field	Protects wearer against all known CB agents.
MCU-2A/P, CB Protective Mask	Protects wearer against all known CB agents. NBC protective mask with single clear urethane lens facepiece and two voicemitter assemblies.
M17A2, Mask, CB Protective Field	Protects wearer against all known CB agents.
DT-236 Dosimeter, Wristwatch	Tactical, gamma total dose instrument. Read by AN/PDR-75 RADIAC Set.
Collective Protection Equipment	**Description**
M20 Simplified NBC Collective Protection Equipment (SCPE)	Room liner for preexisting structures with integral filtration and blower system.
M28 SCPE	Field deployable, inflatable collective protective liner system for use inside tent extendable modular personnel (TEMPER) Tents.
Chemically Protected Deployable Medical Systems (CP DEPMEDS)	Provides CB protection for selected sections of the CP DEPMEDS-equipped hospitals. Room liner for preexisting structures with integral filtration and blower system.
Chemically-Biologically Protective Shelter (CBPS)	A soft shelter system that attaches to the rear of an enhanced capabilities vehicle. Provides CB protection for Battalion Aid stations and medical company treatment facilities.
Survivable Collective Protection System II	Modular concrete collective protective shelter with integral overpressure and filtration systems.
KMU-450F, Building Modification Kit	Overpressure/filtration system for pre-existing structures/buildings.
Fixed Installation Filters	Provide protection against NBC materials in the contained air inside buildings. Can be used continuously or intermittently to complement the ventilation system.
Detection Equipment	**Description**
M8A1, Alarm, Chemical Agent, Automatic Portable	Point detector for nerve agent vapors.
M22, Automatic Chemical Agent Alarm	Advanced point detector. Detects nerve and blister agents. Will replace or complement current M8A1.
Chemical Agent Monitor (CAM)	Point detector for nerve and blister agent vapors.
M8 Chemical Agent Detection Paper	Detects nerve agents G and V and blister agent H
M9 Chemical Agent Detection Paper	Provides nonspecific detection for nerve and blister
AN/PSR-2, Automatic Liquid Agent Detector	Portable point detector for fixed installations (e.g., airfields). Detects liquid concentrations of soman (GD), VX, HD, and L.
M90, Chemical Warfare Agent Detector	All-purpose chemical agent vapor detector. Detects vapor concentrations of blood, blister, and nerve agents. Can also be used to monitor contaminated surfaces using intake tubes.
ADM 300, Multifunctional Radiation Detection Instrument w/Probes	Auto-ranging radiation detection identification and computation (RADIAC) instrument designed to detect alpha, beta, gamma, x-ray, and neutron radiation
M18A2, Chemical Agent Detector Kit	Portable chemical agent detection kit. Detects nerve, blister, blood, and choking agents in vapor or liquid form. Primarily used by explosive ordnance disposal (EOD) units.
M256A1, Chemical Agent Detector	Portable, disposable chemical agent detection kit used to detect nerve, blood, or blister agent vapors.
M272, Water Testing Kit	Portable kit used to test for nerve, blood, and blister agent concentrations in raw or treated water.
IM-93, Dosimeter	Tactical, self-indicating gamma total dose instrument. Range 0-600 radiation absorbed dose (rad).
AN/VDR-2, RADIAC Set	Lightweight, auto-ranging, portable RADIAC instrument. Used for area surveys and personnel monitoring. Dose Rate Range .01 mrad/hour-10000 rad/hour. Dose Range 1-1000 rad.

Table B-1. NBC Defense Equipment (Continued)

Decontamination Equipment	Description
AN/PDR-56, RADIAC Set AN/PDR-75 RADIAC SetAN/PDR-77 RADIAC Set	Portable scintillation instrument used to detect alpha radiation. Reader for DT236 Low Level RADIAC instrument.
Remote Sensing Chemical Agent Alarm M21, (RSCAAL)	Standoff, automatic scanning, passive infrared sensor that detects nerve and blister vapor clouds up to 5 km range.
M291 Skin Decontamination Kit, Individual	Individual decontamination kit for skin and personal equipment.
M295 Decontamination Kit, Equipment	Replaces M258A1M280. Decontamination kit for larger items of personal equipment that the M291 cannot accommodate.
Patient Decontamination, Medical Equipment Set and Chemical Patient, Medical Treatment Set	Non-toxic. Provides supplies and equipment for decontamination and medical treatment of NBC patients at medical treatment facilities.
Decontaminating Apparatus 1 1/3 quart, M11	Refillable decon solution number 2 (DS2) decontaminant dispenser.
M12A1 Power-Driven Decontaminating Apparatus (PDDA)	Vehicle-mounted, gasoline engine-driven decontaminating device.
M13 Decontaminating Apparatus, Portable (DAP)	Non-refillable, DS2 decontaminant application system.
Decontaminating Apparatus, Power-Driven, Lightweight (M17)	Portable lightweight power-driven decontaminating device.
Modular Decontamination System (MDS), M21/M22	Portable lightweight decontaminating device. Comprised of the M21 DS2 Pumper/Scrubber unit and the M22 High-Pressure Washer unit. Replaces M12A1 and M17 lightweight decontamination system (LDS) in chemical units.
Decontamination Material	**Description**
Detergent, General Purpose Liquid	Liquid soap used for decon.
Detergent, Wetting Agent (Powder)	Dry substance mixed with calcium hypochlorite when liquid detergent is unavailable to ensure complete wetting of surfaces.
Decontaminating Agent, Super Tropical Bleach (STB)	Standard military bleach based CB decontaminant.
Decontaminating Agent, Calcium Hypochlorite, High Test Hypochlorite (HTH)	Non-standard bleach decontaminant with higher chlorine content used in lieu of STB.
DS2	Standard military liquid CB decontaminant. Highly corrosive to metal and may soften paint. DS2 will not soften Chemical Agent Resistant Coating paint.
Fuller's Earth	Absorbent powder decontaminant.
Miscellaneous Items	**Description**
Charger, Dosimeter, AN/PP-1578PD	Used to ZERO (charge) the IM-93 dosimeter.
M41 Protection Assessment Test System (PATS)	Portable on-the-face seal verification device for M17A2, M40/M40A1, MCU-2A/P series protective masks or any mask with a US standard external/ internal drinking tube installed.
Multipurpose Integrated Chemical Agent Alarm (MICAD)	Networking system for NBC detectors, sensors, and alarms. Automates NBCWRS. Formats and transmits NBC 1 and NBC 4 reports.
NBC Marking Set	Portable kit consisting of flags, stakes, crayons, and tape used to mark contaminated areas.
Joint Warning And Reporting Network (JWARN).	Software system which integrates data from NBC detectors, meteorological sensors, Global Positioning System (GPS) receivers, etc. System will analyze information, compile and disseminate appropriate reports.
Voice Enhancers	Used on the MCU-2A/P series mask to amplify an individual's voice while wearing the mask.

2. Army

All Army units are capable of conducting limited NBC defense operations. These operations consist of, but are not limited to, detection of nuclear and chemical contamination; performing basic decontamination procedures on individuals and equipment; deployment of nuclear and chemical detection devices; and conduct of nuclear and chemical monitoring, survey, and reconnaissance mission operations.

The Army Chemical Corps force structure includes specialized units providing additional capabilities for NBC detection, identification, survey, reconnaissance, and thorough decontamination. Chemical Corps units also provide large area smoke and obscurant support to operations. See Tables B-2 through B-9 for itemized equipment and capabilities.

a. **Chemical Company (Heavy Division).** The Chemical Company (Heavy Division) is capable of providing the following support:

(1) Four detailed equipment decontamination (DED) sites (52 major items/day/site); operational decontamination; special decontamination.

(2) Large area smoke (0.2 to 1.1 kilometers (km) wide x several km long, weather dependent).

(3) Radiation monitoring for the nuclear accident and incident control plan.

(4) Chemical detection/monitoring for chemical accident and incident control plan.

(5) NBC reconnaissance (route, area, zone, point, and bypass), surveys, surveillance, and sampling.

(6) NBC staff to division headquarters; operates on 24-hour basis.

The Chemical Company (Heavy Division) is comprised of a division chemical section, NBC center (NBCC), headquarters section, decontamination platoons (4), mechanized smoke platoon, and NBC reconnaissance platoon.

NOTE: Upon the implementation of Corps/Division XXI organization, the capabilities of this unit will be provided by other Chemical Corps force structure.

Table B-2. Chemical Company (Heavy Division) Organic NBC Equipment

Decontamination Equipment	Description
Modular Decontamination System (MDS), M21/M22	Portable lightweight decontaminating device. Comprised of the M21 DS2 Pumper/Scrubber unit and the M22 High-Pressure Washer unit.
Detection Equipment	**Description**
M21, Alarm, Chemical Agent, Remote Sensing	Standoff nerve and blister agent detector. Range is line of sight to 5 km.
AN/PDR-56F, RADIAC Set	Portable scintillation instrument used to detect alpha radiation.
M93A1 (FOX), NBC Reconnaissance System	Vehicle-mounted system designed to detect, identify, and mark nuclear and chemical contamination.
Smoke/Obscurant Systems	**Description**
M58, Generator Smoke, Mechanical, Mechanized Smoke Obscurant System	M113A3 tracked vehicle mounted smoke system. Replaces M1059.
M1059, Carrier, Smoke Generator	M113A3 tracked vehicle mounted smoke system.

b. **Chemical Company (Smoke/Decontamination) Airborne/Air Assault.** The Chemical Company (Smoke/Decontamination) Airborne/Air Assault can provide the following:

(1) Three DED sites (thorough decontamination sites [eight tactical vehicles/hour]) or six operational decontamination sites.

(2) Three large area smoke screens (each 0.6 - 1.4 km wide x several km long). Smoke haze up to six km in width and several km long, weather dependent.

(3) NBC staff support and 24-hour NBCWRS support to each Airborne/Air Assault Division.

(4) Platoon tailoring can respond to needs for both smoke and decontamination support.

The company consists of a division chemical section, NBCC, headquarters section, and smoke/decontamination platoons (3).

NOTE: Each platoon can support either equipment decontamination or large area smoke. However, a platoon cannot perform smoke and decontamination simultaneously or immediately switch between missions without transition time.

Table B-3. Chemical Company (Smoke/Decontamination) Airborne/Air Assault Organic NBC Equipment

Decontamination Equipment	Description
MDS, M21/M22	Portable lightweight decontaminating device. Comprised of the M21 DS2 Pumper/Scrubber unit and the M22 High-Pressure Washer unit.
M17 SANATOR, Lightweight Decontaminating System	Portable lightweight power-driven decontaminating device.
Smoke/Obscurant Systems	**Description**
M56, Generator Smoke System: Mechanical Motorized	Large area smoke generation system mounted on Heavy Variant High Mobility Multipurpose Wheel Vehicle (HMMWV).
M1059, Generator Smoke System	Large area smoke generation system Mounted on a HMMWV.

c. **Chemical Company (Recon/Decon) Armored Cavalry Regiment (ACR).** The Chemical Company ACR is capable of providing the following support:

(1) NBC reconnaissance (route, zone, area, point, and bypass to locate, identify, mark, and report NBC contamination), NBC surveys, surveillance, and sampling (3 reconnaissance squads/2 reconnaissance teams each).

(2) One DED site (thorough decontamination site 8–10 vehicles/hour).

(3) Three operational decontamination sites.

(4) Special decontamination.

(5) NBC staff support and 24-hour NBCWRS support.

The company consists of a regimental chemical section, headquarters section, NBC reconnaissance platoons (2), and decontamination platoon.

Table B-4. Chemical Company (Recon/Decon) ACR Organic NBC Equipment

Detection Equipment	Description
M21, Alarm, Chemical Agent, Remote Sensing	Standoff nerve and blister agent detector. Range is line of sight to 5 km.
FOX NBC Reconnaissance System	Vehicle-mounted system designed to detect, identify, and mark nuclear and chemical contamination.
Decontamination Equipment	**Description**
Modular Decontamination System (MDS), M21/M22	Portable lightweight decontaminating device. Comprised of the M21 DS2 Pumper/Scrubber unit and the M22 High-Pressure Washer unit.
M17 SANATOR, Lightweight Decontaminating System	Portable lightweight power-driven decontaminating device.

d. **Chemical Company (Smoke/Decontamination/Reconnaissance) ACR.** The Chemical Company ACR is capable of providing the following support:

(1) NBC reconnaissance (route, zone, area, point, and bypass) to locate, identify, mark, and report NBC contamination; NBC surveys; surveillance; and sampling (3 reconnaissance squads/2 reconnaissance teams each).

(2) One DED site (thorough decontamination site 8–10 vehicles/hour).

(3) Three operational decontamination sites.

(4) Special decontamination.

(5) Large area smoke (0.6—1.4 km wide x several km long). Smoke haze: 2 km wide x several km long – weather dependent.

(6) NBC staff support.

The company consists of a regimental chemical section, headquarters section, NBC reconnaissance platoon, smoke/decontamination platoon.

NOTE: As before, the dual-purpose platoon can only support a smoke <u>or</u> decontamination mission at any one time.

Table B-5. Chemical Company (Smoke/Decontamination/Reconnaissance) ACR Organic NBC Equipment

Detection Equipment	Description
M21, Alarm, Chemical Agent, Remote Sensing	Standoff nerve and blister agent detector. Range is line of sight to 5 km.
FOX NBC Reconnaissance System	Vehicle mounted system designed to detect, identify, and mark nuclear and chemical contamination.
Decontamination Equipment	**Description**
MDS, M21/M22	Portable lightweight decontaminating device. Comprised of the M21 DS2 Pumper/Scrubber unit and the M22 High-Pressure Washer unit.

Table B-5. Chemical Company (Smoke/Decontamination/Reconnaissance) ACR Organic NBC Equipment (Continued)

Decontamination Equipment	Description
M17, Lightweight Decontaminating System	Portable lightweight power-driven decontaminating device.
Smoke/Obscurant Systems	**Description**
M56, Generator Smoke System: Mechanical Motorized	Large area smoke generation system (Mounted on Heavy variant HMMWV).
M1059, Generator Smoke System	Large area smoke generation system (Mounted on HMMWV).

e. **Chemical Company (Smoke/Decon) Corps/Army Service Component Command (ASCC).** The Chemical Company (Smoke/Decon) Corps/ASCC is capable of providing the following smoke/decontamination support to units in a corps' rear area, the communication zone (COMMZ), or a division's AO:

(1) Four DED sites (thorough decontamination sites [eight tactical vehicles/ hour]) or eight operational decontamination sites.

(2) Large area smoke. Smoke haze up to four kilometers in width and several kilometers in depth, weather dependent.

(3) Platoon tailoring can respond to needs for both smoke and decontamination support.

The company consists of a headquarters section, maintenance section, and four smoke/ decon platoons.

Table B-6. Chemical Company (Smoke/Decon) Corps/ASCC Organic NBC Equipment

Decontamination Equipment	Description
M21/M22, MDS	Portable lightweight decontaminating device. Comprised of the M21 DS2 Pumper/Scrubber unit and the M22 High-Pressure Washer unit.
M56, Generator Smoke System: Mechanical Motorized	Large area smoke generation system (Mounted on HMMWV).

f. **Chemical Company (NBC Reconnaissance) Corps/ASCC.** The Chemical Company (Recon) Corps/ASCC is capable of providing the following support:

(1) NBC reconnaissance (route, zone, area, point, and bypass) to locate, identify, mark, and report NBC contamination.

(2) Conventional reconnaissance (route, area, and zone). Capability is reduced after NBC weapons use.

(3) NBC reconnaissance, surveys, surveillance, sampling, and locating potential decontamination sites.

(4) Radiation monitoring for nuclear accident incident response assistance.

(5) Chemical detection for chemical accident incident response assistance.

The company consists of a headquarters section and three NBC reconnaissance platoons with four reconnaissance squads each/two reconnaissance teams each.

Table B-7. Chemical Company (NBC Reconnaissance) Corps/ASCC Organic NBC Defense Equipment

Detection Equipment	Description
M21, Alarm, Chemical Agent, Remote Sensing	Standoff nerve and blister agent detector. Range is line of sight to 5 km.
FOX NBC Reconnaissance System	Vehicle mounted system designed to detect, identify, and mark nuclear and chemical contamination.

g. **Chemical Company (Biological Detection) Corps.** The Corps Chemical Company (Biological Detection) is capable of providing the following support:

(1) Detection of large area biological aerosols.

(2) Presumptive identification of biological warfare (BW) agents.

(3) Collection of aerosol samples for laboratory analysis.

(4) Biological Integrated Detection System (BIDS). The BIDS is an operational level biological detection asset designed to primarily detect long line source releases. It operates as a static array to provide generic detection and identification of BW attacks. The BIDS is a collectively protected shelter, and there are two versions of BIDS in the inventory. The NDI BIDS is a manual system that can identify up to four agents simultaneously. The preplanned product improvement (P3I) BIDS is a semiautomatic system that can identify up to eight agents simultaneously. Although they have different components, both principally operate in similar fashion. Generally, the system triggers when a rapid and meaningful change occurs in the ambient background. Upon a trigger, it collects a liquid sample for analysis and evacuation. The operator conducts analysis of the sample using multiple components to provide generic detection and identification. This information is then communicated to the controlling headquarters. The controlling headquarters merges these reports with other operational information to determine if an attack occurred.

(5) Long Range-Biological Detection System (LR-BSDS). The LR-BSDS is an operational level detection system that detects, tracks, maps, and classifies (man-made versus naturally occurring) aerosols. It operates on a UH-60 platform and uses its communication assets to send periodic reports. Information on the system can be used to provide early warning, cue point detectors, and track a suspect aerosol. The system is normally operated in conjunction with other operational level detectors.

The company consists of a headquarters section, five biological detection platoons/biological detection company (seven BIDS teams/platoon), and an LR-BSDS detachment.

Table B-8 depicts the specialized NBC defense equipment organic to this unit.

Table B-8. Chemical Company (Biological Detection) Corps Organic NBC Defense Equipment

Detection Equipment	Description
M31A1, Alarm, Biological Agent, Automatic: Integrated Detection System, BIDS	Operational level asset. May be assigned to protect a critical fixed site. Detects biological agents. Presumptively identifies agents within 30 minutes. Collects samples.
M94, Long Range Biological Standoff Detection System (LR-BSDS)	Standoff detection system detects, tracks, maps, and classifies aerosols as man-made or natural. 30 km range. Mounted on UH-60. Laser is operationally eye safe.

h. **Chemical Team LB (Reconnaissance) (Special Forces).** The Chemical Team LB (Reconnaissance) (Special Forces) is capable of providing—

(1) NBC reconnaissance support to special forces (SF) units. Uniquely suited for rapid worldwide deployment.

(2) Collection/identification/documentation of NBC contamination.

(3) Expertise in enemy NBC systems and employment TTP.

(4) Specialized NBC protective equipment.

(5) Expertise in friendly, coalition, and allied forces' NBC systems and employment TTP.

i. **Chemical Team JA (NBC Element).** The Chemical Team JA (NBC Element) is capable of providing—

(1) NBC staff support to augment separate brigades, corps, theater defense brigades, theater armies, and unified commands. The team is organized to provide staffing for one 12-hour shift (5 personnel).

(2) NBCWRS monitoring.

(3) Monitoring of NBC assets.

j. **Chemical Team JB (NBC Element).** Capabilities are identical to the JA team, but the unit is organized to provide two 12-hour shifts (10 personnel).

k. **Civil Support Detachment (CSD).** The CSD is capable of—

(1) Assessing a suspected NBC or radiological event in support of local incident commanders.

(2) Advising civil responders regarding appropriate actions.

(3) Facilitating requests for assistance from state and federal assets.

(4) Detecting and collecting samples of chemical, biological, and radiological agents.

(5) Providing mobile lab analysis of collected samples.

The detachment consists of a command section, operations team, administrative team, logistics team, communications team, medical team, and two survey teams.

l. **Other Army Units.** In addition to units that specialize in NBC defense, there are other types of units depicted in Table B-9 that are capable of making significant contributions to fixed site NBC defense operations.

Table B-9. Additional NBC Defense Equipment from Other Army Units

UNIT TYPE	EQUIPMENT	CAPABILITIES
Quartermaster	Water purification, water storage tanks, Trucks, Large Volume Water Tankers	Capable of providing assistance with terrain decontamination operations (water storage and delivery). Water hauling and pumping capabilities. Treat, store, and deliver safe drinking water.
Technical Escort	TAP Suits, M18A2 Chemical Agent Detection Kits	Capable of planning and performing emergency neutralization and subsequent disposal of chemical agents. Response and neutralization of hazards resulting from chemical accident/incident situations and nuclear accident/ incident situations. Escorting hazardous cargo/material.
Preventive Medicine Detachments/Staffs	Water Testing Kit, M272, Preventive Medicine Water Quality Control set, Preventive Medicine Industrial Hygiene Surveillance Equipment	Capable of conducting surveillance on water sources and supplies for potential NBC contamination and providing recommendations to commanders on techniques for providing safe drinking water under NBC conditions. Conducts surveillance for TIM and potential operational facilities/areas that may produce toxic industrial chemicals hazards.
Area Medical Laboratory	NBC agent identification equipment, Endemic/Epidemic disease surveillance and analysis equipment, Preventive medicine laboratory equipment	Provides in theater initial identification of NBC agents. Provides industrial hygiene and occupational health laboratory support on verification of TIM.
Veterinary Services	Food quality assurance testing medical set Veterinary laboratory equipment	Provides food surveillance and quality assurance to include potential NBC contamination surveillance.
Aviation	UH-60 OH-58A/C UH-1	Capable of providing assistance in the detection of NBC agents/radiation. Additionally, UH60 provides platform for LR-BSDS.
Explosive Ordnance Disposal	TAP Suits M18A2 Chemical Agent Detection Kits	Capable of detecting, identifying, rendering safe, evacuating, and disposing of conventional, as well as improvised NBC weapons.

3. Air Force

Readiness personnel are responsible for the NBC defense mission in the Air Force. Personnel are trained NBC defense specialists who also have air base operability, disaster preparedness, and Prime Base Emergency Engineer Force duties. There are no primary

duty NBC defense officers within the Air Force. Because of their relatively small force structure, these personnel deploy from several locations and form a larger team at each employment location (typically 22 at each site). As a complement to this force structure, readiness personnel are augmented by Bio-Environmental Engineers in the areas of reconnaissance and NBC Control Center (NBCCC) operations. Additionally, air wings designate personnel within their units to serve on specialized teams that support installation NBC defense. These teams, known as SMTs, CCTs, and disaster preparedness support teams provide the base with support in the areas of NBC decontamination, detection, and survey operations. When dictated by the threat, readiness personnel also execute smoke missions using single or networked smoke generators. Refer to AFMAN 32-4017, *Civil Engineer Readiness Technician's Manual for Nuclear, Biological, and Chemical Defense* for detailed information. Table B-10 provides a description of Air Force NBC defense equipment and special teams.

Table B-10. Air Force NBC Defense Equipment and Special Teams

Individual Protection Equipment	Description
NAAK	Auto injector set consisting of atropine and pralidoxime chloride.
CANA Automatic Injector	Diazepam auto injector.
PB Tablets (NAPP)	NAPP, an Investigation New Drug.
Suit, CP: BDO	Military Standard CB protective overgarment.
JSLIST	Will replace current BDO. Washable up to 6 times. Reduces heat stress.
TAP Apron	Impermeable butyl rubber apron.
Gloves, CP Rubber	CB protective gloves.
Overboot, Black Vinyl	Chemical Protective (CP) overboot.
Overboot, Green Vinyl	CP overboot.
Cover, Footwear, CP, Rubber	CP footwear covers.
MCU-2A/P, CB Protective Mask	Protects wearer against all known CB agents. NBC protective mask with single clear urethane lens facepiece and two voicemitter assemblies.
M17A2, Mask, CB Protective Field	Protects wearer against all known CB agents.
Collective Protection Equipment	**Description**
Modified M28 Interim Transportable Collective Protection System	Field deployable, inflatable collective protective liner system for use inside TEMPER Tents.
Survivable Collective Protection System II	Modular concrete collective protective shelter with integral overpressure and filtration systems.
KMU-450F, Building Modification Kit	Overpressure/filtration system for preexisting structures/buildings.
Detection Equipment	**Description**
M8A1, Alarm, Chemical Agent, Automatic Portable	Point detector for nerve agent vapors.
M22, Automatic Chemical Agent Alarm	Advanced point detector. Detects nerve and blister agents. Will replace or complement current M8A1.
CAM	Point detector for nerve and blister agent vapors.
M8 Chemical Agent Detection Paper	Detects nerve agents G and V and blister agents H & L.
M9 Chemical Agent Detection Paper	Provides nonspecific detection for nerve and blister agents.
AN/PSR-2, Automatic Liquid Agent Detector	Portable point detector for fixed installations (e.g., airfields). Detects liquid concentrations of nerve and blister agents.
M90, Chemical Warfare Agent Detector	All-purpose chemical agent vapor detector. Detects vapor concentrations of blood, blister, and nerve agents. Can also be used to monitor contaminated surfaces using intake tubes.
ADM 300, Multifunctional Radiation Detection Instrument w/ Probes	Auto-ranging RADIAC instrument designed to detect alpha, beta, gamma, x-ray, and neutron radiation
M18A2, Chemical Agent Detector Kit	Portable chemical agent detection kit. Detects nerve, blister, blood, and choking agents in vapor or liquid form. Primarily used by EOD units.

Table B-10. Air Force NBC Defense Equipment and Special Teams (Continued)

Detection Equipment	Description
M256A1, Chemical Agent Detector	Portable, disposable chemical agent detection kit used to detect nerve, blood, or blister agent vapors.
Biological Agent Hand Held Assays	Detects surface concentrations of 5 to 8 biological agents (depending on the model).
RAPID Biological Detection System	Uses PCR technology to detect biological agents in any physical medium (soil, water, blood, etc.). Used by Biological Augmentation Team.
M272, Water Testing Kit	Portable kit used to test for nerve, blood, and blister agent concentrations in raw or treated water.
IM-143, Dosimeter	Tactical, self-indicating gamma total dose instrument. Range 0-600 rad.
Decontamination Equipment	**Description**
M291 Skin Decontamination Kit, Individual	Individual decontamination kit for skin and personal equipment.
M295 Decontamination Kit, Equipment	Decontamination kit for larger items of personal equipment that the M291 cannot accommodate.
Decontaminating Apparatus, Power-Driven, Lightweight (M17 Series)	Portable lightweight power driven decontaminating device.
Decontamination Material	**Description**
Detergent, General Purpose Liquid	Liquid soap used for decon.
Detergent, Wetting Agent (Powder)	Dry substance mixed with calcium hypochlorite when liquid detergent is unavailable to ensure complete wetting of surfaces.
Decontaminating Agent, STB	Standard military bleach based CB decontaminant.
Decontaminating Agent, Calcium Hypochlorite, HTH	Nonstandard bleach decontaminant with higher chlorine content used in lieu of STB.
Fuller's Earth	Absorbent powder decontaminant.
Miscellaneous Items	**Description**
Charger, Dosimeter, CDV 750 and AN/PP-1578PD	Used to ZERO (charge) the IM-93 dosimeter.
M41 Protection Assessment Test System	Portable on-the-face seal verification device for M17A2, M40/M40A1, MCU-2A/P series protective masks or any mask with a US standard external/ internal drinking tube installed.
NBC Marking Set	Portable kit consisting of flags, stakes, crayons, and tape used to mark contaminated areas.
JWARN	Software system which integrates data from NBC detectors, meteorological sensors, GPS receivers, etc. System will analyze information, compile and disseminate appropriate reports.
Reverse Osmosis Water Purification Units (ROWPU)	Water purification system capable of treating water from any available source. Will remove NBC contaminants.
Voice Enhancers	Used on the MCU-2A/P series mask to amplify an individual's voice while wearing the mask.
Teams	**Capability Description**
Chemically Hardened Air Transportable Hospital	Provides medical treatment in a TFA. While in an active CB environment, self-sustaining for 72 hours. Modular design to meet field medical missions - 10, 25, and 50 bed configuration.
Theater Epidemiology Team FFHA1	Provides theater medical and environmental threat assessments, theater disease surveillance, and disease outbreak investigation, establishment of baseline environmental monitoring of air, water, soil, and background radiation and associated surveillance/monitoring requirements, and evaluation of medical force protection and preparedness programs.
Infectious Diseases Augmentation Team FFHA5	Personnel that augment the capability to identify, control, report, and provide treatment for infectious diseases and BW agents in the deployed theater. Team is designed to be deployed to facilities with greater than 100 beds where a significant threat for BW casualties or infectious disease exists.

Table B-10. Air Force NBC Defense Equipment and Special Teams (Continued)

Teams	Capability Description
Wartime Medical Decontamination Team (WMDT) FFGLA and FFGLB	The WMDT provides capability to remove or neutralize NBC agents on wartime casualties immediately prior to being admitted to the MTF. Standardized WMDTs and equipment assemblages can be deployed, assigned, or pre-positioned to support and enable USAF MTFs to safely and effectively treat contaminated casualties without contaminating medical personnel, equipment, or facilities. WMDTs have a secondary mission to provide technical guidance on food decontamination.
Bio-environmental Engineering NBC Team FFGL1	The mission of the Bio-environmental Engineering NBC Team is to provide increased force protection and wing survivability through NBC agent surveillance, detection, and abatement. Function as technical advisors with Civil Engineer NBC Reconnaissance Teams for NBC agent detection and as technical OPR for biological agent detection. Augment Base Civil Engineer NBC Detection Teams to provide field detection, sample collection, and analysis.
Preventative Aerospace Medicine Team FFGL2	Identifies, monitors and takes measures to prevent disease and nonbattle injury (DNBI). Implementing programs to perform health threat/risk assessment, health hazard surveillance, health hazard control and mitigation of effects can prevent DNBI.
Air Force Radiological Assessment Team	A team of specialists from the Armstrong Laboratory who advice on health physics and analyze field measurements of radioactive materials.
Biological Augmentation Team and Chemical Augmentation Team FFBAT	A two-man team of laboratory office and laboratory technologist who identify pathological diseases using state-of-the-art DNA based technology using the instrument called the RAPID Biological Identification System.

4. Navy

The Navy does not operate specialized chemical, biological, and radiological defense (CBRD) units. CBRD team personnel are drawn from existing job specialties. Naval base CBRD actions are coordinated by the DPO. Shore-based units have disaster preparedness teams. Naval base CBRD equipment is outfitted by the Naval Facilities Engineering Command in coordination with the USN and the Joint NBC Program.

The Naval Forward Deployable Laboratory is a portable, rapidly deployable diagnostic laboratory designed to provide support within the JTF. In the future, this capability will be incorporated in the Forward Deployable Preventive Medicine Unit. It is capable of conducting disease risk assessment, disease diagnosis, disease surveillance, disease outbreak investigation, and identification of biological threat agents. Selected naval bases may be equipped as shown in Table B-11.

Table B-11. Navy NBC Defense Equipment

Individual Protection Equipment	Description
Suit, Chemical Protective: Overgarment	Military CB protective overgarment.
ACPG/JSLIST	ACPG/JSLIST - Will replace current BDO. Washable up to 6 times. Reduces heat stress.
MCU-2A/P, CB Protective Mask	Protects wearer against all known CB agents. NBC protective mask with single clear urethane lens facepiece and two voicemitter assemblies.
M40, Mask, CB Protective Field	Protects wearer against all known CB agents.

Table B-11. Navy NBC Defense Equipment (Continued)

Collective Protection Equipment	Description
M20 SCPE	Room liner for preexisting structures with integral filtration and blower system.
M28 SCPE	Field deployable, inflatable collective protective liner system for use inside TEMPER Tents.
Detection Equipment	**Description**
M8A1, Alarm, Chemical Agent, Automatic Portable	Point detector for nerve agent vapors.
M22 Automatic Chemical Agent Detector Alarm (ACADA)	Advanced point detector. Detects nerve and blister agents. Will replace or complement current M8A1.
M272, Water Testing Kit	Portable kit used to test for nerve, blood, and blister agent concentrations in raw or treated water.
RSCAAL	Standoff, automatic scanning, passive infrared sensor that detect nerve and blister vapor clouds up to 5 km range.
Portal Shield Advanced Concept Technology Demonstration	Interim capability to detect, alarm/warn/dewarn, and presumptively identify BW attack
Interim Biological Agent Detection System (IBADS)	A shipboard or ground point BW detection system employing a suite of detectors, identification modules, and sample collectors. Results are displayed on a computer screen. Provides presumptive identification.
AN/KAS-1, Chemical Warfare Direction Detector	Manual standoff chemical agent detector for use aboard ships and at selected shore sites.
CAM	Point detector for nerve and blister agent vapors.
M8 Chemical Agent Detection Paper	Detects nerve agents G and V and blister agent H & L
M9 Chemical Agent Detection Paper	Provides nonspecific detection for nerve and blister
Decontamination Equipment	**Description**
M291 Skin Decontamination Kit, Individual	Individual decontamination kit for skin and personal equipment.
M295 Decontamination Kit, Equipment	Decontamination kit for larger items of personal equipment that the M291 cannot accommodate.
Decontaminating Apparatus, Power-Driven, Lightweight (M17 Series)	Portable lightweight power-driven decontaminating device.

5. Marine Corps

With the exception of the Chemical/Biological Incident Response Force (CBIRF), the Marine Corps does not use structured NBC defense units. USMC capabilities in this appendix are based on unit equipment and individual/collective training. Marines receive individual and unit training in NBC detection, protection, and decontamination operations. USMC NBC defense personnel include warrant officers (MOS 5702) and NBC specialists (MOS 5711) who are responsible for manning NBCCC, training units, and maintaining NBC equipment. Personnel intensive tasks such as unit decontamination and NBC reconnaissance operations are performed as an additional duty by Marines from within the unit.

The CBIRF was established to combat the growing chemical, biological, and radiological—nuclear (CBR-N) threat. The force is a mission-ready national asset under Commander In Chief, United States Joint Forces Command which is manned, trained, and equipped to respond to CBR-N incidents worldwide, when directed by the National Command Authority. Self-sufficient and capable of sustained operations, the force can assist local and military agencies in dealing with CBR-N terrorist acts by providing initial postincident consequence management. CBIRF is unique as it integrates all the elements needed for CBR-N consequence management in a single command. CBIRF also provides

training to local, state, and federal agencies as well as to other DOD forces and assists with the development of new equipment, techniques, and procedures for responding to the use of CBR-N weapons.

CBIRF is designed to deploy as a complete unit (375 Marines and sailors) and is able to provide the best support if predeployed in the operational area. CBIRF's initial response force (IRF) is kept on a 6-hour alert status and is capable of deploying in two C-5s with all of its vehicles, personnel, and equipment. If required, the IRF can be rapidly configured to deploy in all types of military and commercial aircraft. The limited assets of the IRF are only intended to provide initial response capability; the IRF should be reinforced by the entire force within 24 hours.

The threat will dictate the force size requirement. This self-contained response force will have the following five elements: headquarters, force protection, medical, security search and rescue, and service support. The mission focus of CBIRF is to quickly evacuate casualties of an incident involving weapons of mass destruction and provide time-critical medical intervention in a contaminated environment. A unique feature of CBIRF is its electronic linkage to an advisory group of experts through the Defense Threat Reduction Agency (DTRA). The advisory group composed of military and civilian experts in CB matters, effects modeling, and disaster response will advise CBIRF during training and incident response. Additionally, a deployable laboratory from the Naval Medical Research Institute will support CBIRF. This laboratory is capable of identifying biological agents. Table B-12 depicts the specialized NBC defense equipment organic to this unit.

Table B-12. CBIRF NBC Defense Equipment

Detection Equipment	Description
Gas Chromatograph/Mass Spectrometer; Field and Portable.	Detects, identifies, and analyzes low-level concentrations of chemical agents.
Detection Tubes; Chemical Agents.	Monitors a broad range of hazardous and toxic gases and vapors.
CAM.	Detects and monitors various levels of nerve and blister agents on equipment surfaces and personnel.
Kit, Detector, Chemical Agent M256A1.	Portable kit used to detect chemical contamination.
Detector, Gas.	Hand-held device that detects, monitors, and provides instant values on hazardous and toxic gases or vapors.
Detector, Radiac DT236/PDR75.	Portable device used primarily by NBC and medical personnel to detect radiological exposure levels.
Radiac Set, AN/VDR-2.	Portable, hand-held device used to monitor and detect radiological contamination.
ACADA, M22.	An advanced point sampling, detection, and alarm system capable of detecting nerve and blister agents.
Detector, Chemical Agent, M9 Paper.	Personal device used to detect chemical agent contamination on equipment and personnel.
Meter, PH.	Hand-held device used in detecting liquid chemical agents and determining the decontamination solution concentration.
Kit, Testing, Water, M272.	Portable device used to detect CB agents in water.
NBC Reconnaissance System (FOX) M93.	Armored vehicle mounted system designed to detect, identify, monitor, quantify, and mark chemical and radiological contamination.
RSCAAL M21.	Detects nerve and blister agent clouds at a distance up to 5km.
Individual Protection Equipment	**Description**
Coveralls, Level B.	Lightweight, disposable overgarment which provides protection against CB contamination.
Suit, Protective, Chemical, Overgarment.	Provides protection against chemical agents.

Table B-12. CBIRF NBC Defense Equipment (Continued)

Individual Protection Equipment	Description
Suit, Protective, Level A.	Provides protection from organic and inorganic chemical agents originating from a variety of sources and biological hazards.
Suit, Level A Durable.	A front entry, encapsulating, positive pressure, vapor and liquid protective, one-piece overgarment.
Level A training.	Provides Level A training.
Suit, Level B Durable.	An encapsulating suit which protects against commercial liquid chemicals.
Gloves; Chemical Agent with insert, leather and improved.	Provides hand protection against chemical agents.
Cover, Footwear, Protector.	Provides protection against known chemical agents.
Mask, C/B Protective (M40).	The improved mask provides improved facial and respiratory protection with cup, ballistic protective eyelense, redesigned drinking tube coupling.
Self-Contained Breathing Apparatus (SCBA).	A compressed air breathing apparatus used to provide clean air respiratory support in contaminated areas.
Rebreathers.	A positive pressure, closed circuit breathing apparatus used for respiratory and eye protection in dangerously contaminated environments.
Apron, Toxicological Agents.	Impermeable butyl rubber apron used to provide additional contamination protection.
Decontamination Equipment	**Description**
Decon System, M17A1.	Portable, lightweight, power-driven decontaminating system.
Shelter, Decon.	Provides facility to decontaminate personnel.
Decon Kit, M291.	Provides personnel, immediate decontamination capability.
Trailer, Decon.	Supports decontamination operations.
Medical Equipment	**Description**
Medical Support Equipment.	Includes aspirators, ventilators, pacemaker/defibrillators, breathsaver bags, heat stress monitors, surgical sets, and an armored, 4 litter ambulance.
Authorized Medical Allowance List.	Includes laboratory, shock surgical, and aid station sets.
Manikins; Adult, Child, and Trauma.	Provides cardio/respiratory training support for all personnel.
Collective Protection Equipment	**Description**
Portable Collective Protection System.	Provides protective shelters for C^2, medical, and rest and relief operations.
General Support	**Description**
Generator Set, 50kw, 3kw, 10kw, 30kw, and 8kw.	Provides electrical power for required support.
Pump Module; Fuel and Water.	Provides support for required operations.
Storage Tanks; Fuel and Water.	Provides support for required operations.
Shower, Unit.	Portable system which provides personnel decontamination.
Water Purification Units, Reverse Osmosis.	Water purification system capable of treating water from any source.
Water Storage Tanks; vehicles, modules, and collapsible.	Used to support operations.
Vehicle Fleet.	Includes C^2, transport, cargo and utility, logistics, mobile operations, and troop carrier types of vehicles.

6. Coast Guard

The USCG has NBC defense capabilities consisting of, but not limited to, detection of nuclear and chemical contamination, basic individual equipment decontamination, and coordinating and supervising chemical clean-up activities.

a. **Port Security Units (PSU).** Coast Guard PSU capabilities are based on unit equipment, and individual/collective training is in line with other military services. Coast Guard personnel assigned to worldwide deployable PSUs receive training in NBC detection, protection, and decontamination operations. Table B-13 lists the NBC response equipment held by PSUs.

Table B-13. PSU NBC Defense Equipment

Individual Protection Equipment	Description
NAAK	Auto injector set consisting of atropine and pralidoxime chloride.
CANA Automatic Injector	Diazepam auto injector.
Chemical Protection Suit, OG-84	Military CB protective overgarment.
Helmet Cover, Chemical Protection	CP helmet cover.
Mask Field, Protective MK-40A1	Military protective mask. Protects wearer from all known CB agents.
Mask Field, Protective MCU-2P	Military protective mask. Protects wearer from all known CB agents.
Overshoes, CP, Olive Green	CP overboot.
Detection Equipment	**Description**
Detector Radiac DT 60E/PD	High range personal dosimeter.
Chemical Agent Detection Paper, M8/M9	M8 identifies G,V,H; M9 provides nonspecific detection.
Decontamination Equipment	**Description**
MK 17A3 SANATOR	Portable, lightweight power-driven decontaminating device.
Skin Decontamination Kit M291	Individual decontamination kit for skin and personal equipment. Replaces M258A1.
Tank Assembly, Fabric 3000 gallon	Collapsible water bladder.
Decontamination Material	**Description**
STB	Standard military bleach based CB decontaminant.
Detergent, General Purpose	Liquid soap for decontamination.
Miscellaneous Items	**Description**
CP-95A/PD Computer Indicator	Reader unit for DT-60E/PD.

b. **National Strike Force (NSF).** The Coast Guard NSF has a dedicated capability to respond to intentional or accidental chemical discharges. The NSF consists of three deployable strike teams. Each strike team can respond to most chemical incidents and has the potential capability to respond to certain biological incidents. The strike teams are staffed by active duty and reserve military personnel. They deploy on short notice by aircraft. Coast Guard NSF personnel respond to incidents in the US under the direction of the Coast Guard On Scene Coordinators, the Environmental Protection Agency (EPA), or Federal Emergency Management Agency per Emergency Support Function #10 of the Federal Response Plan, and the National Contingency Plan. NSF response to international incidents is coordinated through USCG Headquarters. The strike teams are trained to operate in Level A gear and to supervise hazardous material response operations. Table B-14 lists the NBC response equipment held by NSF Teams.

Table B-14. NSF NBC Defense Equipment

Equipment	Remarks
Decontamination Shower System and Trailer Hazardous Material Category (HAZCAT) Kit Thermal Imaging Devices Magnomometer Chemical Test Kits Chemical Sampling Kits Communication Equipment	These teams also possess a full spectrum of protective clothing including SCBA, portable computers with current response software/databases, and hazardous material (HAZMAT) library.

7. Other Developments: Air Base/Port Biological Detection System (Portal Shield)

New capabilities are constantly pursued and a recently approved and fielded capability includes the Air Base/Port Biological Detection system (Portal Shield) (see Table B-15). The system provides a biological agent sampling and identification capability and under ideal conditions is capable of identifying threat agents in less than 20 minutes. Portal Shield has the capability to detect, alert/warn/dewarn, and presumptively identify a BW agent. This capability reduces casualties and sustains air base or port facility OPTEMPO. Portal Shield performs biological surveillance functions and the system also uses the M22 ACADA to support chemical defense.

a. **Description.** Portal Shield provides point detection and alarm of a BW attack through the use of multiple networked sensors. Unlike other biological detection systems, it uses networking and smart logic to reduce false alarms. Alarm information is transmitted to a command post and a sample for confirmatory analysis is automatically stored in the system but must be manually retrieved and delivered to the supporting medical unit.

Table B-15. Portal Shield Elements

Elements	Description
Automated Identification	An optical/scanner detector capable of providing BW agent initial identification.
Fixed Site Automation	Multiple detector site layout for the perimeter area. Automation protection and tailored algorithms to mitigate individual detector false alarm potential and to provide increased overall detection and reporting accuracy.
C^4I Connectivity	Chemical detection/reporting systems integrated with the biological detection component to demonstrate integrated NBC detection and reporting capability using shared real estate, communications, data processing, and C^4I resources.
Contamination Detection Sampling Kit	Hand-held assays and premixed buffer solution.

b. **Manning.** Portal Shield requires additional duty operators. The team generally consists of a supervisor, command post computer (CPC) operator, and a recon team. The size of the team is dependent upon the size of the base and other mission, enemy, terrain and weather, troops and support available, and time available (METT-T) considerations. The supervisor is responsible for the network, the Portal Shield team, and coordinating contractor logistics support (CLS) . The CPC controller is responsible for determining the network configuration. The recon team visually confirms detector readings and periodically checks the detectors.

c. **Operations.** The Portal Shield is primarily operated through the CPC. The CPC operates the network and receives information on detector status (operational state) and displays data on any network alarms. When a network activation occurs, a sample will undergo testing. Incoming data is evaluated by the supervisor and CPC operator and, as required, the recon team will visually inspect detection results. When a "Network Alarm" occurs, protection and contamination control measures should be taken. The Portal Shield network information also contributes data to support unmasking decisions (i.e., no positive test results).

8. Allied/Coalition Assets

The fixed site commander must demonstrate the ability to use all available resources to support potential contingencies. Apart from DOD, the armed forces of most potential allied/coalition partners currently possess significant quantities of specialized decontamination, detection, and protection equipment as well as various types of decontaminants. Tables B-16 through B-22 have been extracted from *Jane's NBC Protection Equipment 1997-98*. They depict items of equipment that may be available either within the specified country's armed services or commercially. The tables provide a categorized list of equipment by selected country.

NOTE: The USACMLS and US Army Soldier and Biological Chemical Command (SBCCOM), Aberdeen Proving Ground, MD have not validated equipment capabilities.

a. **North Atlantic Treaty Organization (NATO).**

Table B-16. NBC Defense Equipment: CANADA

Individual Protection Equipment	Description
Protective Coverall	One-piece garment with attached hood worn in place of combat uniform.
ACTON NBC lightweight overboots	Used in Australia, UK. Lightweight CP overboots.
NBC overboots, Mark 5	Used in Australia, UK. CP overboots.
Collective Protection Equipment	**Description**
ARO Aircrew Respirator System	In production.
ARO Ventilated Respirator System	Vehicle-mounted, variable-speed filtration system.
Detection Equipment	**Description**
DRES Chemical Agent Detection System	CAM network (up to eight) with central control station and monitoring stations remote to 4 km.
Detector Kit, Chemical Agent (C-2)	Detects/Identifies G and V series nerve agents, blood agents, and choking agents. Kit contains M8 detector paper. Similar to US M256A1.
Chemical Agent Liquid Detector Paper - 3-way M-8 and M-9	Detects/Identifies G and V series nerve, and H series blister agents.
Detector, Chemical Agent, Nerve Vapor	Nerve agent vapor detector.
Detector Kit, Chemical Agent, M256A1	Same as US M256A1.
RADIAC Set, Remote Monitoring, and Alarm, AN/FDR-502(V)	Sensor networked gamma detector for fixed or semi-fixed installations. Detects gamma at 1-5000 rad/hour.

Table B-16. NBC Defense Equipment: CANADA (Continued)

Detection Equipment	Description
Radiacmeter, IM-5016/PD	In service with Canadian Armed Forces. Detects and measures gamma radiation. Displays readings in rad/hour on analog dial from 1-10 rad/hour.
Radiacmeter, IM-108S/PD	Gamma radiation detector measuring gamma at 0-500 rad/hour.
Radiation Monitor and Automatic Alarm, AN/GDQ-3	Gamma radiation detector network for fixed or semi-fixed sites. Measures gamma at 1-5000 rad/hour.
Gamma Survey Meter, Model 189	Measures x-ray and gamma radiation.
Decontamination Equipment	**Description**
NBC-DEWDECON-2L Decontamination Device	2-liter DS2 application device. Similar to US M11.
NBC-DEWDECON-3L Decontamination Device	In service with Australia, Canada, Saudi Arabia, and other nations. 3-liter DS2 application device pressurized by hand or air compressor.
NBC-DEWDECON-20L Decontamination Device	Australia, Saudi Arabia, and other nations. 20-liter pressurized device for C8-C decontaminant or optional DS2 decontaminant application.
NBC-DEWDECON-M Decontaminant Mixer/ Dispenser	Decontaminant mixer/dispenser with high-pressure water system.
NBC-DEWDECON-PERS Emergency Response Personnel Decontamination Kit	Civilian police, fire fighters, ambulance crews, and civil defense teams. For general decontamination of nerve and blister agents.
Skin Decontaminant Lotion	Neutralizes mustard, nerve agents, and lewisite on contact.
Miscellaneous Items	**Description**
Carleton NBC belt-mounted respiratory system	Battery-powered positive-pressure system designed for use with the C4 protective mask.
Zenon Advanced Double Pass Reverse Osmosis Water Purification Unit	Self-contained large volume water purification unit capable of processing NBC contaminated water. Relies on integral 40 kW diesel power generator.
NBC-DEWPRO-TEK Protective Material	NBC protective material for covering supplies and equipment.

Table B-17. NBC Defense Equipment: FRANCE

Individual Protection Equipment	Description
Giat NBC Hood for Civilians	Protects face and respiratory tract from chemical agent vapors.
NBC Protective Suit, Model S3P	Used in Swiss Army also. Two-piece CP overgarment system.
Protective Coverall, Model T3P	French Air Force air and ground crews. One-piece CP coverall system with integral hood.
NBC/F Protective Coverall	Tank and helicopter crews. Similar to T3P w/o hood.
Paul Boy'e Tropical NBC Combat Suit	In production for the French Army. Two-piece lightweight CP overgarment system with integral hood.
Paul Boy'e Lightweight Decontamination Suit	Lightweight one- or two-piece suit. Reusable after 4 to 5 decons.
Bachmann, Model 63, Disposable NBC Suit	Full-length outer garment, gloves, head cowl, overboots, and spare gloves. Designed for short-term emergency use.
Bachmann, Heavy Duty NBC Decontamination Suit	Heavy-duty butyl-based fabric.
Collective Protection Equipment	**Description**
AMF 80 Modular NBC Shelters	Prefabricated shelter capable of housing up to 60 occupants. Comprised of 2 and 2.5 meter diameter modules connected by neoprene joints. Usually constructed in a trench and covered by a layer of earth. Self-supporting for 7 days.
AP 60 Modular Semi-hardened Shelter	Similar to AMF 80 but self-supporting for 48 hours.
Bachmann NBC Shelters	NBC shelters typically for field repair facilities. Capable of accommodating vehicles or aircraft.
Collective NBC Protection Tent	Personnel shelter, impermeable for up to 24 hours, positive overpressure and filtration system.

Table B-17. NBC Defense Equipment: FRANCE (Continued)

Collective Protection Equipment	Description
FMGC High Capacity, Composite Filter	Filtration unit for collective protective shelters.
Sofiltra-Poelman NBC Filters	NBC filter unit.
Giat NBC Filtering and Pressurization Unit for Soft-Skin Structures	Filtration/Pressurization unit for soft skin structures and mobile shelters.
Giat NBC EVATOX emergency evacuation kit	Kit designed for evacuation of the public from an area with a known toxic atmosphere. Contains I,000 protective respiratory hoods for adults and children as well as 7 infant protection systems.
Detection Equipment	**Description**
PROENGIN Portable Contamination Monitor, AP2C	Similar to US CAM.
Chemical Detection Unit for Fixed Installations	Point detector for G, V and H series agents.
Giat NBC Chemical Detection Control Kit	Can detect most nerve, blood, and choking agents.
Giat NBC Toxic Agent Detection and Identification Kit	In production. Detects toxic agents in atmosphere or on materials.
Giat NBC Detalac mle F1 and mle F2	mle-Model. Point nerve agent detection system. Similar to US M8A1.
Giat NBC DET INDIV mle F1 Individual Nerve Agent Detector	Individual nerve agent detection system for G series agents.
Gait NBC Adhesive Detector Paper, PDF1	Similar to M8 paper with adhesive backing.
Decontamination Equipment	**Description**
Chemical Decontamination Glove mle F1	Personal decontamination device for skin, clothing, and equipment.
Giat NBC Decontamination Appliance, Emergency, 2.5-liters	Similar to US M11.
ACMAT UMTH 1000 Vehicle-Mounted Decontamination System	Vehicle-mounted decontamination system with equipment platform, fixed hydraulic equipment, motorized pump, 3000-liter water tank, and a removable hot water/steam generator. Air-transportable by C-130 aircraft.
Miscellaneous Items	**Description**
NBC Casualty Bag	NBC protective bag with air filter generator. Provides casualty protection for up to 8.hours.
Giat NBC ventilated casualty hood.	Transparent NBC protective hood for casualties.
Giat NBC individual survival kit.	Fabric wallet containing various detector papers, nerve agent vapor detectors, decontamination gloves, pyridostigmine pretreatment tablets, and 2-3 MultiPen or ComboPen, autoinjectors.

Table B-18. NBC Defense Equipment: GERMANY

Individual Protection Equipment	Description
Helsa-Werke NBC Facelet	Used during rest or standby periods when full protection is not necessary.
Helsa-Werke NBC Protective Clothing	Used by Norway, Sweden, Germany and some Middle East Forces. Integral hood, jacket, overtrouser, overboots, and gloves.
Karcher Combat Suit with Integrated NBC Protection System, Safeguard 3002	Used by Saudi Arabia and several other Middle East countries. Integral hood, jacket, and trousers. Worn in place of combat uniform.
Karcher Flying Suit with Integrated NBC Protection System, Safeguard 3002/A	Fire resistant NBC protective garment.
Karcher Impermeable NBC Suit, Safeguard 6004	One-piece, gas-tight, full protective suit with integrated boots and mask.
Collective Protection Equipment	**Description**
Karcher SPS 2000 long-term conservation system	Used in Saudi Arabia. Dual tent storage system consisting of an inner and outer tent and a dehumidifier. Designed for storing equipment in a humidity-controlled environment.

Table B-18. NBC Defense Equipment: GERMANY (Continued)

Detection Equipment	Description
Honeywell-ELAC Chemical Agent Detection System, A2	Personal and point detection/alarm unit for nerve, blood, blister, and choking agents. Adaptable for fixed site networks.
Honeywell-ELAC Mustard Module	Used by Austrian Armed forces. Used with US M43A1 detector to detect blister, blood, and choking agents.
MM-1, Mobile Mass Spectrometer	Used by Israel, Thailand, Turkey, and the US. Detects chemical agent vapors and liquids. Incorporated in US Army and Marine Corps FOX systems.
Transportpanzer-1 'Fuchs' NBC Reconnaissance Vehicle	US, British, and Israeli forces. See US FOX.
Decontamination Equipment	**Description**
Mobile NBC Decontamination Semi-trailer	Mobile decontamination facility for equipment and clothing. Items are processed on conveyor belt through a series of heat, steam, decontaminant application, and rinsing processes. All contaminated runoff is contained in integral tanks. Water is supplied by internal 800-liter tank and for long-term operations, by a water tanker vehicle via hoses.
Karcher Material, Terrain, Personnel Decontamination System (2 Trucks)	Used by Austrian forces. Two truck system. One for decontamination of material and terrain. One for decontamination of personnel and personal equipment. Each vehicle has its own integral 2000-liter water tank.
Karcher Decojet Decontamination System	Used by French, Middle East, and Portuguese forces. Mobile, self-contained, vehicle-carried, frame-mounted decontamination system with integral 200- and 435-liter water tanks. Capable of decontaminating personal, equipment, material, and clothing.
Karcher Decojet-trailer Decontamination System	Used by Australia, Austria, Portugal, Middle East, and some countries in North Africa. Mobile decontamination system mounted on a 4-ton trailer. Provides personal, equipment, material, clothing, terrain, and building decontamination capability.
Karcher DECONTAIN Decontamination System	Used by Portuguese Air Force. Self-contained, complete decontamination system for vehicles, aircraft, personnel, terrain, clothing and equipment. Also capable of processing water contaminated by NBC agents into drinking quality water.
Karcher DT60 Decontamination Tent	Double-walled tent comprised of inflatable tubular frame with integral air compressor.
Karcher Decontamination Tent	Decontamination tent with inflatable frame.
Karcher C8 - Direct Application Decontamination System	Used by Australia, Austria, Egypt, France, Taiwan, Thailand, NATO Headquarters. Capable of mixing and applying decontaminant solution. Used in terrain, vehicle, and aircraft decontamination operations. Similar to US M17 LDS.
Karcher MPDS Multipurpose Decontamination System	Used by Austria, Australia, NATO Headquarters, Portugal, and countries in the Middle East and North Africa. High-pressure steam cleaning system in a light metal frame. Similar to US M17 LDS.
Karcher Portable Lightweight Decontamination System DS 10	Used by Austria, Belgium, Norway, Sweden and countries in the Middle East. Ten-liter pressurized decontaminant mixer/applicator. Similar to US M13 DAP.
Karcher HDS 1200 EK Pressure Steam Jet Cleaner Unit	In use by 40 Armed Forces worldwide. Steam cleaner.
Karcher SCS 1200 DE Lightweight Decontamination System	Used in Africa, Europe, and US. Frame-mounted steam cleaner modified for military use. Used to decontaminate vehicles, equipment, aircraft, and personnel. Similar to US M17 LDS.
Karcher SCS 1800 DE Decontamination System	Used in Europe. High performance, self-contained, decontamination module. Used for mixing and applying decontaminant solutions.
Karcher Decontamination Accessories: MPS 3200 Motor Pump Set; Field Shower Unit; Showerjet 15 Collapsible Water Tank 2500-Liters	MPS 3200 - NATO Headquarters, Australia, Austria, Portugal, and some North Africa and Middle East countries. Field Shower Unit and Collapsible Water Tank - several countries. Showerjet 15 - UK and New Zealand. MPS 3200 - Motor Pump Set. Used for water application, seawater resistant. Field Shower Unit - Two-stage shower unit for personnel decontamination. Showerjet 15 - Capable of decontaminating up 15 personnel simultaneously when attached to Karcher MPDS, HDS 1500D or HDS 1200 hot water high-pressure modules. Collapsible Water Tank – 2500-liter capacity.

Table B-18. NBC Defense Equipment: GERMANY (Continued)

Decontamination Equipment	Description
Karcher Decontamination and Cleaning Agents: RM 21 RM 31 RM 32 RM 35 RM 54 Calcium Hypochlorite-C8 C8 emulsion component TDE 202	In use worldwide. RM 21- Liquid personnel decontamination solution. RM 31- Liquid alkaline agent for cleaning unpainted surfaces. RM 32 - Liquid alkaline cleaner for industrial applications. RM 35 - Disinfecting cleaner for industrial applications. RM 54 - Foam cleaner for sensitive weapon systems. Calcium Hypochlorite - C8 - Decontaminant powder with 64% available chlorine. C8 emulsion component - A mixture of tetrachloroethylene and emulsifier PTC 2000. A component of Munster emulsion. TDE 202 - Decontaminant emulsion that is effective on all known chemical warfare agents and mixtures of agents.
Karcher Hot Air Generator FB 60 E	Used by Australian and US forces. Hot air decontamination device.
OWR DEKON Decontamination System	Mobile decontamination system consisting of the following five basic components: DETECT 1000 - Air-conditioned, over-pressurized, compartmentalized shelter containing NBC detection, communications, and decontamination equipment. DEKON 2000 - Decontamination disaster protection vehicle capable of operating independently. Used for personal and equipment decontamination as well as providing contamination-free drinking water. SHOWER 3000 - Capable of providing personnel showers for up to 3,500 individuals in 24-hours. Associated equipment is a collapsible 5,000-liter water tank. WASH 4000 - Field laundry unit. MOBILE WORKSHOP 5000 - Van with spare parts for maintenance of the complete system.
OWR DEKON Trailer 6000	Trailer-mounted decontamination device for personnel, equipment, and terrain decontamination. Integral 1,000-liter water tank and portable 1,000-liter water tanks. Can mix and apply decontaminant solutions.
OWR DECOFOG III Decontamination System	Portable decontamination system, which dispenses decontaminant solutions in a fine mist. Normally used with GD 5 decontaminant. GD 5 has same decontamination efficiency as DS2 but not as corrosive.
OWR CLEAN 6000 G Decontamination Unit	High-pressure cleaner/steam jet device.
OWR CLEAN 7000 G Decontamination Unit	High-pressure cleaner/steam jet device with decontamination module.
OWR DEDAS 100 Decontamination Unit	DEDAS - Decontaminating Emulsion Direct Application System. Device used for the continuous production of decontaminate solutions and emulsions.
OWR DRESS DEKONT 8000	Mobile disinfectant and drying unit for NBC protective suits.
OWR Multipurpose Decontamination System, MPD 12 and PD 12	Used for decontamination of personnel, equipment, vehicles, aircraft, and terrain. Incorporates a shower unit, steam jet cleaner, 1,400-liter aluminum water tank, and 1,000-liter flexible tanks. Normally carried as a container on a vehicle but can be transported by helicopter.
INDECON Integrated Decontamination System	An integrated, containerized decontamination system. Used for decontamination of vehicles, equipment, personnel, and structures.
NBC Decontamination Truck	Standard NBC decontamination truck. Used for terrain and equipment decon. Comprised of a pump, heater, and decontaminant mixer units as well as two 1,500-liter water tanks. Similar to US M12A1 PDDA.
Miscellaneous Items	**Description**
Marking Set, Contamination, NBC	Used by the US Army. Same as US NBC Marking Set.
Helsa-Werke casualty bags	CB protective bag for casualties with integral air blower and filter canisters.
Karcher Mediclean units	Device designed to pre-clean wounds or areas of body contaminated with NBC agents.
Atropine Aerosol Spray	Alternative to atropine injection. Allows user to administer via nose or mouth.

Table B-19. NBC Defense Equipment: ITALY

Decontamination Equipment	Description
Cristanini SANIJET C 921 Decontamination System	Also used by French, Spanish, US, and Korea. Self-contained decontamination device powered by air-cooled diesel engine. Similar to US M17 LDS.
Cristanini SANIJET 3000/3 Containerized Decontamination System	Compartmentalized container designed to provide personnel and garment decontamination within the structure and vehicle decontamination outside via external hose reels.
Cristanini Trailer C 90-120/2 MIL Decontamination System	Used by some NATO forces. Trailer-mounted decontamination system for vehicle, equipment, personnel, and terrain decontamination.
Cristanini Decontamination and Shower Tent	Tubular frame, PVC, fabric decontamination tent.
Cristanini SANIJET Gun	Specialized gun assembly that allows descaling, decontaminant application, and rinsing to be accomplished from a single hose.
Cristanini BX 24 SPECIAL Decontamination Product	Decontaminant packaged in cartridges for use with the SANIJET Gun.
Tirrena Small Decontamination Set, SDS T 155	Small fire extinguisher-type device used to dispense DS2 decontaminant. Similar to US M11.

Table B-20. NBC Defense Equipment: UNITED KINGDOM

Individual Protection Equipment	Description
NBC Poncho	CP protective poncho with charcoal kilt and integral hood.
Defender CB Mark 1 Civilian Suit	Civilian CP suit available in five sizes. Designed to be worn over clothing and footwear. Configured as a one-piece coverall with integral hood.
Bondina Civilian NBC Protective Suit	Civilian version of British NBC suit. Supplied as a two-piece ensemble comprised of hood, smock, and trousers or one-piece coverall.
Wescare Lightweight NBC Survival Suit, Model No 100	Lightweight three-piece CP suit with integral respirator.
Wescare Lightweight NBC Survival Suit, Model No 101	Lightweight two-piece CP suit without integral respirator.
Complete NBC Kit, Civilian, Lightweight	Civilian lightweight CP kit consisting of garments and equipment in a suitcase. Comprised of oversuit, inner two-piece protective garment, full-face respirator with filter canister, industrial rubber boots, inner cotton and outer rubber garments, mask demisting pack, decontamination powder, and an instruction handbook.
Complete NBC Kit, Civilian, Heavy Duty	Civilian heavy duty CP kit consisting of garments and equipment in a suitcase. Comprised of oversuit, inner two-piece protective garment, full-face respirator with filter canister, industrial rubber boots, inner cotton and outer rubber garments, mask demisting pack, decontamination powder, and an instruction handbook.
Heavy Duty Outer Suit	One-piece heavyweight chemical resistant and flame retardant oversuit designed primarily for civilian use.
Collective Protection Equipment	**Description**
NBC Liners Models GP120/GP240	Chemical resistant tent liners constructed of butyl coated nylon fabric. Portable NBC filtration unit provides pressurized filtered air.
Decontamination Equipment	**Description**
CAM	Same as US CAM.
GID-2 Fixed Chemical Agent Detection System	Some NATO navies. Fixed detection system for vehicles, ships and buildings. Capable of detecting nerve and blister simultaneously.
GID-3 Graseby Ionic Detector	Designed to detect nerve and blister agents as well as monitor the effectiveness of vehicle collective protection systems. Detectors can be networked to form a perimeter defense.

Table B-20. NBC Defense Equipment: UNITED KINGDOM (Continued)

Decontamination Equipment	Description
Nerve Agent Immobilized Alarm and Detector	Used by Portugal and Spain. Automatic alarm system comprised of a detector and alarm unit. Responds to nerve and blood agents. Similar to US M8A1.
Detector Kit Chemical Agent Residual Vapor No 1, Mark 1	Squad level detection kit for nerve and blister agents. Similar to US M256A1.
Decontamination Kit, Personal No 1, Mark 1	Personal decontamination kit comprised of pads containing Fullers earth. Similar to US M13 individual decontamination kit.
Decontamination Kit, Personal No 2, Mark 1	Personal decontamination kit consisting of a 113-gram dispenser of Fullers earth.
Decontamination, NBC, Apparatus, Portable, No 2 (DAP 2)	Designed for decontamination of vehicles and equipment. Consists of pump, hoses, and brushing wand. Similar to US M13 DAP.
Decontaminant Chemical Agent XL1E1	Issued in a kit that contains specific reagents for persistent chemical agents.
WDL Dual-Purpose Decontamination and Large Area Screening System	Dual-purpose decontaminant application and smoke screening system. Capable of dispensing hot air and water as well as mixing decontaminates.
Portaflex 300 Decontamination Shower Unit	Designed for personnel decontamination.
Miscellaneous Items	**Description**
Pearson Pathfinder Marking Device	In service with the British Army. Automatically marks boundaries of areas such as minefields, and NBC contaminated terrain. Can be attached to any vehicle. Fires aluminum rods via compressed air.
Chemical Agent Resistant Material	A two-layer chemically resistant polyethylene material used to protect personnel, supplies, and equipment from liquid agent contamination.

b. Other Treaties/Alliances or Neutralities.

Table B-21. NBC Defense Equipment: ISRAEL

Individual Protection Equipment	Description
NBC Mask No 10A1 (Children 8-12 years)	Protective mask for children. Has drinking system and voicemitter.
NBC Mask No 30 (General Use)	General use protective mask with voicemitter.
NBC Mask No 33 (General Use)	General use protective mask with drinking system, voicemitter, and right-handed canister option.
Civil Defense Hood	Hood with transparent face panel and battery-powered forced ventilation system.
NBC Disposable Protective Clothing	Clear disposable three-layer transparent protective clothing. Consists of trousers and jacket with hood.
SUPERGUM NBC Protective Clothing	Emergency protective clothing for military and civilian applications. Available in sizes for adults and children. Comprised of jacket, trousers, gloves, footwear covers.
NBC Protective Garments, Lightweight, Type EC-UF-222	CP overgarment system with nylon outer shell.
NBC Protective Garments, Standard, Type EC-GF-231	CP overgarment system with cotton outer shell.
Collective Protection Equipment	**Description**
SHALON collective NBC filtration systems	NBC filtration systems built to Israeli civil defense specifications. Each unit is comprised of a washable synthetic foam pre-filter, NBC gas particulate filter, fan unit, flowmeter, and overpressure valve. Units are available for 12-, 25-, 50-, and 100-person shelters.

Table B-21. NBC Defense Equipment: ISRAEL (Continued)

Detection Equipment	Description
Elbit Multipoint Gas Monitor	Continuous air quality monitoring system capable of analyzing air from up to 24 remote sampling points. Can be upgraded to incorporate meteorological and hazard assessment software.
CHASE Chemical Agents Sensor	In service with the Israeli Defense Forces. Chemical agent detection device capable of detecting G and V nerve and H series blister agents. Can be configured for either vehicle or manpack operation.
RAFAEL CHAMP Chemical Agent Detector	Hand-held detector unit capable of detecting nerve, blood, and blister agents.
CDK chemical detection kit	Simplified reliable chemical detection kit designed for use by non-specifically trained personnel. Detects nerve and blister agents displaying positive results as a color change.
Elbit Alarm and Power Remote - Control Unit for M43A1.	Device that interfaces the M43A1 alarm with communication systems providing audible and visible alarms.
Decontamination Equipment	**Description**
DP-2 decontamination powder	Homogeneous, finely ground powder decontaminant for skin and personal equipment.

Table B-22. NBC Defense Equipment: SWEDEN

Individual Protection Equipment	Description
New Pac Lightweight Disposable C - Cover Dress S/91	Used in Austria, Sweden, Denmark, and Finland. Lightweight CP ensemble consisting of jacket with integral hood, trousers with integral footwear covers, and gloves.
New Pac Disposable C - Cover Dress S/89	Used in Sweden. Transparent, disposable full-body CP cover with footwear covers.
New Pac C - Cover Poncho, N/60	Used in Norway. CP poncho.
New Pac C - Cover Poncho, N/90	Used in Norway. CP poncho.
Combat Suit 90	Used in Sweden. CP suit consisting of jacket with integral hood, trousers, and overboots. Worn in place of combat uniform.
Collective Protection Equipment	**Description**
Trellsystem chemically hardened hospital tent system	Inflatable, chemically hardened hospital tent with over-pressurization, filtration, and air conditioning.
Detection Equipment	**Description**
CW Detection Device	Small enzyme based detection device produced in two variations. One for nerve agents and one for mustard.
Decontamination Equipment	**Description**
Hot Air Unit, VA-8	Decontamination device that generates super heated air for uniform/equipment decontamination.
Cargo mobile decontamination station	Mobile decontamination station built on a trailer chassis. Comprised of an extending tent with three sections, 500-liter water tank, pump unit, heating unit, and waste water collection system. Used for personnel decontamination.

9. Covers

The use of buildings and covers to protect supplies and equipment provides significant benefits to the fixed site commander. Limiting the exposure of these items to NBC agents reduces the hazard and the need for decontamination. As a general rule, anything that provides a barrier between the items of concern and the environment will provide some degree of protection. Currently there are NBC protective covers (NBC-PC)

available as common table of allowances (CTA) items. These covers are specifically designed to provide a 24-hour barrier from liquid agent contamination.

Covering can also be accomplished with items as basic as canvas tarpaulins and plastic sheeting, or as elaborate as large area maintenance and tactical aircraft shelters. Table B-23 depicts some examples of material and equipment that may be available to the fixed site commander for this purpose. These items generally provide protection from liquid agent hazards; however, those with integral overpressure/filtration systems also provide vapor hazard protection. In all cases, a significant degree of protection will be afforded to the personnel, equipment, or material either covered or inside. Any building provides partial cover that can be maximized by placing supplies and equipment inside rooms without external walls. All ventilation ducts, doors, windows, and electrical outlets should be covered with plastic sheeting.

NOTE: Caution should be exercised when using commercially available protective covers/material in place of military-issued covers. These items may not possess the multispectral camouflage qualities of their military counterpart and would subsequently be easier to detect by enemy acquisition systems.

Table B-23. NBC Defense Covers

Cover Options	Remarks
ROWPU Cover	Lightweight flexible fabric for covering ROWPU. Puncture-, crack-, and tear-resistant.
Large Area Maintenance Shelter (Clamshell)	Aluminum framed PVC coated fabric shelter, 192 feet x 75 feet x 31 feet.
Tactical Aircraft Shelter	Aluminum box frame PVC coated fabric shelter with clamshell opening at each end, 100 feet x 64 feet x 27 feet. Has air conditioning and heating ductwork.
TEMPER tent	Modular aluminum framed fabric tent system, (8 feet x 20 feet x 10 feet.
Modular Command Post System (MCPS)	Aluminum framed PVC coated fabric tent, 11 feet x 11 feet x 9 feet. Effort is underway to develop a chemically hardened version as part of a P^3I.
Modular General Purpose Tent System	Replacement for current general purpose tents; pole or frame support system fabric tent. Extendable to any length required by adding modules, 54 feet x 18 feet x 14 inches.
CBPS	Protective shelter system constructed of flouro-polymer/aramid laminate fabric that provides liquid and vapor protection and can be readily decontaminated. Integrated with a Field Litter Ambulance, M1097 HMMWV, 300 square feet fully integrated. Also contains a 10 kW tactical quient generator on a high mobility trailer.
MCHT	Multipurpose frame supported collective protection tent. Tent fabric is flouropolymer/aramid laminate. Features four interchangeable removable walls. Individual tent covers 121 square feet.

10. Government/Nongovernment Organization Assets

Government agencies or nongovernment organizations may be capable of providing assets to the fixed site commander in either materials or assistance. Consult the Staff Judge Advocate for advice concerning the legal requirements for obtaining support from government and nongovernment agencies. Examples of these agencies or organizations include but are not limited to—

a. United Nations Peacekeeping Forces (source of trained personnel, equipment, and materials).

b. World Health Organization (source of medical assistance teams).

c. International Red Cross/Red Crescent Societies (source of materials, manpower, and equipment).

11. HN Assets

In addition to the resources available through military supply channels, assets may be available from the HN. Consult the Staff Judge Advocate for advice concerning the legal requirements for obtaining HN support. Use of these capabilities will not only reduce turn around time, but will also alleviate some of the burden placed on military logistics channels. Examples of these include, but are not limited to—

a. Local police departments (source of trained personnel for refugee handling, maintenance of civil order, security operations, and traffic control).

b. Local retail centers and industries (source of covers, expendable supplies, and decontaminants).

c. Local fire departments (source of high-pressure water dispensing equipment and hoses).

NOTE: In some countries, local fire departments are outfitted with equipment packages to support evacuation of the public from toxic areas (e.g., French Fire Brigades).

d. Local water department (source of large quantities of water).

e. Local sanitation department (source of trained personnel to handle disposal of nonpersistent materials and hazardous waste).

f. Environmental control office or similar agency (source of trained personnel to assist in monitoring, reduction, and disposal of hazardous material and waste).

g. Civil defense agencies (source of trained personnel, detection equipment, and materials).

h. Water treatment plants (source of decontaminants).

i. Local construction companies (source of earth moving equipment, materiel-handling equipment, and construction materials).

j. Multinational corporations (potential source of assets previously mentioned).

Appendix C

VULNERABILITY ANALYSIS AND MITIGATION

Vulnerability analysis is the continuous, systematic estimating of consequences to friendly forces from NBC attacks. The overall methodology includes IPB, risk assessment, and vulnerability analysis with associated mitigation measures. This appendix provides a "how to" approach for risk assessment and a discussion on vulnerability analysis, allowing the commander to determine unit vulnerability and how to reduce that vulnerability. TIM hazards are addressed separately in Appendix G. Additionally, because exposure may result from both hostile or accidental release, the normal steps in the risk assessment process may not apply within the normal context of risk assessment.

1. Risk Assessment

The charts (Figures C-1 to C-3) on the following pages describe the risk assessment process. They aid the commander and staff in determining force risk levels and the minimum recommended steps to reduce the NBC risk. Follow these basic steps when using the risk assessment charts:

a. Enter the chart at "Start Here".

b. Answer the main question in the shaded box by considering subordinate questions/answers underneath it.

c. Answer "yes" if the answer to any question below the shaded box is a "yes."

d. Go to the next lower box and repeat the process.

e. Read the risk assessment to the right if the answer to a shaded box question is "no."

f. Read to the right to determine the minimum recommended procedures to reduce risk.

g. Complete the assessment by writing the assessed risk level in the risk assessment box at the bottom of the page.

NOTE: Commanders and staffs should modify these charts as they identify additional questions and mitigation measures based on mission-specific situations.

NUCLEAR RISK ASSESSMENT

Select YES if one or more boxes are checked

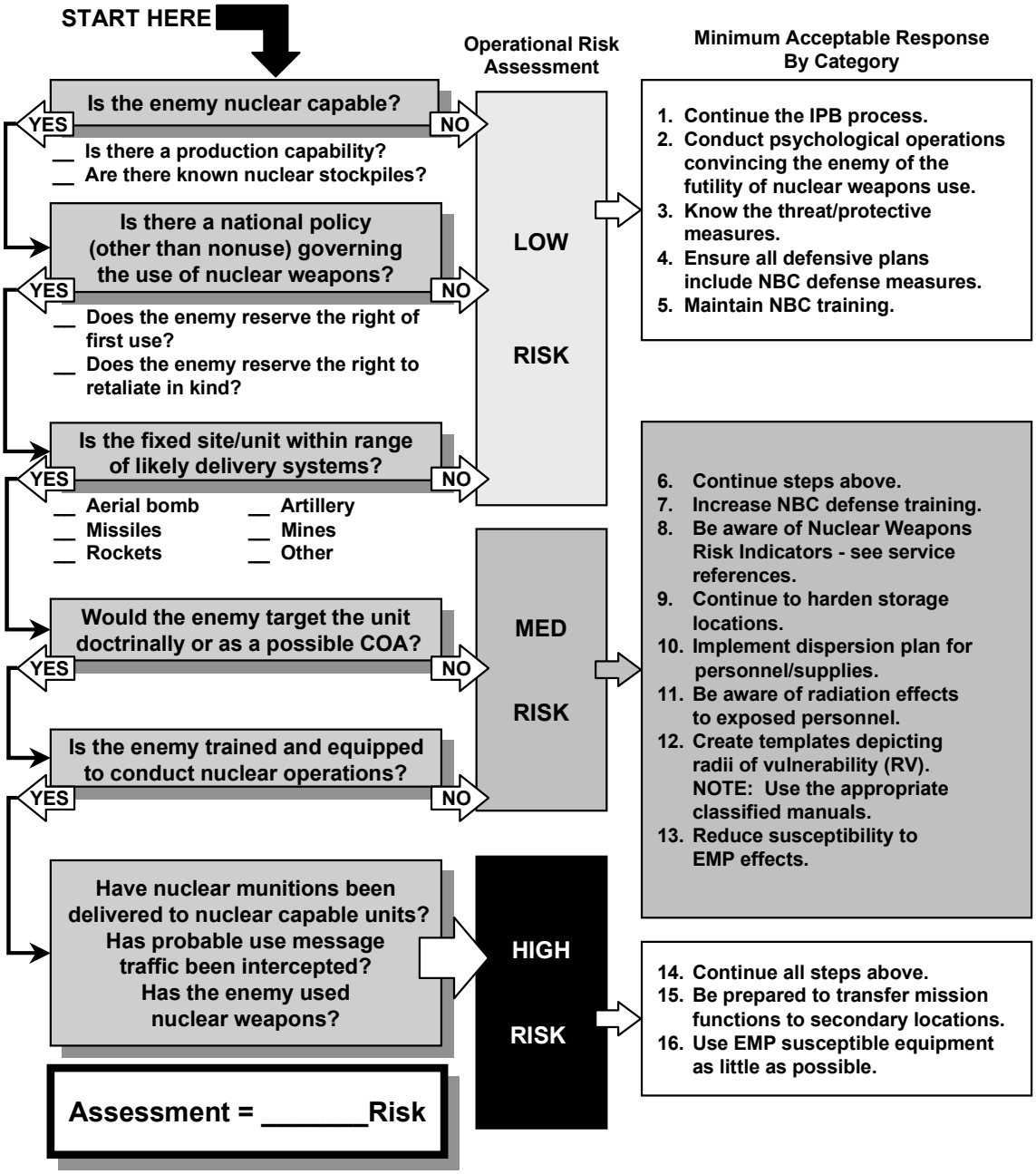

Figure C-1. Nuclear Risk Assessment

BW RISK ASSESSMENT

Select YES if one or more boxes are checked

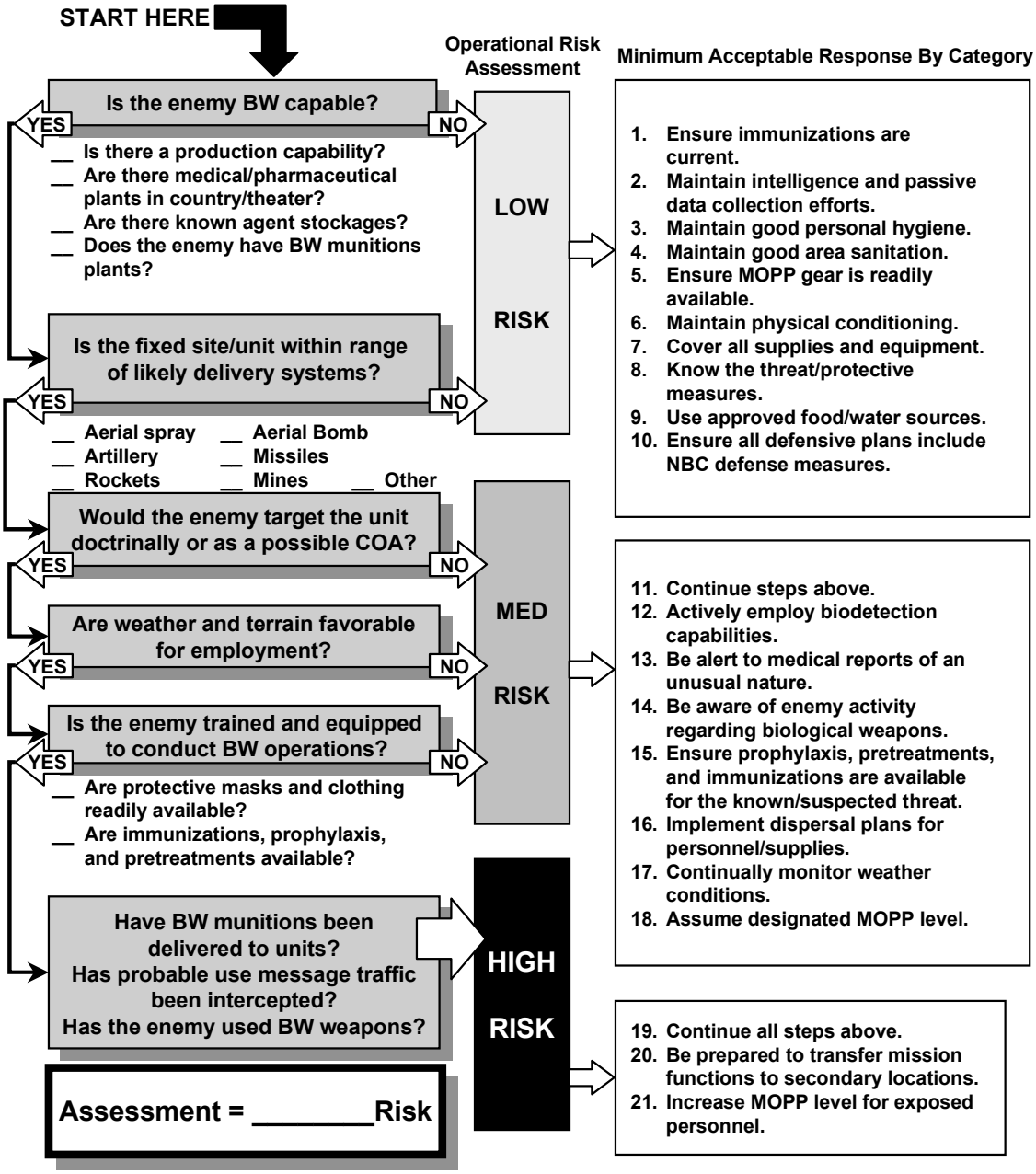

Figure C-2. Biological Risk Assessment

CHEMICAL RISK ASSESSMENT

Select YES if one or more boxes are checked

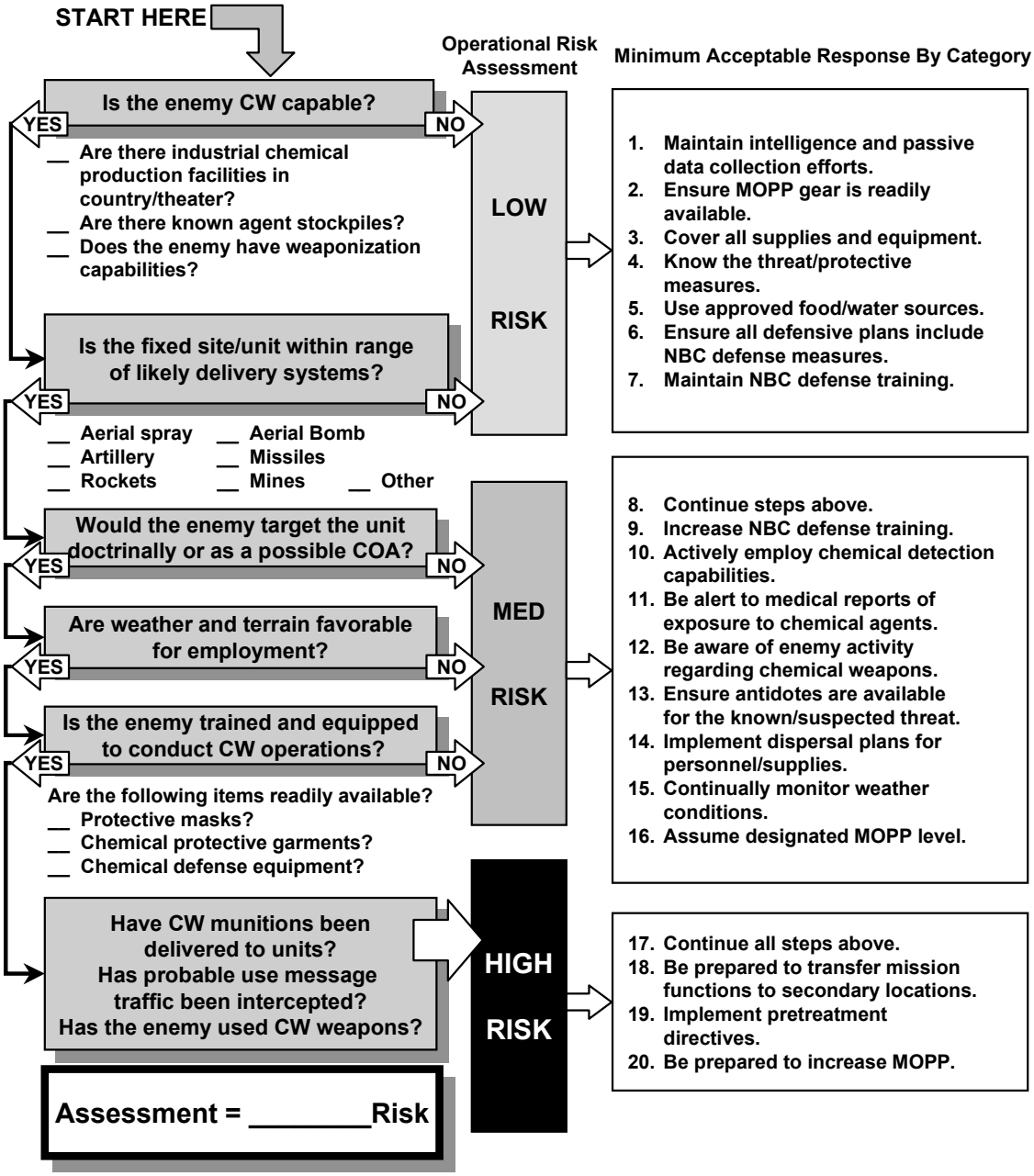

Figure C-3. Chemical Risk Assessment

2. Nuclear Vulnerability

a. To assess a unit's vulnerability to a nuclear attack, a commander determines the unit's NBC defense protection level and the type and size of the weapon likely to be employed by the enemy. The commander then weighs various COAs to determine which COA allows for mission accomplishment at an acceptable risk.

When addressing unit vulnerability to nuclear weapons employment, consider blast, shock wave, thermal radiation, heat, initial radiation, residual radiation (fallout), and EMP effects. The potential exists for an enemy to employ a weapon that produces only one of these effects (e.g., radioactive dust particles, EMP). Therefore, assess vulnerability to each effect, not just the greatest effect.

A nuclear explosion's biological effects are measured according to the amount of radiation (centigrays) to which personnel are exposed. For the biological effects of radiation in man, refer to FM 8-9/NAVMED P-5059/AFJMAN 44-151, standardization agreement (STANAG) 2500, *NATO Handbook on the Medical Aspects of NBC Defensive Operations*.

b. There are two techniques to evaluate unit vulnerability to nuclear detonations. The first is a technical approach in which unit dispositions are compared with the effects of an expected yield. The second is an operational approach in which unit dispositions are compared with targeting criteria used by the threat target analyst.

In a nuclear environment, the more concentrated a unit is, the more lucrative a target it becomes. If the unit itself is not the target, but falls within the fallout pattern, unit monitors will be capable of providing the commander with essential information regarding the hazard. Nuclear hazard prediction is addressed in Allied Tactical Publication (ATP) STANAG 2103, *Reporting Nuclear Detonations, Radioactive Fallout, and Biological and Chemical Attacks and Predicting Associated Hazards—ATP-45* or appropriate service publications.

c. The primary tool for analyzing friendly dispositions is the radius of vulnerability (RV). RV is the radius of a circle within which friendly troops will be exposed to a risk equal to, or greater than, the emergency risk criterion (5 percent combat ineffectiveness) and/or within which material will be subjected to a 5 percent probability of the specified degree of damage (see the RV tables in JP 3-12.2 secret restricted data (SRD), *Nuclear Weapons Employment and Effects Data*, or JP 3-12.3, *Nuclear Weapons Employment and Effects Data (Notional) (unclassified for training purposes).* The ground zero for the RV is always assumed to be the point where detonation will do the greatest damage to the unit or installation. Delivery errors are not considered. For RV of unspecified categories, see comparable table charts in JP 3-12.2 or JP 3-12.3. Based on vulnerability radii and unit size, commanders may determine risk from a nuclear attack and whether or not to adjust unit dispersion. However, personnel may not be the targets. Often equipment, due to sensitivity and vulnerability, becomes the target. For actual vulnerability radii, refer to JP 3-12.2 (SRD).

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

(1) Determining the appropriate threat yields based on current intelligence and determining the disposition of unit personnel.

(2) Obtaining the appropriate vulnerability radii from the RV table (JP 3-12.2 (SRD), JP 3-12.3, FM 3-3-1 for training purposes).

(3) Estimating fractional coverage for each target category using the visual, numerical, or index technique. For information concerning these techniques, refer to JP 3-12.2 (SRD).

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

3. Biological Vulnerability

a. Prior to conducting vulnerability analysis, use Figure C-2 (Biological Risk Assessment) to determine the risk of a biological agent attack or the enemy's capability and probability of use. 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 (Table C-1).

NOTE: Remember, even if an enemy lacks the capability to employ biological weapons, the unit is still vulnerable to endemic diseases. Possible sources include contaminated water sources and local food. Commanders need to maintain good hygiene practices. Ensure personnel wash hands frequently, particularly prior to eating, to prevent ingestion of harmful biological material (either indigenous or BW agents found on various surfaces).

b. To determine vulnerability to biological agents, conduct the following actions and analyses:

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

(2) Determine unit's protective posture.

(3) Determine unit’s biological detection posture – do you have early warning systems? Do you have BIDS, Portal Shield, IBADS, LR-BSDS, or Joint Biological Point Detection System (JBPDS)?

Table C-1. Biological Vulnerability Matrix

IMMUNIZATION (AGAINST PREDICTED AGENTS)		PROTECTIVE POSTURE		DETECTION POSTURE		HYGIENE		DISPOSITION	
	RELATIVE VALUE		RELATIVE VALUE		RELATIVE VALUE		RELATIVE VALUE		RELATIVE VALUE
COMPLETE ≥ 90%	2	Shore MOPP3/4	2	BIDS Portal Shield IBADS LR-BSDS JBPDS	2	GOOD	1	MOBILE	1
INCOMPLETE < 90%	4	Shore MOPP1/2 MASK ONLY	4	LESS THAN TWO OF THESE SYSTEMS	4	AVG	2	SEMI-MOBILE	2
NONE	6	MOPP READY/MOPP ZERO	6	NONE	6	POOR	3	STATIC	3

RELATIVE VALUES = SUBJECTIVE RATING	
8 - 9	LOW
10 - 16	MEDIUM
17 - 24	HIGH

Minimum actions resulting from these ratings are described below.

LOW:
- **Maintain current efforts. Attempt to improve on those areas that are weak.**

MEDIUM:
- **Analyze current actions and increase efforts to reduce rating. Concentrate on those areas that you have immediate control over (e.g., MOPP levels & hygiene and possibly detection assets).**

HIGH:
- **Analyze current actions and immediately increase efforts to reduce rating. Concentrate on those areas that you have immediate control over (e.g., MOPP levels and hygiene).**
- **Determine whether you have operational control (OPCON) of detection assets. If not, determine where these assets are and if you are inside the detection "umbrella" or if these assets can be repositioned to cover your operation.**
- **Determine if immunization rates are satisfactory for the total force. Typically, contract workers from whatever source will 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.**

If "mask only" protective posture provides required protection for predicted agent, use a value of 2.

EXAMPLE BIOLOGICAL VULNERABILITY ANALYSIS

1. **Begin at the left column and add the relative values from each column.**
   - Approximately 30% of unit has been immunized.
   - Unit is currently in MOPP ZERO.
   - Unit has a BIDS attached.
   - Unit practices good hygienic measures.
   - Unit is in a static fixed site.

2. **Adding the values shows a –**

   4 for Immunization
   6 for MOPP level
   4 for Detection posture
   1 for Hygiene
   3 for Disposition
   TOTAL = 18 = High Vulnerability

NOTE:
Read the vulnerability rating at the bottom of the chart. Using techniques with lower values reduces the overall vulnerability.

(a) Point detectors such as the BIDS or IBADS will determine if a biological attack has occurred, provide information on the BW agent, and provide a sample for confirmatory purposes. A biological detector generally consists of a trigger, collector, detector, and identifier. The trigger will monitor the background, determine if significant changes occur in the ambient background, and initiate the collection and detection/ identification process. It is important to note that due to the state of technology and the nature of the background, triggers may react to the background changes that are not due to a BW attack. This is normal and generally protection actions should not be taken upon trigger events alone. The detector, if present, will determine if the aerosol is biological or nonbiological (i.e. smoke, dust). The identifier specifically identifies the BW agent and allows the commander to initiate force protection and contamination avoidance measures.

(b) Other point detectors such as Portal Shield also provide point detection and alarm of a BW attack through the use of multiple networked sensors. Unlike other biological detection systems, it uses networking and smart logic to reduce false alarms due to man-made events and certain natural aerosols. Generally, the system triggers when a predetermined threshold concentration is reached. This activity is communicated to the command post. Agent identification occurs within 15 minutes, and alarms are transmitted to the command post. A sample for confirmatory analysis is also automatically stored in the system and can be delivered to the supporting medical unit for analysis.

(4) Determine unit's hygienic practices. For example, are troops provided a means to bathe/cleanse regularly?

(5) Determine current or projected maneuver (or mobility) disposition.

(6) Consider time of day and weather conditions. The time most conducive for a BW attack is during a clear night or during early morning hours with light winds (less than 10 knots or 12 miles per hour).

c. Vulnerability ratings are subjective. Apply rating measures in relationship to probable agent of choice. Also, ratings do not consider troop motivation/morale factors. The final rating provides a general vulnerability analysis and should be used as a basis for a thought process leading to sound recommendations on vulnerability reduction measures. This analysis provides a basis to advise on vulnerability and the reasoning used and, more importantly, provide vulnerability reduction measures.

4. Chemical Vulnerability

a. Prior to conducting a vulnerability analysis, first determine the risk of a chemical attack or the threat's capability and probability of use (see Figure C-3). If the possibility exists for the threat to employ chemical agents, conduct a vulnerability analysis in two parts: first, make an estimate of the threat's capability to employ chemical munitions in the unit's AO/area of interest (see Figure C-3) within a specific time period; second, use this information to generate simplified effects information.

b. **Estimate Delivery Capability.**

(1) *Step 1.* **Determine 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 their protective gear (as in "MOPP READY" protective posture) 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. The time period of interest can range from 6 hours to 48 hours.

Vulnerability analysis is generally conducted in support of the planning process, **not** in support of current operations. Some planning factors are based on a 12-hour to 48-hour cycle. Fixed site operations may be based on a significantly higher time frame (i.e., 12 hours to 96 hours) with time periods of 24 hours or greater used when 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 weather data with each time period.** Associate each time period with a temperature (ambient or ground), wind speed, and stability category. The M93 NBC 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): 55°, 50°, 40°, 30°, 20°, 10°, 0°, -10°, -20°, or -30°. Determine temperature by taking the <u>average</u> of the temperatures from each chemical downwind message (CDM) line applicable to the time period of interest. Use this average temperature for all calculations.

NOTE: All required information can be obtained from the CDM.

NOTE: When estimating 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.

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 (kmph). As a rule of thumb, for any wind speed above 18 kmph, use 18 kmph. Calculate wind speed in the same manner used above 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 (unstable conditions), you will probably elect to disregard those figures and develop a separate (lower) average for casualty estimation. The staff estimates 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.

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. When the atmosphere stability category is either neutral or unstable, the agent's concentration near the ground is lower. Inversions occur at night with clear skies and light winds. Determine the stability category in the same way as temperature and wind speed.

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 delivery capability.** Estimate the number of chemical munitions likely to be employed in your 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 your AO.

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 when, where, and what type of agent the enemy might use in the AO. If the situation or event template does not yield the needed information, assume the enemy can optimize the agent mix. For example, to determine the threat's capability to create a contamination obstacle, assume they will fire only persistent agents. Likewise, to predict casualty effects, assume the enemy will fire agents that have the greatest casualty-producing effects.

When the primary threat is covert or unconventional, express enemy delivery capability in terms of agent weight or as agent weight times some expected delivery means. For example, 10 kilograms of nerve agent delivered by an agricultural sprayer. If estimates indicate 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.

The intelligence officer considers a number of factors in making his estimate:

- Number of employment assets within range of the AO.

- Other AOs 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.

- Impact of threat attacks on civilians.

The intelligence estimate should provide a range of numbers based on 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.

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/staff, which can be later refined. Continuously assess the situation and look for events and options with the potential of changing the outcome of the battle.

c. **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. Effect information will provide casualty effects and downwind agent effects.

(1) **Determine Casualty Estimate**.

(a) *Step 1.* Determine probable friendly target size. Based on the chemical staff's and S2/G2 IPB, select an area/activity the enemy would probably target then determine the target size. For example, determine the area occupied by a fixed site activity, in this case 400 meters (m) x 600 m. Calculate the number of hectares (ha) in the selected target area. One ha is 10,000 square meters; therefore, an area that is 400 m x 600 m = 240,000 square meters or 24 ha.

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

(c) *Step 3.* Estimate casualties based on—

- Intelligence preparation of the battle space.

- The number of rounds the threat may use to engage the specific target.

- Predicted temperatures (from CDM or other sources).

- Tables C-2, C-3, and C-4 for corresponding casualty percentages.

NOTE: For Tables C-2, C-3, and C-4, if the number of rounds falls between given numbers, assume worst case by rounding up to the next higher number.

The casualty estimates are valid for wind speeds less than 20 kmph. Other factors such as air stability category, humidity, variation in wind speeds under 20 kmph, 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 degrees C, and the weapon is 152 mm gun/howitzer. Intelligence analysis estimates the enemy will fire 240 rounds at the target (240 rounds divided by 24 ha is 10 rounds per ha). Go to Table C-2 and extract approximate casualty percentage (50 percent). To determine blister agent casualties, use the same procedures and Table C-4; however, use MOPP level rather than temperature.

Table C-2. GB Casualties.

Munitions in Rounds per ha (100 m^2)			Temperature (degrees Celsius)			
MLRS	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
Based on 15 liter/minute breathing rate (rest or light work) and 9-second masking time.						

Table C-3. Thickened Soman (TGD) or VX Casualties.

Munitions in Rounds				Temperature (degrees Celsius)			
Missiles per 1000 ha	Missiles per 150 ha	Bombs per 1000 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
Based on MOPP ZERO. At higher levels, agents are not as effective due to the increased skin protection.							

Table C-4. Blister Agent Casualties.

Munitions in Rounds per ha (100 m^2)		Protective Posture	
		MOPP ZER0	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 Downwind Hazard.** Associated risks from downwind hazards (see STANAG 2103 [ATP-45 (A)/FM 3-3/Fleet Marine Force Manual 11-17] or appropriate service publication for downwind prediction models) can be broken into three categories.

(a) High casualty risk occurs at winds speeds of 10 kmph or less during slightly stable, stable, or extremely stable atmospheric conditions. Agent clouds will produce very narrow and very long hazard clouds. Dosages of 100 times the lethal levels are possible in the hazard area.

(b) High degradation risk occurs during stability categories of neutral to very unstable and wind speeds less than 10 kmph. Agent clouds will produce wide hazard areas with lethal effects rarely extending as far as 10 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.

(c) Low casualty risk occurs at wind speeds of 10 kmph 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 duration will be short and will not extend as far as in previous categories.

5. Vulnerability Assessment Tool (VAT) Example

a. The VAT is designed to help commanders determine the best mix of defensive capabilities and strategies to employ against a predetermined CB threat. The VAT will help predict likely sortie and casualty levels in a variety of scenarios, thereby assisting in the development of plans to limit mission degradation. The VAT is part of AFMAN 32-4017, *Civil Engineer Readiness Technician' Manual for NBC Defense, and* AFMAN 32-4019*, Chemical-Biological Commanders Guide*.

b. The operability estimates given in the VAT are based on a detailed simulation and analysis of air base operations in a CB environment, addressing two theaters of operation, two types of air bases (large and small), and two times of year (summer and winter). The measures of effectiveness apply to a 1-week period of time and express the number of sorties generated (as a percentage of the tasking) and the number of CB-induced casualties (as a percentage of the base population).

c. The analysis considers a host of relevant variables. These variables can be divided into three main categories: the representation of air base operations, the representation of the CB environment, and the representation of the CB defensive capability. In Table C-5, the baseline depicts small base operations. There are several threat profiles (chemical only, biological only, and combination). The basic defensive components describe the population's use of collective protection, BDO versus JSLIST, cooling systems, and operational decontamination. The "dewarn" variable represents the expected time period the population will be in MOPP 4, mask only, etc. Consequently, on line 39 the VAT shows an expected sortie production rate of 79 percent and a chemical casualty rate of 7 percent if chemical missile attacks occurred over the course of the week; the population had collective protection; the BDO was used; cooling systems were not

available; individuals remained in MOPP 4 for 1 hour and then went to a mask-only configuration after each attack; and operational decontamination was not performed.

Table C-5. Vulnerability Assessment Tool (Example)

AO---SMALL BASE---SUMMER															
Defensive Components						CW Only		BW Only (Covert +TBM)		BW Only (Covert Only)		CW + BW (Covert +TBM)		CW + BW (Covert Only)	
#	ColPro	IPE Type	Cooling	Dewarn	Decon	S	C	S	C	S	C	S	C	S	C
31	Y	B	N	9	N	42	0	75	8	86	4	37	7	36	5
32	Y	B	N	8	N	48	2	79	8	86	4	41	8	41	6
33	Y	B	N	8	Y	47	1	75	8	86	4	41	7	41	5
34	Y	B	N	7	N	47	10	75	9	86	4	30	32	41	19
35	Y	B	N	6	N	65	5	81	8	86	4	54	11	59	8
36	Y	B	N	6	Y	65	2	80	8	86	4	57	8	59	6
37	Y	B	N	5	N	63	13	82	8	86	4	39	34	55	19
38	Y	B	N	4	N	65	28	84	9	86	4	36	48	50	34
39	**Y**	**B**	**N**	**3**	**N**	**79**	**7**	**83**	**8**	**86**	**4**	**69**	**12**	**70**	**8**

Appendix D

FIXED SITE NBC DEFENSE PLANNING TOOLS

This appendix supports the discussion in Chapter III by further focusing NBC defense considerations on fixed site operations. The format used is the standard OPORD format with a brief statement as to the type of information that might be addressed. Because of the multiple tenant activities normally found on a base or within a base cluster, it is important that all tenants operate in concert and respond to NBC situations in a like manner. Organizing the entire base NBC defense under one plan will help preclude some tenants being protected and others "not getting the word."

The following sections, Mission Templates (Section 1), Fixed Site NBC Defense Planning (Section 2), and Fixed Site NBC Recon/Surveillance/Monitoring (Section 3) are designed to stimulate thought as to the type of information to be included. The sections are not intended to exclude the application of specific mission considerations not addressed in this text.

1. Mission Templates

NOTE: Once templates are filled out, they may contain classified data and must be safeguarded accordingly.

a. Mission templates provide a "road map" for planning, preparing, and successfully executing operations. The NBC defense staff can use doctrinal templates and checklists to plan NBC defense operations; to employ NBC reconnaissance, CB detection, and decontamination assets; and to conduct battle management. This section provides tools for developing OPORDs and employing NBC defense assets. Each template provides the process for planning, preparing, and executing the chemical support mission from the staff's perspective. The boxes on the templates serve as memory aids and most tasks are self-explanatory.

The staff templates chemical missions that support the following operating systems:

- Reconnaissance, surveillance, and intelligence. NBC reconnaissance and biological detection support commander's critical information requirements (CCIR) collection efforts.

- Mobility and survivability. Avoidance, protection, and decontamination measures directly support mobility and survivability efforts along with friendly smoke/CCD operations.

- Command and control. Tracking and controlling the disposition of NBC defense assets provides options for flexible NBC defense execution.

- Combat service support. Providing NBC protection, sustained C^2, and sustained combat support requires attention to details of mission resources. Limited resources equal limited flexibility.

b. The following pages provide base cluster/base commanders and staffs guidance and mission templates for NBC defense operations, NBC reconnaissance, biological detection, and decontamination operations.

2. NBC IPB Template

a. The NBC IPB template (Figure D-1) is used to evaluate the enemy's ability to employ NBC weapons against fixed site operations and to delineate the assets required to mitigate NBC effects. This template is used to summarize what is known and not known about the enemy's NBC capabilities and to determine information required. With this information, the staff can perform an NBC vulnerability assessment evaluating the impact of an NBC attack on the base mission, site operations (some operations will be more vulnerable to degradation than others), and individual mission performance factors. Finally, the template provides a quick reference to the status of units attacked or in the downwind hazard area of an NBC attack. Units are only posted to this status matrix when they are at risk. When no longer at risk, they may be deleted from the matrix.

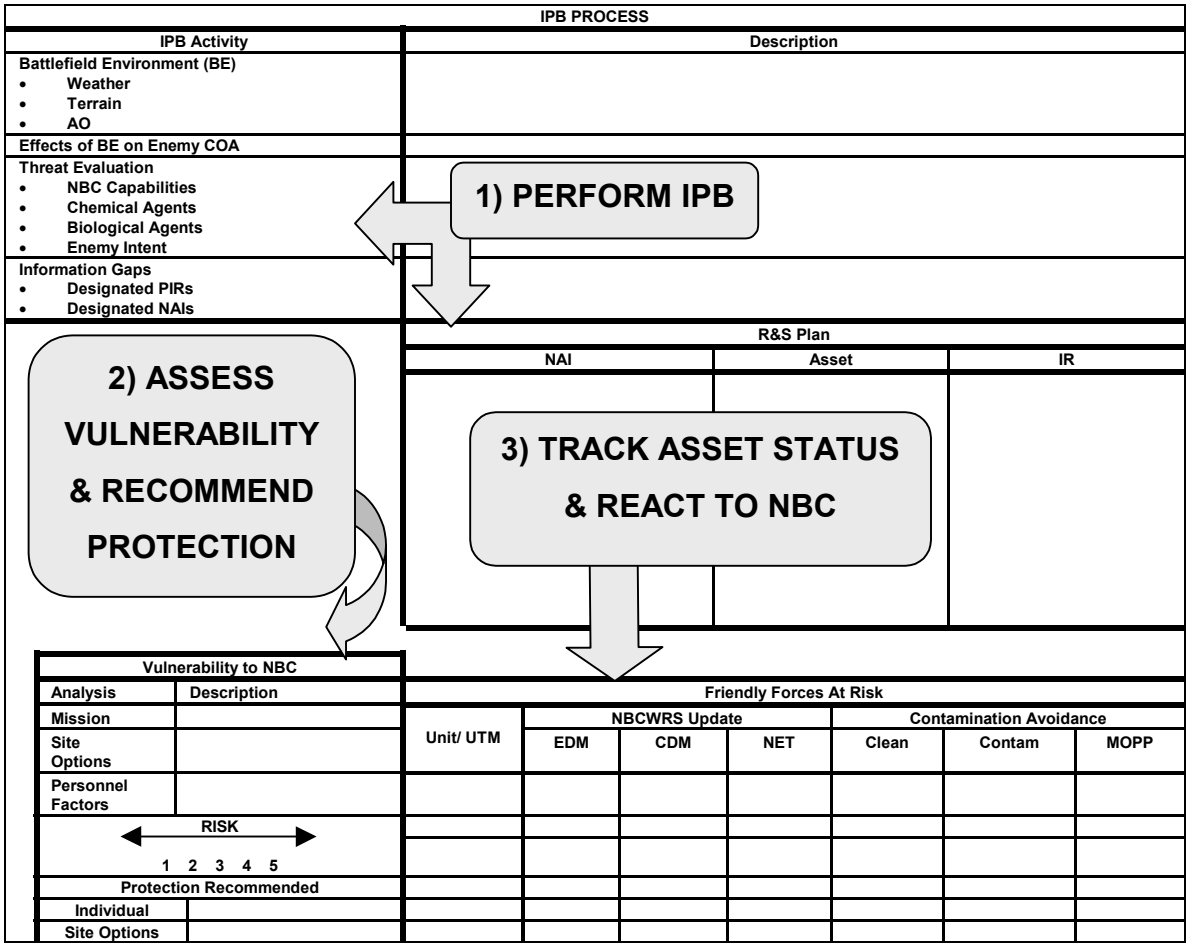

Figure D-1. NBC IPB Template Instructions

b. Figure D-2 provides a blank NBC IPB template that may be enlarged and reproduced for planning purposes.

IPB PROCESS

IPB Activity	Description
Battlefield Environment (BE) • Weather • Terrain • AO	
Effects of BE on Enemy COA	
Threat Evaluation • NBC Capabilities • Chemical Agents • Biological Agents • Enemy Intent	
Information Gaps • Designated PIRs • Designated NAIs	

Additional IPB/Threat Data

R&S Plan

NAI	Asset	IR

Vulnerability to NBC

Analysis	Description
Mission	
Site Options	
Personnel Factors	
RISK 1 2 3 4 5	
Protection Recommended	
Individual	
Site Options	

Friendly Forces At Risk

Unit/UTM	NBCWRS Update			Contamination Avoidance		
	EDM	CDM	NET	Clean	Contamination	MOPP

Figure D-2. NBC IPB Template

3. Site Survey NBC Defense Checklist

Table D-1 provides an example checklist to assist staffs and personnel assigned to conduct site surveys that integrate NBC defense considerations.

Table D-1. Site Survey NBC Defense Checklist (Example)

1. Determine the threat.

- ☐ What is the actual threat at the location as agreed upon by the NBC personnel, security forces, and intelligence? Use all available documents and specific discussions with intelligence personnel during this evaluation.

- ☐ What is the likelihood of enemy use of—
  - ☐ Specific NBC agents?
  - ☐ Conventional weapons, terrorism, and special forces operations?

- ☐ If NBC weapons are likely to be used—
  - ☐ How are the agents likely to be delivered?
  - ☐ How many weapon systems will probably be used in any given attack?
  - ☐ What are the range, payload, accuracy, and likely burst characteristics (air, ground) of the weapon system(s)?
  - ☐ What specific agents are likely to be used?
  - ☐ In what physical form (liquid, dusty, aerosol) will the agents probably be disseminated?

- ☐ When is the enemy likely to employ NBC weapons (early on, nighttime, etc.)?

- ☐ What contamination levels (g/m^2, mg/m^3, $spores/m^3$, etc.) will probably exist at your location after an attack?

- ☐ What is the purity of the enemy's agents?

- ☐ Is there a shelf life associated with the enemy's agent production (i.e., the agent(s) must be used within 6 months of production in order to be effective)?

- ☐ Are the characteristics of the enemy's agent the same as an American-made agent (i.e., does the enemy's VX have the same volatility rate, color change on M8 paper, etc.)?

- ☐ In terms of conventional weapons, what are the probable weapons delivery systems (i.e., mortars, rockets, surface-to-surface missiles, and man-portable surface-to-air missiles)?

- ☐ What is the "hazard ring" associated with critical operating locations of the installation (to include typical aircraft takeoff and landing patterns)? This "ring" provides insight into the amount of area around the installation that must be secured from ground forces—the installation's perimeter fence has no tactical significance. Develop the hazard ring by drawing a line equaling threat weapon system ranges from the critical airfield operating locations. In most cases, the "ring" will actually take the shape of a large dog bone.

- ☐ If a realistic threat, what are the range and accuracy of enemy sniper activities?

2. Determine communication requirements.

- ☐ What communications capabilities currently exist at the location?

- ☐ Is there an installation-wide warning system?

- ☐ Does a public announcement system exist and what are the areas of coverage?

- ☐ Are there tapes for the public announcement system in all applicable languages?

- ☐ Does the warning system have the capability to broadcast the siren sequences the base populace is used to hearing?

Table D-1. Site Survey NBC Defense Checklist (Example) (Continued)

- ❑ Is the system set up so that a power loss or another problem in one sector does not adversely affect other sectors?
- ❑ Are there any known communications chokepoints (i.e., a single cable or switchboard that holds the wiring for the majority of installation communication lines)?
- ❑ If appropriate, what communications lines will be used to pass or receive hazard information from local civil defense, air defense, or security notification systems?
- ❑ Are GPSs coded?

3. Determine facility requirements.

- ❑ Are facilities available to house base C^2 functions?
- ❑ Do these facilities provide semihardened and/or filtration capabilities?
- ❑ If so, how will deploying personnel learn how to operate the system(s)?
- ❑ If so, are the filters operational and how many spares exist?
- ❑ Do these facilities have an emergency escape capability?
- ❑ Are adequate storage facilities available for base civil engineer equipment, CCA supplies, bulk stored chemical warfare defense ensemble, and CCD materials?
- ❑ Are sufficient facilities available to beddown deploying forces? If not, does the installation terrain allow the rapid establishment of tent compounds (i.e., not swamp land)?
- ❑ Have facilities been identified for use by NBC defense personnel?
- ❑ Do sufficient personnel protection facilities (buildings, bunkers, etc., with splinter protection and overhead cover) exist in the main work and rest and relief areas?
- ❑ Do sufficient collective protection facilities exist for the entire base populace? If not, has available collective protection space been allocated on a prioritized basis (i.e., direct sortie generators before support personnel)?

4. Determine utility requirements.

- ❑ What power sources (110/220 VAC, etc.) are available at the deployed location?
- ❑ Which facilities have serviceable, fixed generator systems as their source of backup power?
- ❑ Are appropriate unit personnel trained in generator maintenance, start-up, and refueling requirements?
- ❑ Does every section of the installation have adequate commercial power?
- ❑ Are there main switches for turning on/off the utilities within each grid (quadrant) of the base?
- ❑ Is the source of electrical power contained within the base perimeter or does it originate from an external location power station (for example, three miles away)?

Table D-1. Site Survey NBC Defense Checklist (Example) (Continued)

- ❑ Which facilities have emergency lights?
- ❑ Do adequate water supplies exist for drinking?
- ❑ If not, will the deployed water purification capability support operations?
- ❑ Do adequate water supplies exist for contamination control and firefighting activities?
- ❑ Are water hydrants readily available and functional? If so, do our forces possess the tool(s) to use them?
- ❑ Is the available water for contamination control operations primarily salt water?
- ❑ Does a sufficient water-heating capability exist to support food preparation and personal cleanliness?
- ❑ What water storage capabilities exist (tanks, flexible bladders, water buffaloes, etc.)?
- ❑ Are sewer lines available and functional?
- ❑ Do NBC defense personnel require additional generators in order to support critical mission operations?

5. Determine air defense requirements.

- ❑ Does the unit have an organic point air defense capability?
- ❑ If not, is there another air defense unit (Army, HN) scheduled to deploy and assigned to protect the installation?
- ❑ Does the air defense unit possess both antiaircraft and antimissile capabilities?
- ❑ In what air and missile defense sector is the installation located?

6. Determine equipment requirements.

- ❑ Is there an NBC equipment repair capability available in the local area (RADIACs, chemical detection, etc.)?
- ❑ Will there be equipment standardization issues with HN or other US military service personnel (filter element swaps, batteries, etc.)?
- ❑ Will there be equipment interoperability issues with HN or other US military service personnel (suit removal, detection instrument units of measurement, etc.)?
- ❑ Are “pre-positioned” assets available? If so, what are they and are they serviceable?
- ❑ What will individuals do with their hand-carried CB IPE?
- ❑ If appropriate, when is bulk-shipped CB IPE scheduled to arrive? What will the unit do with the CB IPE once it arrives?
- ❑ How will CB IPE be issued to hospital and CCA/TFA locations for resupply purposes?
- ❑ How will disposal of contaminated IPE be handled?

Table D-1. Site Survey NBC Defense Checklist (Example)
(Continued)

7. Determine contamination control requirements.

- ❑ What C^2 structure will govern contamination control operations?
- ❑ How many contamination control units will exist and from which units will they be formed?
- ❑ What is the concept of operations (CONOPS) for decontamination (i.e., weathering except when mission-critical or decon everything)?
- ❑ What decontamination equipment is currently available on site?
- ❑ What decontaminants exist at the location (DS2, STB, solid chlorine, etc.)?
- ❑ Where are the decontamination equipment and the decontaminants stored? How do you gain access to them? Are they maintained properly?
- ❑ Do facilities exist for aircraft decontamination (wash racks, spray system, etc.)?
- ❑ Is water available for decontamination and is it salt or fresh water?
- ❑ Are assets available to cover equipment when overhead cover is unavailable?

8. Determine NBC detection requirements.

- ❑ What NBC detection equipment is currently on site?
- ❑ Exactly where are these assets stored?
- ❑ Who has access to these assets and how do you contact them?
- ❑ What NBC detection equipment is projected to deploy to the site?
- ❑ Where are deploying equipment assets coming from?
- ❑ When are equipment packages due to be delivered?
- ❑ Will sufficient NBC detection instruments be present to ensure total mission coverage (i.e., stationary sites, mobile reconnaissance teams, decontamination teams, instruments for CCA and TFA operations, and instruments to place between contaminated and clean areas of the installation)?
- ❑ What type and amounts of NBC detection equipment does the HN possess?
- ❑ What are the HN's NBC detection equipment capabilities and limitations?
- ❑ How does the HN plan to use assigned NBC detection equipment assets?
- ❑ What integration of HN and unit plans must be accomplished in relation to stationary NBC detection equipment utilization to ensure 100 percent coverage?
- ❑ How many decontamination teams does the host have? How many do you have?

Table D-1. Site Survey NBC Defense Checklist (Example)
(Continued)

- ❑ Does each decontamination team possess sufficient NBC detection equipment?
- ❑ How many people will be on each HN's reconnaissance team?
- ❑ What is the HN's CONOPS for reconnaissance teams and does it conflict with your reconnaissance CONOPS?
- ❑ Do HN reconnaissance teams possess the types and amounts of NBC detection equipment (assets) to effectively implement the appropriate CONOPS?
- ❑ What communications capabilities exist for reconnaissance teams and with whom will they communicate?
- ❑ How will NBC contamination be reported (i.e., positive, negative, or identification of specific agents, category, and concentration level) when known?
- ❑ How will reconnaissance teams be dispatched (automatic dispatch upon declaration of "alarm black" or only when notified by C^2?
- ❑ What calibration and maintenance support exists for NBC detection equipment?
- ❑ Are sufficient quantities of batteries available for NBC detection equipment?

9. Determine NBC cell requirements.

- ❑ Do sufficient quantities of appropriate maps exist for primary and alternate NBC cell operations? Are digitized maps available for automated NBCWRS?
- ❑ Who has primary and alternate responsibility for NBC cell operations and is there a tasking for the exchange of NBC cell personnel?
- ❑ What is the reporting channel for NBC cell reports?
- ❑ What subcollection centers will exist in the surrounding area?
- ❑ Who will provide weather information to the NBCCC and/or NBC cell functions?
- ❑ Does the unit possess information that will enable NBC cell personnel to provide detailed CB plotting and persistency calculations?
- ❑ Does the unit have the proper forms for NBC warning and reporting?

10. Determine other military unit requirements.

- ❑ Which units are presently assigned or scheduled to be deployed within your AO?
- ❑ Do these units have NBC specialists assigned? If so, how many?
- ❑ What are or will be these units' NBC roles and missions in the area?

Table D-1. Site Survey NBC Defense Checklist (Example)
(Continued)

- ❑ Do any of the units have a capability you can use but do not possess (such as biological detection through the BIDS system, enhanced chemical detection through the use of the FOX, etc.)?
- ❑ Do the units possess sufficient personnel and equipment to fulfill their mission requirements in relation to how they directly impact your unit's operations?

11. Determine CCA/TFA requirements.

- ❑ If sufficient collective protection facilities do not exist, are unit procedures set up to utilize an on-base CCA/TFA complex if possible before venturing off base?
- ❑ What are the likely drawbacks to off-base CCA/TFA operations at the employment location?
- ❑ At least for planning purposes, are suitable CCA/TFA locations in the surrounding area preidentified, surveyed, and available at each major compass direction?
- ❑ What installation facilities possess CB filtration systems? How many personnel can be supported by these collective protection systems?
- ❑ Are there areas within the confines of the installation perimeter that could serve as an on-base CCA/TFA?
- ❑ If yes, are these areas already spoken for?
- ❑ If yes, will logistical, communications, and transportation problems be insurmountable?
- ❑ Do these sites have land line communications available?
- ❑ Do these sites have multiple access routes?
- ❑ Can security of the proposed TFA sites be reasonably assured to include security for routes to and from TFA?
- ❑ Are required signs and equipment available for installation CCA/TFA operations?
- ❑ How will required equipment, to include replacement CB IPE, be transported to the CCA/TFA once the site is selected and/or activated?
- ❑ How will personnel be transported to the TFA? What are the security provisions for off-base CCAs?
- ❑ Who will provide food, water, and other critical supplies to the CCA/TFA sites?
- ❑ Where will the people required for installation CCA/TFA operations originate from? How and when will they be trained? Will they be permanently assigned or simply report at a specified time?
- ❑ Has the unit considered the requirement for CB IPE aeration and contaminated waste disposal sites as part of its CCA/TFA planning activities?
- ❑ Does the HN use warning signals that are contradictory to ours (for example, yellow means attack is imminent)?

Table D-1. Site Survey NBC Defense Checklist (Example) (Continued)

- ❑ Does the HN or main operating base possess warning signals that the deploying forces are not used to practicing with (for example, a special alarm for attacking ground forces, "alarm blue" versus "alarm red" {Korea}, and "alarm green" {Korea})?

12. Determine biological detection requirements.

- ❑ Are detectors employed in sufficient number for threat conditions?
- ❑ Is a laboratory available for analysis of samples?
- ❑ Are procedures in place for evacuation of suspect BW samples (i.e., escort personnel, chain of custody, evacuation to CONUS)?
- ❑ Are CLS assets integrated into the support plan?
- ❑ Are detectors employed as an array and not as single systems?
- ❑ Are detectors conducting monitoring when BW attack conditions are favorable?
- ❑ Are procedures in place to notify supporting biodetection resources to increase their readiness level?
- ❑ Are background monitoring regimens established?
- ❑ Are key biological defense decision points integrated into the CONOPS, (i.e., masking, pretreatment)?

4. Beddown Priorities Checklist

Table D-2 is a recommended priority list for NBC beddown operations. The NBC defense planner implements these actions and determines the actual priorities based upon guidance from the commander.

Table D-2. Recommended NBC Defense Site Setup (Beddown) Priorities Checklist

1. Develop warning and notification systems.
- ❑ Attack warning and notification.
- ❑ Aircraft and tactical ballistic missile.
- ❑ Conventional and NBC weapons.

2. Develop attack response plans and checklists.
- ❑ Preattack actions.
- ❑ Dispersal and sheltering of assets.
- ❑ Preparation for NBC contamination detection, protection, avoidance, and control.
- ❑ Actions during the attack.
- ❑ Activation of warning and notification.
- ❑ Sheltering personnel and equipment.
- ❑ Postattack actions.
- ❑ Reconnaissance operations.
- ❑ Repair, recovery, and contamination control operations.

Table D-2. Recommended NBC Defense Site Setup (Beddown) Priorities Checklist (Continued)

3. Recommend dispersal and shelter strategies for vital assets.
- ❑ Weapons systems.
- ❑ Base C^2 centers.
- ❑ C^4I systems.
- ❑ Critical maintenance facilities.
- ❑ Collective protection facilities/areas.
- ❑ Critical petroleum, oil, lubricants (POL) storage and distribution assets.
- ❑ Munitions storage, assembly, and loading assets.
- ❑ Critical utility generation and distribution systems.
- ❑ Critical supply storage.
- ❑ Fire/crash facilities and assets.

4. Implement sheltering or relocation of nonvital assets.
- ❑ Medical facilities.
- ❑ Noncritical maintenance facilities.
- ❑ Noncritical POL facilities.
- ❑ Noncritical utility generation and distribution systems.
- ❑ Noncritical supply storage.
- ❑ Dining facilities.
- ❑ Living areas.
- ❑ Other facilities and assets.

5. Request mutual support MOAs/MOUs with HN and allies.

6. Familiarize NBC specialists with their assigned duties
- ❑ NBCCC.
- ❑ NBC reconnaissance.
- ❑ Decontamination teams.
- ❑ Open air CCTs.
- ❑ Personnel protective SMTs.

7. Establish NBC plotting/reporting system.
- ❑ NBCCC.
- ❑ NBC reconnaissance.

5. NBC Reconnaissance Template

a. The NBC Reconnaissance Template (Figure D-3) is used to summarize the reconnaissance missions and organizations charged with hazard detection and monitoring on a base, site, or base area of interest. The mission box lists missions assigned by the base commander for conducting NBC reconnaissance. These assignments can be NBCRS missions or survey and monitoring missions assigned to sector commanders or base tenant activities. More specific base/base cluster NBC reconnaissance missions may include medical treatment personnel collecting specimens from suspect NBC patients for analysis, preventive medicine surveillance of drinking water sources and supplies, and veterinary services surveillance of potential food supplies and government-owned animals. The C^2 box highlights the relationships between the NBC reconnaissance, surveillance, and survey teams; their locations; and the named area of interest (NAI) they will operate in or against. The communications box provides contact information and the sustainment box lists

critical items required to perform reconnaissance operations. The site commander and staff should study the NBC IPB and the NBC Reconnaissance Templates to ensure areas potentially targeted by the enemy are covered in the base reconnaissance/collection plan.

NBC Reconnaissance Template

MISSION

Commander's Intent

1) RESTATE MSN & CONDUCT IPB

Mission/Phase

2) ID NAI AND TAI

3) ID SCHEME OF MANEUVER

4) FINALIZE R&S PLAN

5) SPECIFY SUSTAINMENT PLAN & ISSUE ORDERS

Communications

NET	Call Signs & Freqs	Periods of Radio Listening Silence

6) MONITOR EXECUTION

Reports

COMMAND & CONTROL

Command and Support Relationships

OPCON	ATTACHED	DS	GS	TACON

Grid Coordinates:

NAIs:

Sustainment

Water _____ MOPP Gear _____

Fuel _____ CAM Batteries _____

Markers _____

Medical Support _____

Other: _____

Decontamination Priorities:

Figure D-3. NBC Reconnaissance Template Instructions

b. Figure D-4 provides a blank template for planning purposes.

NBC Reconnaissance Template

MISSION	COMMAND & CONTROL				
Commander's Intent	Command and Support Relationships				
	OPCON	ATTACHED	DS	GS	TACON
Mission/Phase					

Grid Coordinates:

_____
_____
_____

NAIs:

_____
_____
_____
_____
_____

Sustainment

Water _____ MOPP Gear _____
Fuel _____ CAM Batteries _____
Markers _____
Medical Support _____
_____

Other: _____
_____
_____
_____

Decontamination Priorities:
_____
_____
_____
_____
_____
_____
_____
_____
_____

Communications

NET	Call Signs & Freqs	Periods of Radio Listening Silence

Reports

Figure D-4. NBC Reconnaissance Template

6. Biodetection Template

a. Biological surveillance is the systematic observation of the JOA for biological hazards. This includes surveillance by available biological detectors, human intelligence, signals intelligence, LB teams, veterinary and preventive medicine inspections, and medical laboratory analyses. The Biodetection Template (Figure D-5) is very similar to the

Reconnaissance Template except the mission block refers to the corps commander's mission for biodetection operations rather than the base commander's intent and mission phases. Additionally, the NAI and UTM grid coordinates are generally assigned by the corps and coordinated with the base commander. Unique sustainment items such as BW detector tickets and BIDS/LR-BSDS components are provided through the biological detection company. Units conducting base logistics support operations may be tasked with providing common supplies and maintenance activities.

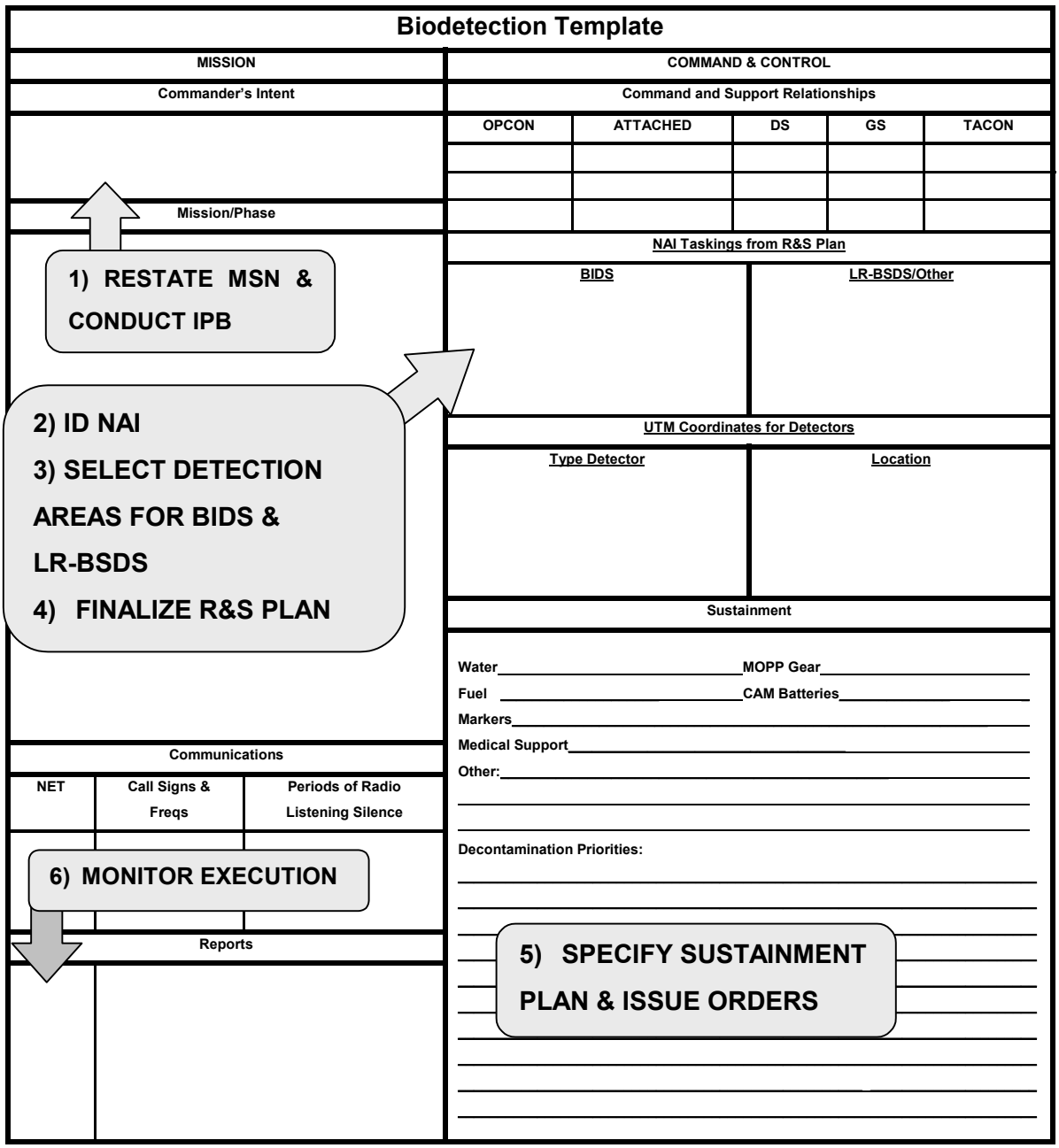

Figure D-5. Biodetection Template Instructions

b. Figure D-6 provides a blank template for planning purposes.

Biodetection Template

MISSION	COMMAND & CONTROL				
Commander's Intent	Command and Support Relationships				
	OPCON	ATTACHED	DS	GS	TACON
Mission/Phase					
	NAI Taskings from R&S Plan				
	BIDS		LR-BSDS/Other		
	UTM Coordinates for Detectors				
	Type Detector		Location		
	Sustainment				
	Water_____ MOPP Gear_____				
	Fuel _____ CAM Batteries_____				
	Markers_____				
	Medical Support_____				
Communications	Other:_____				
NET / Call Signs & Freqs / Periods of Radio Listening Silence	Decontamination Priorities:				
Reports					

Figure D-6. Biodetection Template

7. Detection Network Example

One of the advantages of fixed site operations is a comprehensive NBC detection network can be developed that takes into account threat agents, anticipated delivery systems, terrain, and historical weather conditions. Figure D-7 depicts a USAF example NBC detection network using the "Dice 5" pattern, namely detectors are located along the

perimeter and throughout the interior of the fixed site. The "Dice 5" concept is applied both to specific portions of the base and to the base as a whole.

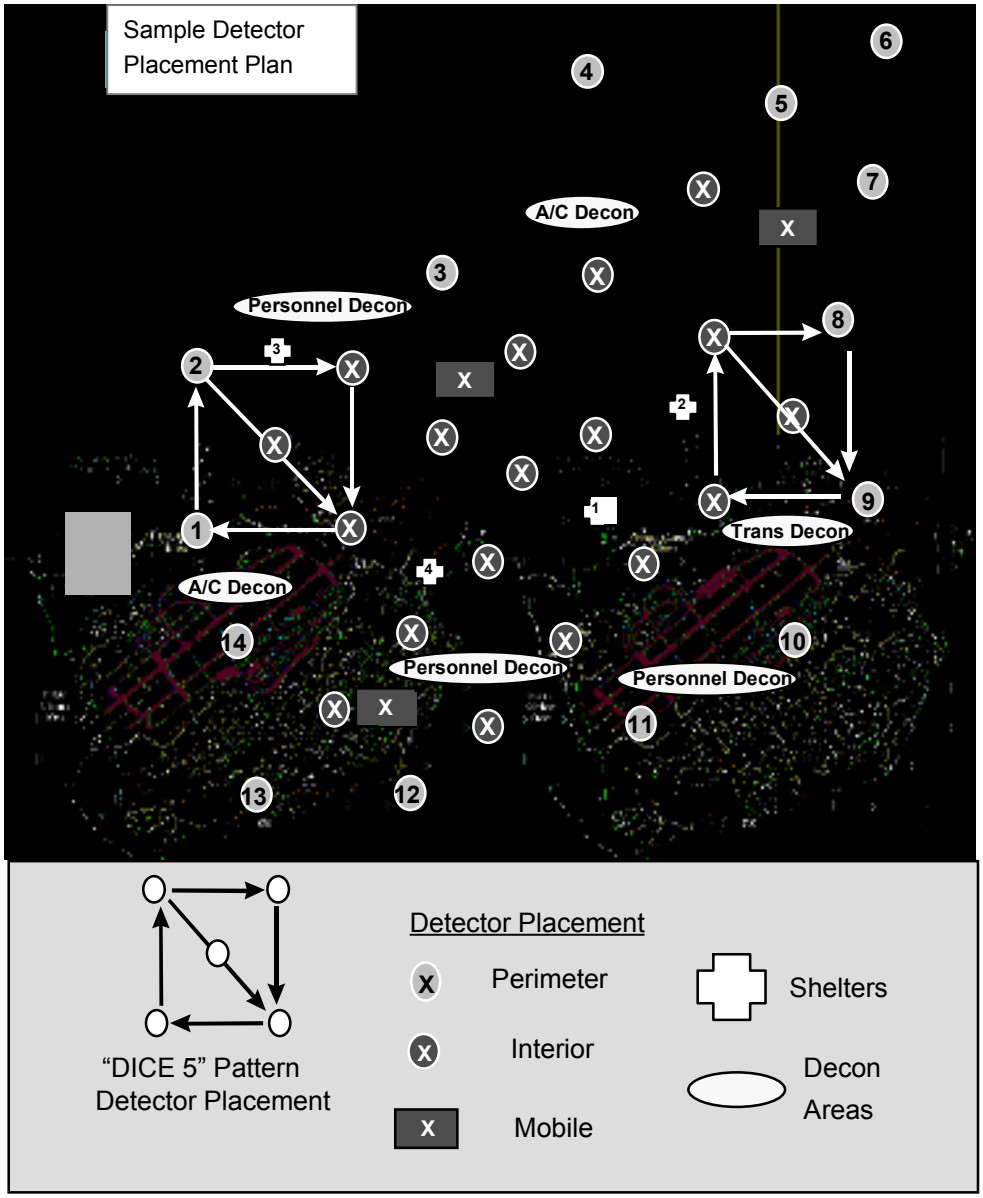

Figure D-7. Detection Network Example

8. Decontamination Template

a. The Decontamination Template (Figure D-8) helps assess decontamination requirements based upon friendly IPB (i.e., how many targets can the enemy attack simultaneously). Agent type and anticipated quantities drive decontamination requirements and are quantified as "required throughput". The C^2 box lists priorities for decontamination based upon the site commander's assessment of critical activities that require an immediate return to normal operations status. Additionally, this box specifies decontamination site locations, link-up points, security requirements, and COA affecting

decontamination operations. Under the sustainment window, special attention is required for site closure procedures. The decontamination site, once used, will remain a hazardous materials site requiring remediation when base priorities permit. This template entry should reflect the tentative plan for closure and remediation as well as confirm notification of the responsible engineer activity.

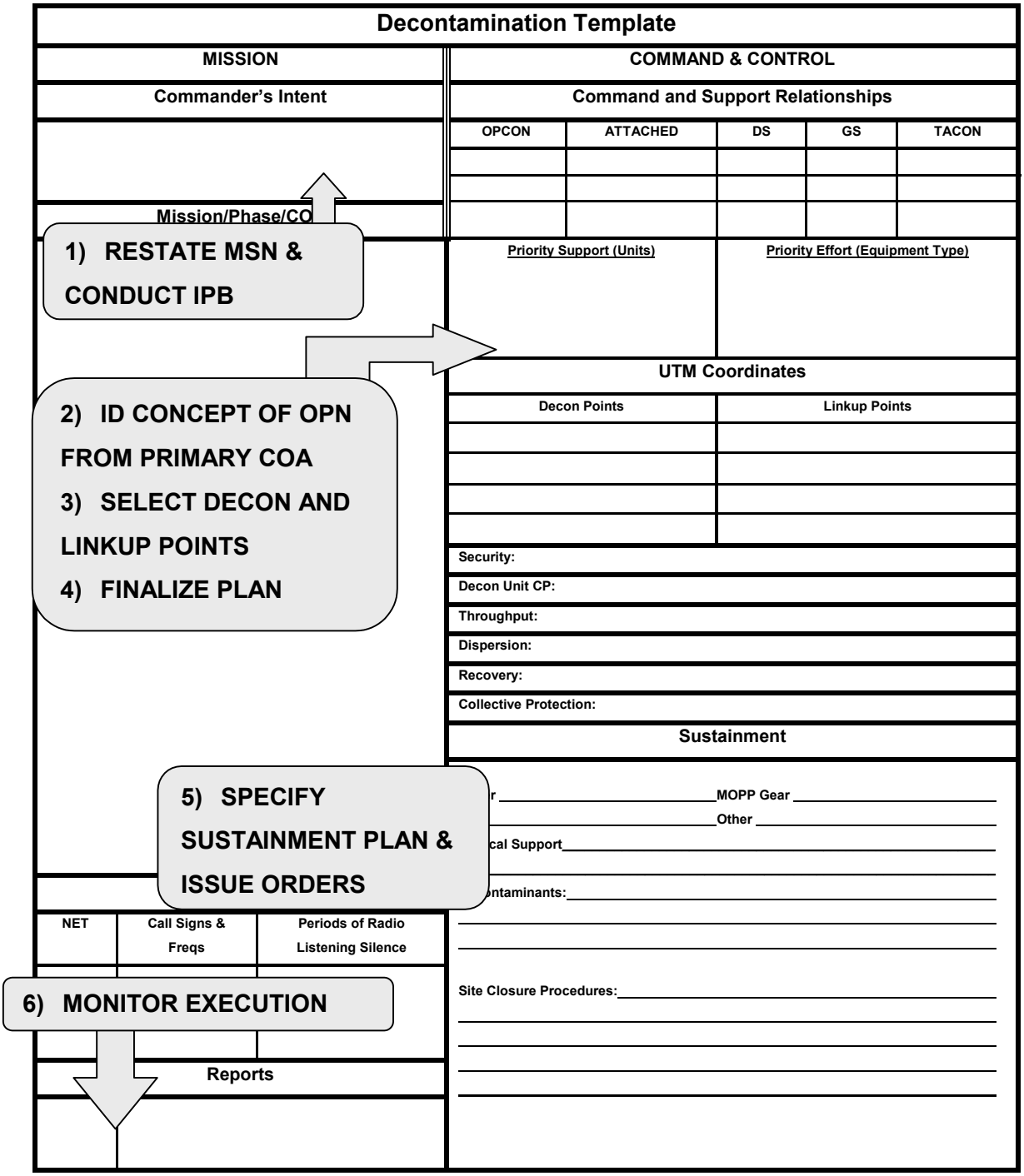

Figure D-8. Decontamination Template Instructions

b. Figure D-9 provides a blank decontamination template for planning purposes.

Decontamination Template

MISSION	COMMAND & CONTROL
Commander's Intent	**Command and Support Relationships**

OPCON	ATTACHED	DS	GS	TACON

Mission/Phase/COA

Priority Support (Units)	Priority Effort (Equipment Type)

UTM Coordinates

Decon Points	Linkup Points

Security:

Decon Unit CP:

Throughput:

Dispersion:

Recovery:

Collective Protection:

Sustainment

Water _____ MOPP Gear _____

Fuel _____ Other _____

Medical Support _____

Decontaminants: _____

Site Closure Procedures: _____

Communications

NET	Call Signs & Freqs	Periods of Radio Listening Silence

Reports

Figure D-9. Decontamination Template

9. Fixed Site NBC Defense Planning

This section focuses on key portions of the military decision-making process requiring extensive input from the operational NBC defense planner to ensure recommended COA include appropriate NBC defense considerations. These NBC defense considerations, framed within the context of mission analysis and COA development, will be comprised of the NBC staff estimate and corresponding NBC defense plan. They include recommendations such as mission support concept for COA, missions risks and vulnerabilities, mitigation measures, task organization for NBC defense, tasks to tenant and transient forces/units, HN and civilian considerations, and asset availability and visibility.

a. **Mission Analysis.** Mission analysis focuses the base commander and staff planning throughout the decision-making process. Table D-3 exemplifies a typical mission analysis process. These steps are not always conducted sequentially and many are continuously or periodically reviewed and reassessed.

NOTE: To properly support the command, NBC defense planners must understand not just the NBC defense mission but the overall fixed site mission and intent.

Since numerous doctrinal references exist for the military decision-making process and planning joint operations, the remaining discussion focuses on the NBC defense aspects of the military decision-making process. Discussion of selected mission analysis steps can be applied to NBC defense, smoke, and NBC recon annex development as well as the basic OPLAN/OPORD.

Table D-3. Mission Analysis (Example)

Mission Analysis Steps	
Step 1	Analyze Higher Headquarters' Order (Mission, Intent, Concept, Time Lines, Adjacent Units' Missions, Assigned AO)
Step 2	Conduct Initial JIPB (Define the Operational Environment, Describe the Battle Space Effects, Evaluate the Adversary, Determine Most Probable/Most Dangerous Adversary COA)
Step 3	Determine Specified, Implied, and Essential Tasks
Step 4	Review Available Assets
Step 5	Determine Constraints
Step 6	Identify Critical Facts/Assumptions
Step 7	Conduct Risk Assessment
Step 8	Determine Initial CCIR
Step 9	Determine the Initial Reconnaissance Plan
Step 10	Plan Use of Available Time
Step 11	Write the Restated Mission
Step 12	Conduct a Mission Analysis Briefing
Step 13	Approve the Restated Mission
Step 14	Develop the Initial Commander's Intent (What the Fixed Site Must Do To Succeed)
Step 15	Issue the Commander's Guidance
Step 16	Issue Warning Order (Restated Mission, Cdr's Intent, AO, CCIR, Risk Guidance, Recon Requirements, Deception Guidance, Specific Priorities, Time Plan, Rehearsal Guidance)
Step17	Review Facts/Assumptions (Periodic Process)

(1) **Higher Mission and Intent** (Step 1). Review the mission and intent for NBC protection guidance and combat/combat support priorities that result in specified or implied NBC defense tasks, such as exposure guidance or support priorities.

(2) **Conduct Initial JIPB** (Step 2). Using the four-step JIPB process discussed in Chapter II, NBC JIPB attempts to identify the enemy's most likely and most dangerous NBC COA (including TIM considerations) as it pertains to the friendly mission.

(3) **Determine Specified, Implied, and Essential Tasks** (Step 3). Review the plan/order for further specified or implied NBC defense tasks. If time is limited, review only the basic plan, the intelligence annex, the NBC annex, the logistics annex, fire support annex, air defense annex, rules of engagement annex, engineer annex, medical annex and, if present, the civil affairs annex. Appendix A, Fixed Site NBC Defense Task List, demonstrates the use of CJCSM 3500.04A to describe specific tasks and their implied and supporting NBC collective tasks. This appendix can also be used to design the commander's NBC defense METL.

(4) **Review Available Assets** (Step 4). Review the available assets (forces, equipment, supplies, HN support) for capabilities to support identified tasks. Immediately identify task organization or equipment/supply capability shortfalls to the appropriate operations or logistics planner. Ensure type unit characteristics file is current for deploying forces.

(5) **Determine Constraints** (Step 5). Shortage of mission-essential assets is an immediate constraint on operational capabilities. Other NBC defense constraints include items such as levels and rates of supply, rates of usage, decon throughput capability, environmental considerations, military and civilian NBC training readiness, and HN NBC support requirements.

(6) **Identify Critical Facts/Assumptions** (Step 6). Facts and assumptions help shape COA development and analysis (see Table D-4). Although many facts available from the higher command's plan/order reduce time requirements, they do not eliminate responsibility for subordinate staff planning and independent JIPB/analysis.

(7) **Conduct Risk Assessment** (Step 7). Using charts similar to those found in Appendix C, the NBC operational planner assesses the NBC risks. NBC vulnerability analysis allows further detailed evaluation of risks and mitigation measures during COA development.

(8) **Determine Initial CCIR** (Step 8). The NBC defense staff offers NBC CCIR for the commander's consideration. CCIR include information for both friendly and threat forces, and they are normally limited to less than 10 questions. Fixed site examples include: "Will the enemy use persistent chemical agents on LOG BASE ALPHA?" and "Will organic decon assets of the theater reserve force be available to support airbase decontamination operations?" Remember, to determine good CCIR: ask only one question; focus on a fact, event, or activity; and provide intelligence required to support a single critical decision.

Table D-4. Factors Affecting NBC Defense Plans

Possible Facts/Assumptions Affecting NBC Defense Plans	
• **Higher Mission/Intent**	• **Command Mission/Intent**
• **NBC Mission/Intent**	• **Enemy NBC Weapons/Agents**
• **Enemy NBC Delivery Capabilities**	• **Enemy NBC Protection Capabilities**
• **Enemy NBC Protective Posture**	• **Enemy NBC Intent**
• **Terrain Considerations**	• **Weather Implications**
• **Task Organization**	• **NBC Defense Capabilities**
• **NBC Defense Training Status**	• **NBC Protection Capabilities**
• **NBC Protective Posture**	• **Unit Dispositions**
• **NBC Resupply Rates**	• **Available Time**
• **Required Time**	• **HN/Civilian Support Requirements**
• **HN/Civilian Capabilities/Limitations**	• **NBC Hardened Medical Facilities**
• **HN/Civilian NBC Equipment and Training Requirements**	

(9) **Determine the Initial Reconnaissance Plan** (Step 9). Determine key events or "triggers" for launching NBC recon or survey teams. Then prioritize use of available NBC recon assets. Based on initial JIPB, identify likely NBC or TIM hazard areas (these areas become NAI). Associate specific units/teams with specific NAI. Subsequently, the intelligence officer will turn this initial plan into a recon and surveillance (R&S) plan with specific mission taskings assigned by the operations officer. Ensure unit taskings match unit capabilities. For example, units without special hazardous materials training and equipment are not good candidates to perform TIM reconnaissance.

(10) **Plan Use of Available Time** (Step 10). "Using available time" goes beyond simple time management and synchronizing assets with execution requirements. Overlay friendly timelines with projected enemy timelines to mitigate or exploit the visible windows of risk or opportunity.

(11) **Conduct a Mission Analysis Briefing** (Steps 11-13). The commander is briefed on the mission analysis products and recommended restated mission. Key input from the NBC defense planner includes discussion of NBC and TIM hazards, their associated risks, and critical mitigation measures.

(12) **Develop the Initial Commander's Intent** (Step 14). During mission analysis, the commander develops his intent. The intent statement includes the conditions for success with respect to the adversary, the terrain, or the desired end state. For example, from a fixed site perspective, intent may require specific OPTEMPO support rates or sortie generation rates; therefore, NBC planning and priorities must support the sustainment of these specified rates.

(13) **Issue the Commander's Guidance** (Step 15). Key aspects of command guidance for the NBC defense planner are CCIR, risk guidance, priorities of support (avoidance, protection, decontamination, recon, and smoke), timelines, and rehearsals.

(14) **Issue a Warning Order** (Steps 16-17). Unless the NBC threat is immediate, NBC guidance in nonchemical unit warning orders is generally restricted to minimum protective posture or time-sensitive requirements such as initiating needed medical immunizations and prophylaxis, preparation of medical treatment facilities to

receive NBC casualties, and/or preparation for decontamination operations. As the staff begins COA development, they conduct a periodic review of facts and assumptions.

b. **Course of Action (COA) Decisions.** Staffs develop, analyze ("wargame"), compare, brief, and recommend a COA for the commander's approval. The NBC defense planner follows the same method when developing a COA for the fixed site NBC defense plan. Each COA must meet the criteria of suitability (to accomplish the mission and meet the commander's guidance), feasibility (to accomplish the mission in terms of available resources), acceptability (advantages gained justify the costs), distinguishability (each COA significantly different from others), and completeness (answers who, what, where, when, how, and why).

Before the staff conducts the COA decision brief, the NBC defense planner critiques each COA included in the briefing. This critique addresses the ability of NBC defense assets to support each COA (see Figure D-10). In addition to mission support, use the NBC defense principles (avoidance, protection, and decontamination) to assess how well each COA supports the fixed site NBC defense goals: NBC protection, sustained C^2, and sustained combat support.

As the primary staff analyzes relative combat power and support capabilities, generates options, and arrays forces, the NBC staff officer analyzes each COA based on current JIPB, risks, and vulnerability assessments (see Appendix C for more detailed instructions). This approach produces threat-based NBC defense requirements and recommends assignments to specific units/assets within the available force structure. Unsupported requirements or unacceptable risks become disadvantages for later comparison to other COAs. Unsupported mission support requirements are forwarded to higher headquarters.

The end result is an NBC defense strategy (NBC defense estimate) for each viable COA. Therefore, when the commander approves a COA, the basic NBC defense support plan is completed with minimum delay.

c. **NBC Staff Estimate.** The NBC staff estimate includes NBC defense recommendations for each COA and the approach used to prepare COA recommendations. The estimate follows this basic outline with emphasis on unique NBC defense considerations of each item:

(1) Mission.

(2) Situation and considerations.

(a) Characteristics of the AO (weather, terrain, other such as TIM).

(b) Enemy forces (NBC capabilities, NBC intent, NBC COA).

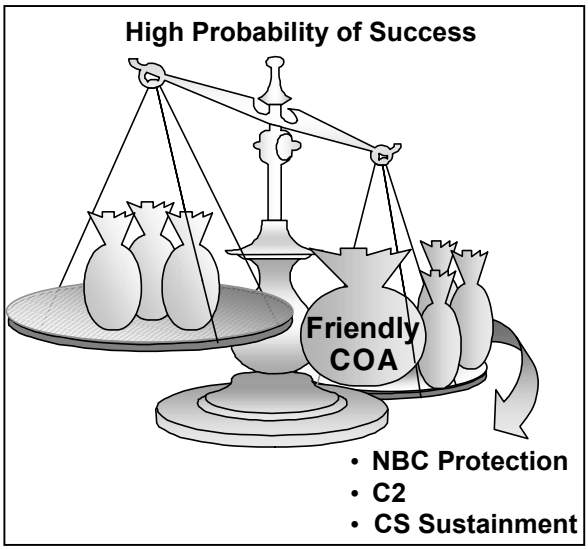

Figure D-10. NBC Defense Measures Support COA

(c) Friendly forces (friendly COA, NBC risks and vulnerabilities of each COA, NBC defense capabilities/limitations of each COA, NBC resource status, mitigation requirements for each COA, and key considerations such as mission, NBC protection, C^2, and sustainment support for each COA).

(d) Assumptions.

(3) Analysis (advantages/disadvantages of each COA using key considerations).

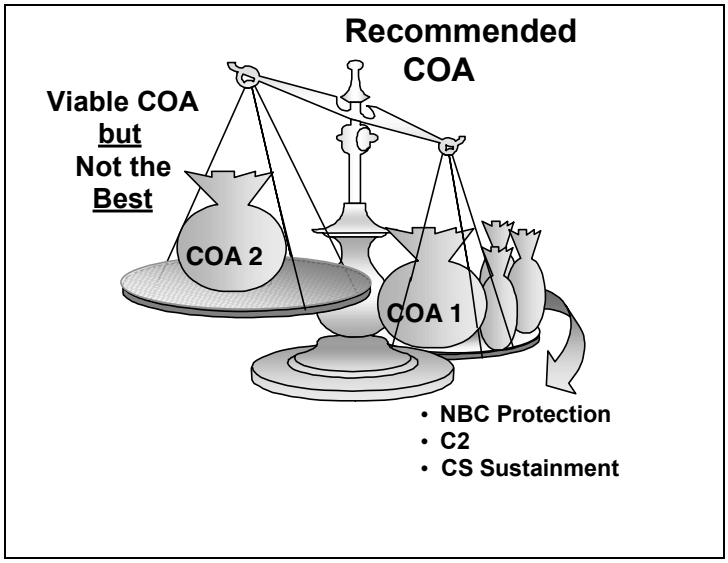

Figure D-11. Best COA

(4) Comparison (COA ranked by each consideration and with decision matrix).

(5) Recommendation and conclusions.

(a) Most supportable COA from NBC defense perspective (see Figure D-11).

(b) Issues, risks, vulnerabilities, and mitigation recommendations.

Once the commander selects the COA, the COA conclusions (issues, risks, vulnerabilities, and mitigation) form the basis for the recommendations included in the NBC defense plan.

d. **Fixed Site NBC Defense Plan.** The fixed site NBC defense plan evolves from mission analysis, COA decisions, the NBC estimate, and command guidance. The plan addresses NBC hazard avoidance, protection, and decontamination. Depending on the detail, it may consist of separate annexes for basic NBC defense; NBC reconnaissance, surveillance, and monitoring; smoke operations; and/or restoration operations. The NBC annexes require staff coordination since the NBC environment influences each staff functional area. In some cases, duplicate instructions reinforce the overall plan. Using tools and templates like those in Appendixes D and E, the basic plan/annex must address the following items:

(1) **Enemy NBC Situation.** Include enemy employment of TIM (including sabotage and destruction, see Appendix G), smoke, flame, riot control agent considerations, NBC capabilities, threat states, and employment risk windows if not addressed in the intelligence annex.

(2) **Friendly NBC Situation.** Include tenant and transient NBC defense capabilities/locations with projected arrival and departure times for transients. Identify NBC defense task organization, smoke, flame, and riot control agent guidance.

(3) **Mission.** The fixed site NBC defense mission statement must answer who, what, when, where, and why.

(4) **Execution.** Critical subparagraphs must include the following:

(a) **Commander's Intent.** Achievable/measurable criteria for success; for example, priority to personnel protection and less than 15 percent decrease in sortie generation.

(b) **Scheme of NBC Defense Operations.** Descriptive overview of how NBC defense will be executed. Include smoke guidance or refer to smoke support annex.

(c) **Tasks to Subordinate NBC/Tenant Units.** Detailed NBC defense task assignments to each tenant unit, with execution guidance as required.

(d) **HN Tasks.** NBC defense training and protection guidance for supporting HN personnel.

(e) **Emergency Tasks to Area Transient Units.** Emergency support taskings to transient units in the base AO.

(f) **Rehearsals.** Locations, times, required attendees, and special requirements.

(g) **Coordinating Instructions**. Due to the multiservice/international nature of fixed site operations, **do not assume standing operating procedures (SOP) remain valid**. Develop interoperability agreements, as necessary, to include:

- Minimum MOPP levels and flexibility guidance.
- Contamination avoidance guidance.
- Personnel safety criteria (USA troop safety criteria).
- Operational exposure guidance.
- Automatic masking/unmasking guidance (if different from unit SOP).
- Reporting requirements (if different from unit SOP).
- Actions before, during, and after NBC attack.
- Identified observer units (if different from unit SOP).
- NBC sample collection guidance and transfer points.
- Location of potential NBC hazardous civilian/military facilities.
- Instructions/procedures for civilian interaction/support.
- Area NBC defense responsibilities.

(5) **Service Support.** Use subparagraphs to address the following:

(a) Contaminated casualty collection points/procedures.

(b) Procedures for collecting, handling, and evacuating contaminated remains.

(c) Locations of consolidated NBC defense equipment.

(d) Locations of field expedient decon supplies/HN support.

(e) Decon/MOPP exchange points.

(f) Decontamination priority of support (by unit) and effort (by equipment within units).

(g) Special contamination control requirements.

(h) Retrograde contamination monitoring sites.

(i) NBC equipment/supply controlled supply rates and prestock points.

(j) Procedures for chemical defense equipment (CDE) early resupply ("push") packages.

(k) Patient decon augmentation support.

(l) Patient decontamination.

(m) Treatment supplies.

(6) **Command and Signal.** Use subparagraphs to address:

(a) Location of chemical staffs and supporting units.

(b) Warning signals/alarms.

(c) NBCWRS instructions.

(d) CDM/effective downwind message (EDM)/STRIKEWARN instructions.

(e) EMP protective measures.

e. **Deployment Planning.** Operational planners use two fundamental products for deployment planning: the Commander's Task Organization and the TPFDL. Effective command and staff communication regarding these products is essential. Otherwise, entire units and unit sets of equipment could sit idle at an airport or seaport of embarkation and not be available to support the mission. Once resources enter the movement/logistics pipeline, the deployment system provides total asset visibility, even in transit. The challenge is to quickly move tremendous tonnage and volumes of resources through a strategic pipeline with finite throughput capacity. This is accomplished through mission-focused task organization and TPFDL.

(1) **Task Organization.** The commander task-organizes the force to accomplish mission requirements; however, mission task organization and timelines are impacted by available airlift and sealift deployment capabilities. The keys to force design (task organization) are flexibility, balance, and mission focus. The JTF is organized to achieve maximum effectiveness from each contributing component (i.e., USA, USN, USAF, USMC, and USCG). Commanders determine the proper mix of force capabilities in order

to maintain flexible, effective, and efficient support to the mission. Task organization decisions are always mission-focused; every deployed asset must support the mission.

Develop NBC defense deployment packages based on mission-essential tasks and force capabilities. These packages are designed to support mission-specific NBC defense tasks and provide flexible support to other "nonstandard" chemical unit tasks. The concept entails providing economy of force while supporting mission execution and command flexibility.

(2) **Time-Phased Force Deployment List.** Once the commander determines task organization and deployment priorities, the deployment sequence and timelines for the task-organized units are established. The commander and supporting movement control centers use time-phased force deployment data (TPFDD) to—

(a) Maximize transport throughput capacity based on command established mission priorities.

(b) Resolve transportation conflicts based on mission priorities.

(c) Synchronize force arrival with mission priorities/time requirements.

(d) Ensure appropriate NBC equipment is sourced for deployment.

NOTE: TPFDL priorities will change based on JIPB updates and changes. NBC staff officers will closely monitor the deployment of NBC defense resources, to include verifying their status on the TPFDL. Resources not appropriately prioritized to mission requirements could arrive too late to support the mission. Resources not prioritized or even listed would wait for movement indefinitely.

f. **NBC Annex.** Use the NBC annex to clearly define the OPORD NBC defense concept, facilitate mitigation measures to the anticipated threat (NBC weapons and TIM), and provide details for base support planning and execution. The NBC annex may include the following:

(1) **General.**

(a) Standardize times throughout (time you've used throughout the order, usually ZULU).

(b) List maps, charts, overlays, and relevant documents. May list map sheet series and numbers.

(c) Provide maps, charts, and overlays as required with annex. Maps are normally requested through the intelligence section (S2/G2). Overlays should identify decontamination points; IPE storage and exchange points; locations of field expedient decontamination equipment such as firefighting equipment, pumps, and bulldozers; evacuation routes and traffic control points; casualty collection points; and collective protection shelters.

(2) **Situation:** Enemy.

(a) **Enemy capability, previous employment, delivery systems, and location of stocks.** Describe the enemy's NBC agent capabilities, enemy order of battle, when NBC weapons are likely to be used, delivery capabilities, and an assessment of where NBC weapons are positioned (e.g., depots or forward deployed).

(b) **Probability of employment.** List circumstances or conditions supporting enemy use of NBC weapons.

(c) **Threat to operations area.** Determine the most likely delivery means/agents per anticipated enemy objective(s). Identify fixed site sustainment operations most susceptible to NBC attack.

(3) **Situation: Friendly.**

(a) **Unit NBC defense plans (units).** Determine chemical, engineer, air defense, or base defense units with missions that can prevent enemy reconnaissance, protect against NBC delivery systems, or mitigate the effects of NBC attack.

(b) **Decontamination and reconnaissance resources supporting NBC defense.** Include NBC reconnaissance and decontamination assets as well as engineer, logistics, combat health support, or HN resources contributing to NBC defense.

(c) **Potential targets (military and civilian).** Evaluate each for NBC threats.

(d) **Effects on civilian communities.** Evaluate effects which may have major implications for fixed sites relying heavily on civilian workers or commercial operations such as POL supply or merchant marine operations.

(e) **Detection/NBCWRS capability.** Plan, announce, and conduct NBCWRS rehearsals. Fixed sites often rely on general support NBC reconnaissance with an area support mission. Additionally, rear area elements typically have fewer organic NBC detection devices and less capable communications for local NBCWRS.

(f) **Attachments and detachments.** List the base cluster/base elements charged with specific NBC defense responsibilities.

(4) **Mission.**

(a) **Concise mission statement.** Missions for chemical units supporting fixed sites in a direct support (DS), OPCON, or TACON role should be distinguished from those providing general support to fixed sites (most often in the corps/echelons above corps (EAC) rear area or COMMZ).

(b) **Purpose (avoidance, protection, decon, smoke).** Maintain focus on mission and goals: NBC protection, sustained C^2, and sustained combat support.

(5) **Execution: Commander's Intent.** Specify how the commander wants NBC defense to support mission objectives (e.g., criteria for success). This may be in quantitative terms of sustained throughput or mission support capabilities (e.g., short ton/day, sorties/hour) or specific measures for protecting the force. This may also include command protection guidance (how much risk is the commander willing to take to maintain site operations?) This is translated into terms such as 50 percent of the force will be in MOPP2 at all times, or motorized smoke units will utilize smoke pots for self-concealment.

(6) **Execution: CONOPS.**

(a) **Mission priorities (1st, 2d, etc.)** Establish fixed site support priorities consistent with the mission, commander's intent, and guidance for protecting the force. The base commander or staff should coordinate base NBC defense priorities with the tenant, the tenant's headquarters, and the higher headquarters.

(b) **NBCWRS.** Procedures must include warning **every individual** at the fixed site.

(c) **Site decontamination concept.** Plan/conduct decontamination based on concentrated mission areas/sectors to avoid spreading contamination or waste. Include specific guidance for waste/contamination control at each site.

(d) **Base/site smoke concept.** Integrate with the overall CCD plan and/or refer to the smoke support appendix.

(e) **Area(s) reconnaissance concept.** Establish priorities for reconnaissance based on the commander's guidance, potential tenant mission impacts, and most likely targets.

(f) **Area(s) detection concept.** Provide detection employment guidance for establishing threat-based detector arrays incorporating required base/cluster detection assets.

(7) **Execution: Task to Subordinate Units.**

(a) **NBC training responsibility.** Use either a centralized or decentralized approach to ensure adequate training/rehearsals down to the individual level.

(b) **Decontamination tasks.** Assign tasks for additional operational decontamination support (MOPP exchange, vehicle spraydown, waste management, or resupply assistance). Identify thorough decontamination support missions/requirements as well.

(c) **Smoke tasks.** Assign missions to support the smoke concept or refer to the smoke support appendix.

(d) **Reconnaissance tasks.** Assign tasks to support NBC NAI and/or refer to the NBC reconnaissance/surveillance/monitoring appendix. Develop the reconnaissance plan to mutually support the detection plan.

(e) **Detection tasks.** Specify detection requirements based on threat NBC employment windows or operations in the vicinity of TIM facilities/hazards. Coordinate detection efforts to create a base/site detector array for maximum detector coverage.

(f) **Additional tasks unique to specific units.** Self-explanatory.

NOTE: Assign tasks per mission requirements/capabilities, not by whether units are specifically chemical or nonchemical units. For example, USN construction forces are not equipped for large area NBC reconnaissance; specialized USA and USMC units with the NBCRS are best for that mission.

(8) **Execution: Coordinating Instructions.**

(a) **Coordination of taskings.** Identify coordination requirements with activities supporting NBC defense operations.

(b) **Avoidance guidance (areas, food, water).** Avoidance is less an option for fixed sites than for mobile elements. Good operations security, especially counterreconnaissance, is vital. This may be manifested by heightening physical security, aggressive external and internal patrolling, or simply locating key activities in areas less susceptible to enemy intelligence collection.

(c) **Dispersion, cover, and protection.** Where dispersion is impractical, greater emphasis must be placed on other protective measures such as CCD. Maximize/prioritize use of NBC covers or general purpose covers.

(d) **Sample collection.** Samples taken from patients should be handled IAW medical and intelligence annexes.

(e) **MOPP protection guidance.** Enforcing MOPP and protective measures is more difficult when diverse tenants occupy the same site, especially multiservice and multinational sites. The different tenants may have different MOPP procedures. Achieving consistent masking and unmasking procedures will be a major challenge. Simple inclusion of minimum MOPP as coordinating instruction may not be sufficient. Identify conditions that cause MOPP levels to change (i.e., missile attack and any prescribed MOPP response). IPE serviceability criteria should also be established or reinforced in the OPORD. Plan, announce, and conduct rehearsals.

(f) **MOPP exchange sites**. Fixed sites may establish consolidated MOPP exchange locations for contaminated personnel. Focus on controlling contamination and disposal of contaminated suits following exchange.

(g) **Link-up points**. Units or personnel going through decontamination report to a link-up point for traffic control, preliminary instructions, and controlled flow through the site. The supporting decontamination element controls the link-up point. Assign tasking for physical security support, if required.

(h) **Operational exposure guidance.** Identify the turn back dosage (maximum radiation dosage a unit or individual is allowed) for radiation survey teams.

(i) **Troop safety criteria**. Include guidance for NBC defense units operating in nonstandard situations such as TIM threats.

(j) **Collective protection**. Identify the location and priority of use for collective protection facilities, except medical. Medical units have organic collective protection systems. They will be employed based upon the threat in the AO.

(k) **EMP/transient radiation effect on electronics guidance.** Identify known or anticipated EMP sources and actions to mitigate affects.

(l) **Medical protection**. Refer to the medical annex for vaccine, pretreatment, postexposure guidance, and medical facilities for contaminated casualties.

(9) **Service Support.**

(a) **Casualty handling.** Specify base responsibilities/locations for NBC casualty collection points and patient decontamination in the event of multiple-tenant casualties. This is normally a single unit responsibility. Refer to the logistics annex for graves registration guidance, and ensure graves registration personnel are familiar with contaminated remains handling and decontamination procedures.

(b) **Field expedient supplies.** Identify location of materials or equipment that can be diverted to emergency NBC defense. OPORD should task owning units with providing support on order.

(c) **Distribution (how, where, what, when, who).** Distribution plans, especially those involving civilians, such as consolidated CDE storage with command designated issue times or immediate individual issue to all base support personnel. Address CDE issues such as uneven distribution of CAMs or other detectors throughout the base. Require CDE asset reporting to obtain/maintain asset visibility.

(d) **Maintenance.** Address unique DS/GS NBC maintenance requirements such as BIDS.

(e) **POL.** Specify NBC defense unit procedures for acquiring POL when detached.

(f) **Consumption rates (each mission/task).** Establish limits on consumption, usually based upon replenishment capabilities.

(g) **Resupply delivery (times, location, what, how much).** Establish whether supplies will be pushed all the way to the site or if picked up at offsite logistics resupply points. Where possible, consolidate resupply requirements to conserve transport resources.

(h) **Prioritize Tasks for Support.** Prioritize based upon mission, commander's intent, and command guidance.

(10) **Command and Signal.**

(a) **Control procedures.** Establish who controls NBC defense operations and chemical units operating on or near the fixed site (e.g., site S3/G3). If supporting only part of a site's tenants, identify where other units obtain NBC defense support.

(b) **Frequencies and signal operating instructions designation.** Identify radio nets for supporting chemical units. Fixed sites will rely heavily on the telephone for on-site communications.

(c) **CP locations.** Identify controlling CP for chemical units and all fixed site tenants' CP.

(d) **NBCWRS.** Include network diagram, a simple sketch portraying information flow requirements (up, down, and laterally) and any special/designated frequency requirements. If tenants are not clear on standard NBC warnings/alarms, state specific actions/reactions.

10. Fixed Site NBC Recon/Surveillance/Monitoring

a. **General.** Same as NBC annex, except charts and overlays. Provide a graphic overlay of the fixed site or base indicating high value targets, NBC surveillance and monitoring locations, and NBC survey team routes.

b. **Situation: Enemy.** Same as NBC annex.

c. **Situation: Friendly.**

(1) **Base NBC reconnaissance, biodetection, and survey teams**. List all attached OPCON or TACON NBCRS elements, supporting biodetection teams, and NBC survey teams with base or sector responsibilities.

(2) **Medical surveillance**. Identify medical activities with capabilities for identifying/treating NBC casualties or contamination. Medical units are authorized a high density of CAMs by common CTA. Additionally, they have radiation safety specialists. Medical units can provide limited NBC detection, water supply surveillance, and guidance on exposed food supplies.

(3) **Potential targets**. Reconnaissance, surveillance, and monitoring plans should coincide with fixed site assessment of targeted base activities.

(4) **Attachments and detachments**. NBCRS (FOX) teams and BIDS teams may be attached, OPCON, or TACON to the base. TACON elements may be used for specified tactical missions but may not be assigned other missions without approval of the assigning headquarters.

d. **Mission.** Same as NBC annex, except monitoring and survey party missions. Identify monitoring and survey party missions assigned to tenant activities. May be assigned by base defense sectors or by potential target areas.

e. **Execution: Commander's Intent.** Describes the desired end state. It is not a summary of the CONOPS.

f. **Execution: CONOPS.**

(1) **NBCRS priorities (1st, 2d, etc.)** C^2 should generally remain with one base activity with the FOX teams placed TACON or OPCON to other tenants as necessary.

(2) **NBCWRS**. Establish warning and reporting procedures for all designated reconnaissance, surveillance, and monitoring activities. Once time-sensitive information is collected, identify who needs that information first. Implement a warning and reporting architecture that permits the rapid transmission of NBC surveillance findings to the BDOC and to activities in downwind hazard areas.

(3) **Areas (reconnaissance, detection, monitoring).** Specify areas (and priorities) to be reconnoitered and monitored and the conditions that trigger these operations (may be peak threat periods, after a suspected attack, or "on-order" (O/O)).

g. **Execution: Tasks To Subordinate Units.**

(1) **General guidance.** Provide unit/element task requirements such as responsible NAI and periodic requirements. Assign O/O missions as required.

(2) **Specific guidance.** Issue specific reconnaissance, surveillance, or monitoring guidance by separate fragmentary order.

h. **Execution: Coordinating Instructions.**

(1) **Rehearsals**. Because of the numerous tenants on a base and various mission priorities, orchestrating recon and surveillance will be a major challenge for large fixed site commands. Rehearsals and team training will help eliminate problems.

(2) **MOPP protection**. Specify protection levels for detection, monitoring, and survey teams required to seek out contamination. Team protection levels are likely to be higher than the remainder of the site.

(3) **Operational exposure guidance from commander**. Radiation survey teams and units operating in nuclear areas require operational exposure guidance to avoid overexposing party personnel.

(4) **Contamination Avoidance Guidance**. Initial guidance may be to locate contamination boundaries only, leaving complete contamination measurement until a later time.

(5) **Reports.** Establish reporting requirements for R&S teams and monitoring sites. Regularity of reports as well as reporting channels should be articulated. Reporting channels may be different from normal chain of command. Base sector commanders are likely to be responsible for all tenants within the sectors.

i. **Service Support.** Same as NBC annex.

j. **Command and Signal.**

(1) **Control procedures.** The operations center staff reviews all reconnaissance, surveillance, and survey reports and recommends courses of action to mitigate NBC effects. Sector/tenant activities report to the base operations officer and request decontamination, reconnaissance, or MOPP exchange support where these functions are controlled by the base commander.

(2) **Communications.** Same as NBC Defense Annex.

(3) **NBCWRS.** Same as NBC Defense Annex.

Appendix E

FIXED SITE NBC DEFENSE EXECUTION TOOLS

Passive defense measures for fixed site NBC defense are responses to anticipated or actual NBC attack and TIM. One of the most useful NBC defense tools resulting from the planning process is a synchronization matrix for the execution of NBC defense tasks. It is intended to help staffs track execution, not to issue orders.

1. NBC Execution Matrix

An NBC execution matrix (Figure E-1) is provided as a basis to begin synchronizing unit efforts in support of the NBC defense tasks. The matrix demonstrates a logic process that must consider specific threat/mission scenarios. It is developed from OPORD taskings and identifies specific events which must occur for mission success. This matrix should be included in the OPLAN/OPORD as an appendix to the NBC annex.

a. The matrix identifies tasks/events and supporting unit taskings from the OPORD to support the example execution matrix.

b. The example entries from the OPORD are only conceptual and should not be construed as all-inclusive.

c. Task/event entries and taskings must conform to mission-specific influences such as threat, task organization, command guidance, unit capabilities, and the NBC defense mission (decontamination, reconnaissance, smoke).

d. Remarks are included and may address specific requirements and C^2 information not included in the task/events columns.

2. Blank Planning Matrix

A blank matrix for use in developing entries in support of NBC defense taskings is provided as Figure E-2.

NOTE: Once template is filled out, it may contain classified data and must be safeguarded accordingly.

ANNEX H	CB Support to OPORD 3-38-97	DTG 124030 Mar 97

MISSION: Operate PORTSMOUTH port terminal to receive equipment and supplies for JTF Barker and to retrograde equipment as necessary. The 14th Chemical Company provides GS decontamination to the port; the 92d Chemical Company (-) provides GS NBCRS reconnaissance and DS smoke generator support.

	Phase	A	B	C	D	E
LINE	**Task/Event**	Establish JTF Port Ops	Offload Ops	Storage Ops	User Staging Ops	Inland Clearance Ops
1	**NBC Threat**		SCUD w/ persistent nerve & blister	SCUD w/ persistent nerve & blister	SCUD w/ persistent nerve & blister	Persistent agents along LOC
2	**Templated Threat**	Intelligence Agents and Saboteurs	Ship/MHE/Cargo contamination; personnel 2°; NAI 3	Contamination of equip/supplies; personnel 2°; NAI 7	Contamination of equip/supplies; personnel 2°; NAI 2,6	NAI 14, LOC chokepoint
3	**NBC Vulnerability**		**Moderate**; however, requires 5-8 missiles to cover target area	**Moderate**; however, requires 5-8 missiles to cover target area	**Limited**	**Moderate**
4	**Decon Site Grid**		Use onboard and dock pumps to flush	Decon 36 NK 415116	Decon 37 NK 409128	Decon 38 NK 410120
5	**Link-up Point Grid**			LU 36 NK 417112	LU 37 NK 405127	LU 38 NK 411118
6	**Decon Support**		Use onboard and dock pumps to flush	14th Cml Co establishes and mans site on receipt of OPORD; 1st priority msn	14th Cml Co (-) provides decon O/O; 2d priority	14th Cml Co (-) provides decon O/O; 3rd priority
7	**Smoke Support**		Smoke Plt in DS to terminal OIC. Visual/IR O/O	Smoke Plt in DS to terminal OIC. Visual/IR O/O	Smoke Plt in DS to terminal OIC. Visual/IR O/O	
8	**NBC Recon Support**	Provide 2 FOX systems for TIM and area recon	Provide M21 overwatch of berthing areas 1 and 3; O/O recon to verify/define	O/O Recon storage areas for contaminated victims NAI 7	O/O Recon staging areas victims NAI 2 and NAI 6	O/O Recon NAI 14
9	**Biodetection**	Recommend BIDS/LR-BSDS NAIs to the Corps G2				Request LR-BSDS during high threat periods from NK 3612 to NK 4620
10	**MOPP**	ZERO	ZERO	TBD	TBD	TBD

Remarks:
BDOC will recommend position for BIDS vicinity of wharf operations. Request BIDS/LRBSDS support from Corps G3/Cml Officer if threat escalates.
14th Chemical Company establishes CP vicinity NK 4509. O/O = On Order
92d Chemical Co (-) establishes CP vicinity NK 3612. 2° = Secondary

Figure E-1. Example NBC Execution Matrix

ANNEX_____	NBC Support to OPORD_____	DTG_____

MISSION:

Phase		A	B	C	D	E
LINE	**Task/Event**					
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Remarks:

Figure E-2. Blank Matrix

Appendix F

HOST NATION AND CIVILIAN CONSIDERATIONS

1. Overview

Agreements and MOUs between the US and the HN government help establish and maintain OCONUS fixed sites, ports, and airfields. These installations assist in the implementation of US policy during peacetime, in humanitarian assistance operations, and in sustaining the force during conflict. Once established, fixed site operations rely heavily upon DOD civilians and non-DOD civilians (contractors, contract employees, and HN local hires) to conduct day-to-day operational mission activities. DOD, non-DOD, and HN civilians play vital roles in fixed site planning, operations, and operational mission accomplishment, providing prompt and sustained support in times of peace and conflict. Disruption in their functional capacity adversely impacts fixed site operations at critical periods.

2. Organization, Roles, and Responsibilities

a. **US Embassy.** The US Ambassador is the senior US official to the HN and is directly responsible to the President of the United States in carrying out US policy. Embassy organization and duties of embassy officials support implementing US policy. The US Ambassador and embassy staffs are direct links to the HN government and assist in the acquisition of HN assets in support of fixed site operations. US embassies also develop and maintain emergency action plans that should be considered during fixed site planning. Embassy staffs maintain liaison with all elements of the HN to include government, intelligence, influential citizens, labor, political leaders, populace, and industry. As such, their offices provide expedient LOC with the HN government to expedite approval for changes and additions to fixed site operations. These include clearing political, economic, and religious obstacles which may arise; authorizing the use of HN assets on a timely basis; and negotiating labor disputes.

b. **Fixed Sites.** Bases may need personnel from the HN to perform immediate and long-term functions such as laborers, stevedores, truck drivers, supply handlers, equipment operators, mechanics, linguists, medical aides, computer operators, and managers. These may be available from a HN labor pool. The HN may also provide military or paramilitary units to support US forces by performing traffic control, convoy escort, base security, and cargo and troop transport duties. However, HN support is highly situational and heavily dependent upon operational capabilities of the HN supporting US policies. Commanders, using civil affairs personnel, determine functional types and levels of HN support that can be accepted with a high assurance the HN will meet its commitments. For example, civil affairs personnel in conjunction with their counterparts in the HN make the following determinations:

(1) Is the labor force stable and adequate to provide needed resources for daily operations and to fulfill surge requirements?

(2) Is military security competent to quell spontaneous and organized actions directed at the fixed site and toward US personnel and civilians?

(3) Are translators competent to act as intermediaries with a high assurance of communicating all positions correctly?

(4) Is there a high assurance that HN personnel filling critical positions will continue in the capacity during periods of instability?

(5) Will the HN provide and sustain required resources?

HN planning factors also include considerations for training and equipment requirements as discussed below.

c. **Fixed Site Commander.** The fixed site commander is responsible for mission readiness, maintaining physical security, and force protection of the fixed site.

(1) **Mission readiness of the fixed site.** Key to fixed site mission readiness in this vulnerable environment is ensuring the site's personnel are organized, equipped, and trained. They must be available even when subjected to acts of civil disorder, terrorists activities, and/or employment of NBC weapons or TIM. This requires—

(a) **Organization.** Organize tenant units to support the base cluster/base NBC defense plan. Integrate HN assets as available to complement base cluster/base defense and minimize threat actions. Obtain additional support from transient units not yet tasked with other missions.

- Establish and maintain NBC emergency response SOP involving fixed site assets and integrated HN assets. Fully commit, but do not overcommit, assets.

- Organize ERT from all fixed site tenants to reduce the probability of damage and minimize the effects from NBC weapons, TIM, or disasters.

- Maximize use of available time through site preparation, task organizing, assigning objectives and sectors, effective C^2, and use of redundant LOC with ERT and other response forces once engaged.

- Know your key personnel and understand their availability in time of crisis. Key personnel include supervisors, key technical staff, and linguists.

- Establish HN security assets in a primary role, but provide for planned backup from fixed site assets.

- Establish a group of selected subject matter experts from fixed site staff and tenant organizations to liaison with embassy staff and interface directly with HN to increase NBC defense awareness, expedite support, and satisfy logistics requirements.

(b) **Equipment.** Establish mission-essential equipment requirements for NBC defense. Allocate available supplies and equipment to support this requirement.

- Determine types and quantities of supplies and equipment needed to support the plan (e.g., decontaminants, IPE, chemical protective ensemble (CPE), engineering, communication).

- Determine what to issue, to whom, and when, and training required when issued. This may include mission-essential US civilians, such as the ambassador and his staff.

- Determine the most suitable distribution method to support the NBC defense plan (e.g., unit issue, consolidated location, and dispersed locations). Consider storage requirements, hardening from effects of NBC hazards, fires, deterioration, weathering effects, security requirements, availability, and the impact on the plan if supplies and equipment are not available as needed.

- Determine resupply activities.

(c) **Training**. Specify and accomplish training objectives. Determine training resource requirements and equipment/supply support.

- Leader training. Train in NBC defense conditions supporting the base cluster/base NBC defense plan. Focus training on NBC defense requirements and add complexity and difficulty to METL training. Train in common NBC tasks and use work/rest cycles. Ensure fluid replacement to sustain maximum NBC defense readiness condition in stressful and lethal situations. Know the mission and evaluate the unit's capability to effectively respond.

- Individual training. Train in common NBC tasks (individual decontamination, masking, MOPP, NBC recognition, warning and reporting). Train to support the NBC defense plan. Make training tasks progressively harder as personnel training level/knowledge rises.

- Collective training. NBC collective tasks are part of the unit training plan or are derived from the METL. To save valuable training time and effort, determine which tasks support more than one mission-essential task. Also, determine which essential tasks must be trained in an NBC environment. Identify tasks that should not be done in a contaminated environment; can be done by increasing MOPP; and must be done, but execution rates in MOPP are unacceptable. These tasks become the focus whereby the SOP describes how operations will be different under NBC conditions.

- Train NBC defense teams to perform their NBC defense plan functions. TTP differences in training, doctrine, and equipment may require training adjustments. Working with HN and coalition forces requires consideration of challenges such as equipment, material, manpower, language, doctrinal, political, and social differences.

- Rehearsals/drills. Rehearsals, drills, and exercises conducted between joint, coalition, and HN forces create rapport and establish relationships. This creates a degree of standardization and economy of resources, establishes understanding, and focuses on common goals. This also strengthens and reinforces teamwork and identifies problems that must be clarified/amended. To ensure interoperability under NBC conditions, training should replicate conditions in an NBC environment. These rehearsals and drills serve to answer questions such as: is the plan task-organized properly, does all equipment function according to plan, who will conduct decontamination, who will conduct survey, are mission assignments appropriate for the units' capabilities, and is mission support needed and available?

(d) **Availability**. Regardless of the environment, critical personnel must be available to accomplish the mission. Radical changes can occur without adequate warning (Iran takeover of the US embassy); therefore, plans must take into account items such as—

- Recall rosters. Tenant units establish and maintain rosters for immediate notification of site personnel, contract civilians, and HN civilians. Rosters may be selective based on need (e.g., surge operations, alert team response training, security alerts). Enforce established response times to ensure critical functions are maintained.

- Noncombatant evacuation operations (NEO) plans. The Department of State (DOS) and the chief of mission (COM) (the US Ambassador to the HN) are primarily responsible for NEO. The COM formulates NEO plans to evacuate noncombatants and nonessential personnel from the HN. These plans should address NEO under NBC conditions and may require DOD support issuing protective equipment and instruction in its use. The establishment of NBC employment indicators that "trigger" evacuation is critical.

- Contingency plans to backfill. Selecting replacement personnel or identifying returning personnel is key to maintaining or restoring full mission complement.

(e) **Civil defense preparedness.** Establish and maintain operational and hardened collective protection shelters, mission-essential personnel designations, noncombatant evacuation routes, personnel, and equipment staging areas.

(2) **Maintaining fixed site physical security and force protection.** This includes involvement of DOD/non-DOD civilians, HN civilians/international workers, and the HN government. These personnel support the site's ability to react, survive, repel, recover, and continue the mission.

(3) **Noncombatants.** Commanders must consider their responsibilities toward all civilians authorized on site. Specific NBC defense considerations might include requirements for continued NBC defense support and the availability of NBC protective equipment and other medical or logistical support. The commander's legal obligations toward civilians are governed by the law of war, international agreements, federal statutes, or contract provisions; therefore, commanders should seek specific legal advice regarding these issues. Commanders should also seek guidance from higher headquarters before providing NBC defense/humanitarian service to off-site civilians.

Appendix G

TOXIC INDUSTRIAL MATERIALS

1. General Considerations

TIM hazards increase greatly in significance when manufactured, stored, distributed, or transported in close proximity to fixed site operations. Deliberate or inadvertent release significantly increases hazards to the population and US forces. While CW agents are highly toxic and lethal in small amounts, the countries producing them are generally known and are few in number when compared with the quantities and universal nature of TIM. TIM should be recognized for the single hazard they pose as well as the potential risks resulting from explosion, fire, and associated products derived from a single TIM or TIM in combination. Most TIM will present a vapor (inhalation) hazard and contact 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. These TIM are generally in one of the following categories:

- Agricultural (includes insecticides, herbicides, and fertilizers).

- Industrial (chemical and radiological materials used in manufacturing processes or for cleaning).

- Production and research (chemicals and biologicals produced or stored in a facility).

- Radiological (nuclear power plants, medical facilities/laboratories, uranium mining and refining operations, nuclear fuel fabrication, transportation, and radiological waste storage operations).

2. Planning Considerations

a. Given the prevalence of TIM throughout the world, it must be assumed that future threats to US military force deployments will include TIM hazards. Area studies, intelligence estimates, and/or economic studies indicate potential TIM hazards in the AO. All levels of command should keep a totally open flow of information regarding the existence and status of TIM hazardous areas. Commanders must ensure the exercise of appropriate security safeguards for TIM hazard planning information, since potential belligerents could use the threat of release as well as the actual release of TIM hazards to increase local and regional tensions. Identification, location, detection, and appropriate response to potential TIM hazards must be a key part of NBC defense planning. Information of particular significance when planning a TIM hazard response includes the TIM location, hazard presented (explosive, flammable, inhalation), quantity of material involved (in combination or single), dispersion patterns based on historical prevailing wind direction, activities or populations to be evacuated/protected, protection required, established safe distances for personnel, and hazard control requirements.

b. In addition, the Material Safety Data Sheets (MSDS) for chemicals found in the *North American Emergency Response Guidebook (NAERG)* can be acquired from many sources and provides a general reference for identifying specific and generic TIM hazards, required individual protection, and emergency response when responding to the initial TIM hazard. Briefly, the NAERG provides a quick cross-reference index for TIM ID numbers, guide numbers, and alphabetical listing of TIM hazard categories which are then incorporated into a table of initial isolation and minimum protective action distances to the 90th percentile (90 percent probability that the hazard will not exceed these distances). Table G-1 provides an example of isolation and protection distances. Although currently a single–service reference, FM 8-500, *Hazardous Materials Injuries* provides additional information.

Table G-1. Initial Isolation and Protective Action Distances (Example from NAERG)

ID NUMBER NAME OF MATERIAL	SMALL SPILLS (From small pkg or small leak from large pkg)			LARGE SPILLS (From large pkg or many small pkgs)		
	First ISOLATE in all directions	Then PROTECT Persons Downwind during— DAY	NIGHT	First ISOLATE in all directions	Then PROTECT Persons Downwind during— DAY	NIGHT
1005 Ammonia, anhydrous	30 m (100 ft)	0.2 km (0.1 mi)	0.3 km (0.2 mi)	95 m (300 ft)	0.3 km (0.2 mi)	0.8 km (0.5 mi)
2480 Methyl Isocyanate	125 m (400 ft)	0.5 km (0.3 mi)	2.3 km (1.4 mi)	305 m (1,000 ft)	1.9 km (1.2 mi)	8.2 km (5.1 mi)
2477 Methyl isothiocyanate	60 m (200 ft)	0.2 km (0.1 mi)	0.6 km (0.4 mi)	185 m (600 ft)	0.6 km (0.4 mi)	2.4 km (1.5 mi)

c. NBC defense planners should develop a chart or table similar to Table G-2 for known TIM hazards affecting fixed sites. This document displays the distances for minimum protection of responding personnel, immediate protection of life and health of the general public, and information needed to respond to the hazard. Support the chart with annotated small scale and city maps of hazard locations with prepared templates to visually depict the TIM protective action zone, isolation zones, response personnel protection requirements, evacuation routes, and population holding areas.

d. Since toxic industrial vapors tend to flow into low places with little air circulation, the preferred location (balanced by mission requirements) for military facilities close to TIM hazards is at higher elevations, in open areas, upwind, and at established safe distances from the source. Establish a hazard response guide for TIM hazards. The hazard response guide must include the elements for the TIM hazard involved as shown in Table G-2.

NOTE: Of vital importance to commanders and troops is the awareness that current military respirator canisters can only provide very limited protection from TIM.

Table G-2. Example Hazard Response Guide (Mixed Load/Unidentified Cargo)

POTENTIAL HAZARD
FIRE OR EXPLOSION • May explode from heat, shock, friction, or contamination. • May be ignited by heat, sparks, or flames. • Vapors may travel to source of ignition and flash back. • Containers may explode when heated.
HEALTH • Inhalation, ingestion, or contact with substance may cause severe injury, irritation, disease, or death. • High concentration of gas may cause asphyxiation without warning. • Contact may cause burns to skin and eyes. • Runoff from fire control may cause pollution.
PUBLIC SAFETY
PROTECTIVE CLOTHING • Wear positive pressure SCBA. • Structural firefighters' protective clothing will only provide limited protection.
EVACUATION **Fire** • If tank, rail car, or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.
EMERGENCY RESPONSE
FIRE **CAUTION: Material may react with extinguishing agent.** **Small Fires** • Dry chemical, carbon dioxide, water spray, or regular foam. **Large Fires** • Water spray, fog, or regular foam. • Move containers from fire area if you can do it without risk. **Fire Involving Tanks** • Cool containers with flooding quantities of water until well after fire is out. • Do not get water inside containers. • Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. • ALWAYS stay away from the ends of tanks.
SPILL OR LEAK • Do not touch or walk through spilled material. • Eliminate all ignition sources (no smoking, flares, sparks, or flames in the immediate area). • All equipment used when handling the product must be grounded. • Keep combustibles (wood, paper, oil, etc.) away from spilled material. • Prevent entry into waterways, sewers, basements, or confined areas.
FIRST AID • Move victim to fresh air. • Call emergency medical care. • Apply artificial respiration if victim is not breathing. • Do not use mouth-to-mouth method if victim ingested or inhaled the substances; use other approved respiration devices equipped with a one-way valve. • Remove and isolate contaminated clothing. • Administer oxygen if breathing is difficult. • Shower and wash with soap and water. • Effects of exposure (inhalation, ingestion, or skin contact) may be delayed. • Ensure medical personnel are aware of the material(s) involved and take precautions to protect themselves.

e. Some TIM hazards can act to displace oxygen from the air, making any filter-type respirator insufficient protection. The military canister-type respirators, while possibly providing some protection from any hazardous material in the air, will not be able to replace the oxygen missing from the air. In this case, the only effective protection is a supplied-air-type respirator, such as SCBA.

3. Determining Protective Action Zones

Plans supporting protective action zones for each hazard site and immediate evacuation from the hazard path are the best defense. As a minimum, commanders should consult with the engineer officer, NBC defense officer, legal officer, medical officer, intelligence officer, provost marshal, and public affairs officer when planning protective action zones. These staff officers can provide guidance for hazard isolation, entry denial, evacuation, and in-place protection. National sources may be available to provide operational and scientific expertise in the event of an actual incident.

a. **Isolate hazard area/entry denial.** Isolating the hazard area establishes control and is the first step for protective actions that follow. Exclude personnel not directly involved in responding to the hazard, especially responding personnel that are not adequately protected. The initial isolation zone will include upwind distances from the incident within which dangerous concentrations of a material may exist.

b. **Evacuate.** When time and mission allow, evacuation is the best protective response to a TIM hazard. However, there must be enough warning and preparation time to evacuate the protective action zone. Evacuate personnel nearest and outdoors in direct view of the scene, then evacuate personnel furthest from the TIM hazard. The protective action zone assumes that random wind direction changes confine the hazard vapor plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance. For practical purposes, the protective action zone (e.g., the area in which people are at risk of harmful exposure) is a square whose length and width are the same as the downwind distance as shown in Figure G-1. The hazard is located at the center of the circle, which represents the initial isolation zone around the hazard. Emergency action evacuation measures must consider that many TIM, including water-reactive poison inhalation hazards, may enter a river or stream and travel with the current, creating a substantial downstream hazard.

When evacuating the hazard area, individuals should wear clothing that prevents deposition of liquid on and minimizes injury to exposed skin. NBC protective clothing may be used.

Do not permit evacuees to congregate at established safe distances. Evacuation to established safe distances does not guarantee complete safety for evacuated personnel. When possible, move evacuated personnel to a designated location by a specific route and to a distance where additional movement is not required following a radical wind shift.

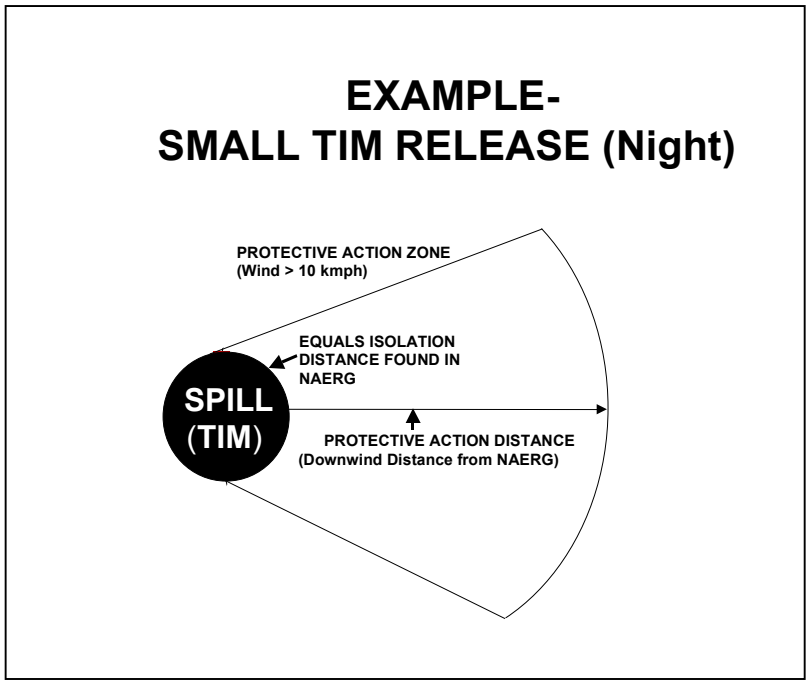

Figure G-1. Protective Action Zone

c. **In-Place Protection.** Use in-place protection (Appendix J, Table J-2) when evacuation may cause greater risk than remaining in place or when successful evacuation cannot be conducted. In-place protection may not be the option of choice if the TIM vapors are flammable, the hazard is persistent, or buildings cannot be closed tightly.

Although vehicles are not as effective as buildings, vehicles can offer some protection for a short period when windows are closed and the ventilating system is shut off. Warn persons that are protected in place to stay clear of windows due to the danger from glass and projectiles in the event of a fire or explosion. Maintain communications with in-place protected personnel to advise them of changing conditions. Communications are a psychological lifeline for personnel cut off from freedom of movement and information.

4. Vulnerability Mitigation

Since TIM incidents differ, each will have special problems and considerations. During planning, attempt to secure pertinent information involving production, storage facilities, distribution, and transportation of TIM. As a minimum, obtain the type, quantity, and specific risk from fire, explosion, toxicity, corrosive effects, and/or persistency of gas. Sources for this information include appropriate scientific, civilian industrial, and chemical defense experts; safety reports and MSDS on the facility; international code markings on storage tanks; and local civilian authorities who have emergency response procedures and resources.

A thorough vulnerability analysis provides an initial estimate of the NBC threat and is the first step toward mitigating the operational effects of damage or destruction of a TIM facility. Determining the TIM hazard/threat in an AO is a primary responsibility of the medical and supporting preventive medicine staff. They are supported by the chemical and

civil affairs staffs. Prior to entry into the area, area assessment teams provide information involving TIM hazard production, storage facilities, and suspected hazard areas. These teams can also assess the threat to a given facility and provide input about previous industrial operations at the facility.

a. **TIM Precautions.**

(1) When no release has occurred, establish a minimum safety exclusion zone based upon mission requirements, surveys, and assessments of the TIM facility. Additionally, if possible, units should avoid encamping within 10 km of a potential TIM release.

(2) If a TIM release occurs, evacuate beyond the safety exclusion zone established by the incident or on site commander. When mission requirements dictate entering the exclusion zone for unknown TIM, personnel should wear, at minimum, the following:

- Positive pressure (pressure demand) SCBA (Mine Safety and Health Administration/National Institute of Operational Safety and Health approved).
- Fully encapsulated, gas-tight, and vapor-tight (Level A) chemical-resistant suit.
- Chemical-resistant inner gloves.
- Chemical-resistant outer gloves.
- Two-way radio communications.
- Other recommended safety equipment as appropriate (to determine what additional equipment/supplies are available to various unit/activities, see authorization documents such as tables of organization and equipment and/or tables of distribution and allowances).

NOTE: Structural firefighter's protective ensemble and MOPP do not equal a "fully encapsulated chemical-resistant suit."

(3) Reduce safety exclusion areas only after performing a detailed survey and assessment of the extent of the probable hazard area.

(4) When friendly units are required to operate in an area where a potential TIM facility exists, NBC defense planning should include the following actions:

(a) Coordinate with HN ERT.

- US forces have no jurisdiction outside DOD installations except for the continuing obligation to safeguard US lives and property.

- DOS must be integrated into the decision-making process in OCONUS operations.

- Teams may be from the HN government, HN armed forces, or the industrial facility involved.

- Communicating sensitive tasks and tasks requiring immediate response may hinder task accomplishment in non-English-speaking countries. Arrange for interpreters/translators.

(b) Identify the probable TIM, extent of possible contamination, minimum protective equipment, and personnel safety considerations. Develop a matrix to determine the minimum safe distance to the hazard.

(c) Coordinate with higher headquarters and HN to identify support availability.

- Identify emergency response and assistance teams (e.g., technical escort units or similar civilian agencies).

- Anticipate scenarios requiring coordinated responses.

(d) Develop an incident response plan. For detailed information and procedures for response plans, refer to the following publications that provide excellent templates for plan development: AFI 32-4001, *Disaster Preparedness Planning and Operations;* AFMAN 32-4004, *Emergency Response Operations;* and AFMAN 32-4013, *Hazardous Material Emergency Planning and Response Guide.*

(e) Implement the TIM recon plan and assign units to prepare and execute the recon missions.

(f) Use commercial detectors, such as Draeger tubes, which can provide confirmation of individual TIM. However, chemical reactions and combustion by-products produce toxic products that may not be identified by these detectors.

(g) Coordinate with theater medical elements (e.g., preventive medicine team) for follow-on industrial hygiene assessments as dictated by mission requirements.

(h) Coordinate with in-theater technical escort unit elements for follow-on technical support, if appropriate.

(i) Coordinate with engineer elements if the facility in question was damaged or destroyed or assessments indicate it is abandoned.

(j) Coordinate with decon elements for decon of contaminated personnel and equipment.

(k) Coordinate for delivery of collected samples to the in-theater supporting medical laboratory.

(l) Avoid hazard areas as long as possible. When conducting recon or rescue operations near or within the hazard, equip ground survey teams with respiratory protection (SCBA) and skin protection certified for the TIM. Use aerial, visual recon to help collect C^2 information to assist with incident management.

(m) Survey IAW established procedures (i.e., FM 3-19, *NBC Reconnaissance*) to determine the limits of the hazard. Mark hazard areas IAW STANAG 2002, *Warning Signs for the Marking of Contaminated or Dangerous Land Areas, Complete Equipments, Supplies and Stores.* Annotate the identified TIM on the marker.

b. **Risk Management Summary.**

(1) **Exposures exceeding the permissible exposure limits and published exposure levels immediately dangerous to life and health (IDLH).** Mandate personal protective equipment commensurate with the hazard, to include individual and collective protective equipment.

NOTE: See reference sources such as the applicable MSDS that are available for the different chemical warfare agents and toxic industrial chemicals for information on exposure limits.

(2) **Potential skin absorption and irritation sources.** Evaluate hazards for water and air reactivity; explosive, combustible, or other mixture hazards; and toxicity hazards. Mark and template potential hazard zones and plan and institute protective measures.

(3) **Potential eye irritation sources.** Provide IPE or other protective measures to keep individual exposure within prescribed safe limits.

(4) **Oxygen deficiency.** Evaluate hazards that might cause decreases in oxygen level and install warning devices that alert to oxygen deficient levels.

Appendix H

FIXED SITE DECONTAMINATION

1. Overview

This appendix begins with a series of decision/logic charts (see Figure H-1) for assisting commanders with decontamination decisions. Excluding some different techniques for specialized equipment, personnel and equipment decontamination procedures referred to in these charts (see Figures H-2 and H-3) are essentially the same throughout the services and are addressed in specific service doctrinal manuals.

However, the remainder of the appendix focuses on facilities and terrain decon techniques (see Figures H-4 and H-5) since very few detailed TTP exist in any single reference.

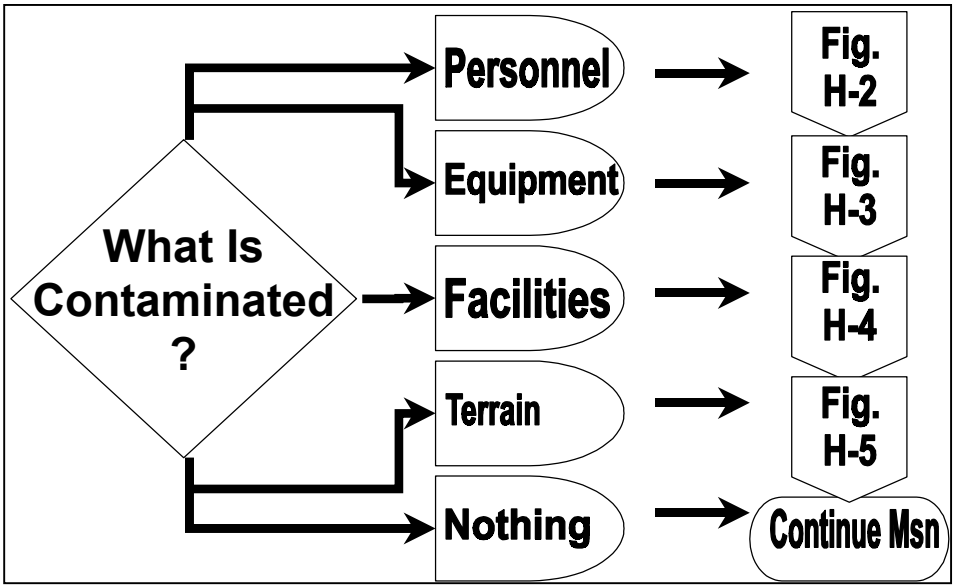

Figure H-1. Decon Decisions

2. Decontamination Decision Logic

a. **Personnel Contamination.** Contaminated personnel automatically perform immediate decontamination as soon as possible after the attack. Beyond immediate decontamination, the commander must make decisions (see Figure H-2) based on answers to questions affecting his mission. "Can the mission be accomplished in MOPP?" is a question of immediate importance and drives subsequent decisions. The commander's goal is to accomplish the mission with minimum degradation from MOPP balanced with the requirement to protect personnel from the NBC hazard. If time and resources are insufficient for a thorough decon, the commander considers the same requirements for operational decontamination. Remember, operational decontamination is not the preferred end state because it incurs risk and degradation until thorough decon and weathering (normally for extended periods) can occur. Additionally, protective overgarments provide protection for a limited time based upon the specific overgarment. Extended periods in

contaminated clothing increase contamination risks to personnel. JSLIST overgarments provide 24 hours of protection after liquid contamination.

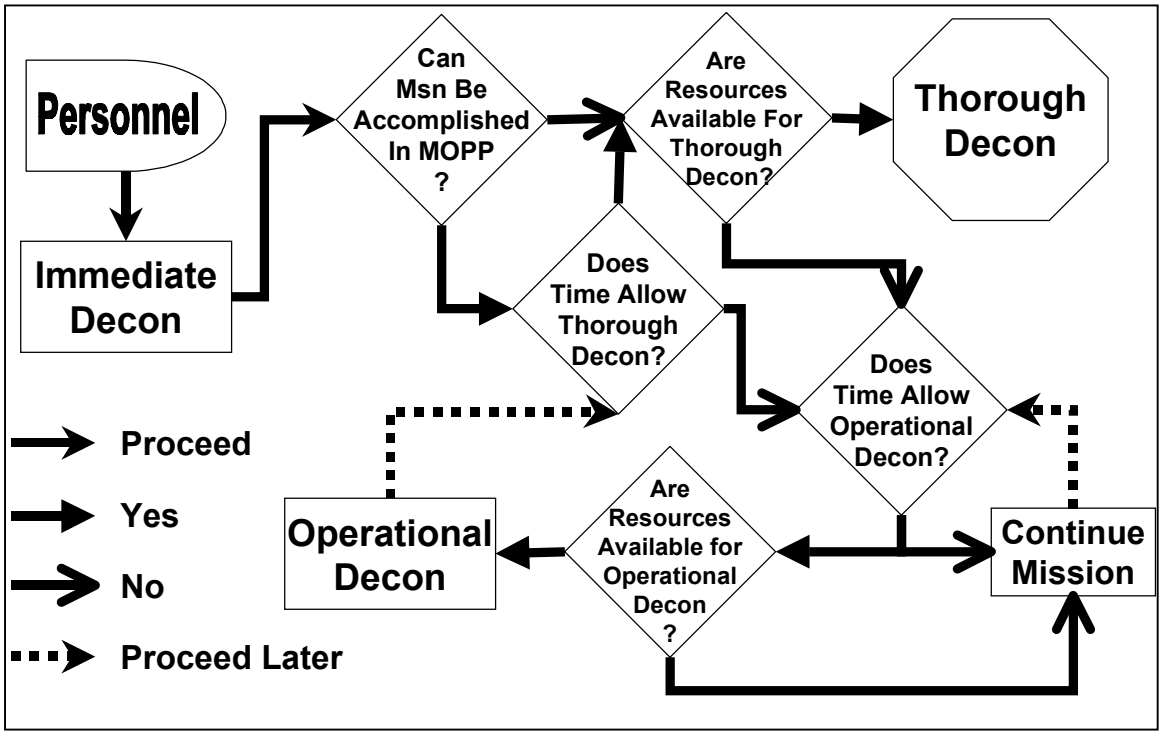

Figure H-2. Personnel Decisions

b. **Equipment Contamination.** After decontaminating themselves, personnel perform immediate decontamination on contaminated individual equipment. As personnel perform immediate decontamination, the commander determines if the remaining contamination will cause unacceptable mission performance degradation. If acceptable, the commander continues the mission assuming an element of risk requiring frequent reassessment.

When risks are unacceptable, the commander considers operational or thorough decon (see Figure H-3). The staff's recommendation is based on available time and resources. Ideally, if both are available, conduct thorough decon. If time and resources are limited, consider operational decon to provide temporary relief from MOPP and reduce contamination on equipment. If time or resources don't permit operational decon, continue the mission with periodic reviews of risk and resources.

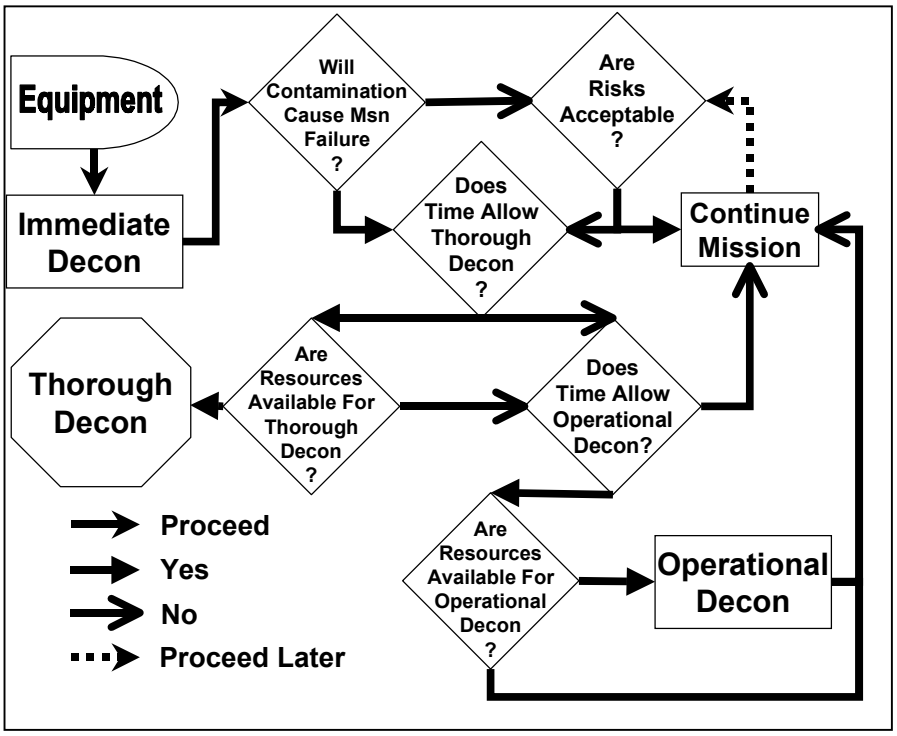

Figure H-3. Equipment Decisions

c. **Facility Contamination.** If facilities are contaminated (see Figure H-4), the first actions are marking, reporting, and warning of the contamination and closing the facility to incoming traffic and aircraft except emergency vehicles. This allows the commander to determine the extent of contamination in mission-essential facilities. In partially contaminated facilities, the commander determines if the contaminated area is mission-essential or creating a vapor hazard. If the answer is "no" to both questions, the commander continues the mission and the area is remediated postconflict, if necessary.

Contamination hazards that may cause mission failure or pose unacceptable risk require the commander and staff to determine if mission functions can move to another facility within the base/base cluster. If the function(s) can't be moved within the base/base cluster, the commander and staff consider relocating the function(s) to another redundant facility in theater; if not a viable option, consider operational decon. Remember, as with contaminated terrain, contaminated facilities may require postconflict remediation. If decontamination is the only viable option, see Table H-8 and Table H-9 for further assistance.

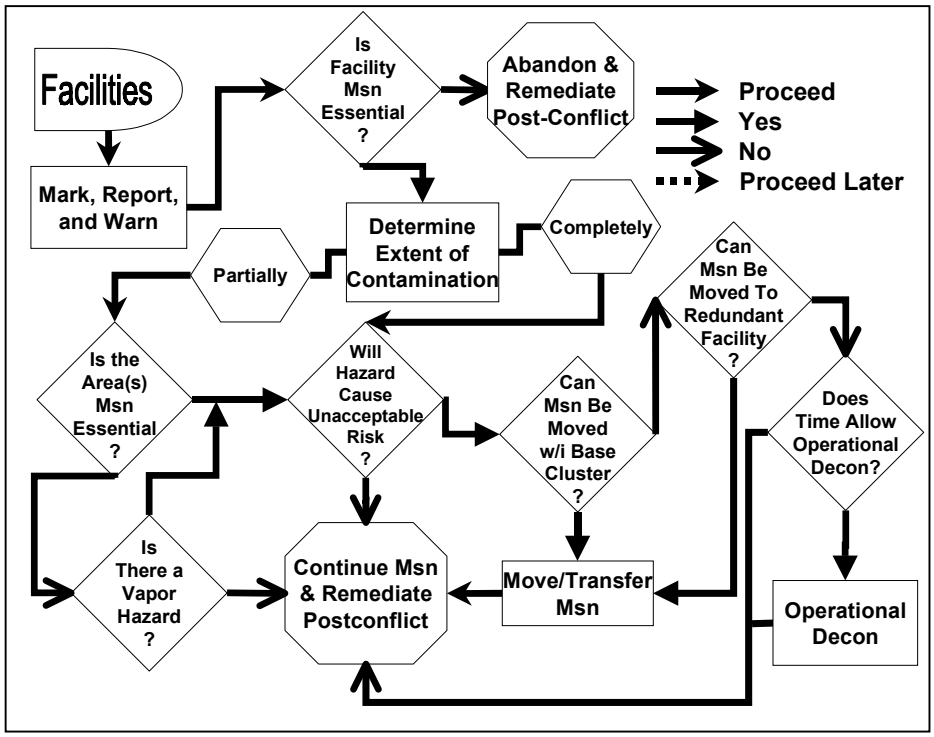

Figure H-4. Facility Decisions

d. **Terrain Contamination.** Contaminated terrain (see Figure H-5) poses two problems: a hazardous obstacle to operations and a downwind hazard. Units encountering contamination mark and report the area so other units can receive warning. While the area will likely require postconflict environmental remediation, continue the mission if it is neither an obstacle nor a downwind hazard.

As with any obstacle, the commander can choose to breach or not use the area in the vicinity of the NBC hazard. Regardless, ensure personnel are protected to the maximum extent possible while sustaining combat operations. Breaching operations are hasty or deliberate based on mission, time available, and resources. In either case, personnel and equipment are checked afterward for contamination and may require decon.

Contaminated terrain may pose a hazard downwind. Avoiding the hazard by relocating may not support mission requirements, and prolonged operations in increased protection (MOPP) may also be unacceptable. If so, the commander may have to cover, remove, or decon the hazard to reduce mission risks. As with breaching, work crews and equipment will likely require decontamination.

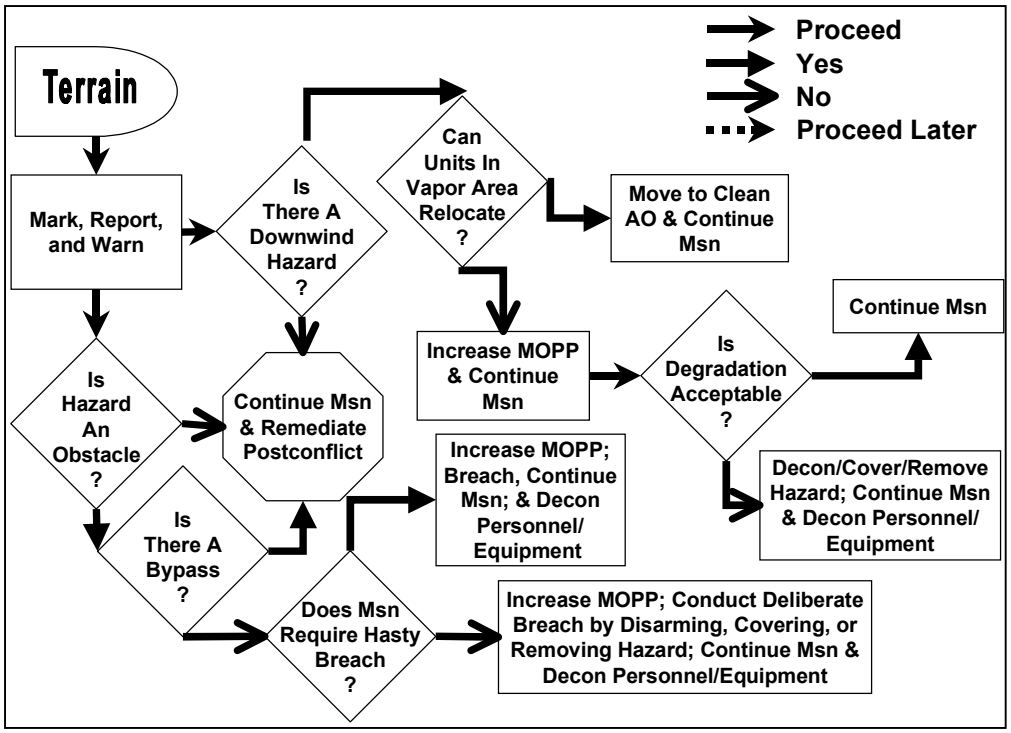

Figure H-5. Terrain Decisions

3. Facility Decontamination

Decontamination of fixed sites is resource intensive and should only be considered when MOPP degradation is unacceptable and mission accomplishment is at risk. Facilities can be heated, flushed, disinfected, and neutralized (see Table H-1) to remove or destroy the contamination. Regardless of the technique chosen, decontamination should be limited to those facilities and portions of those facilities that are absolutely mission-essential, without which mission objectives are endangered. All remaining facilities/portions of facilities (appropriately marked) will be decontaminated as necessary during postconflict operations. Commanders and staffs must be ruthless in deciding what can and what can't be replaced and, consequently, what must be decontaminated and what must be removed.

The proper implementation of contamination avoidance and contamination control measures directly influence the amount and extent of decontamination operations required in the postattack environment. In simple terms, preventive activities are much easier to accomplish than decontamination activities. For example, create shuffle boxes or troughs containing decontamination mixtures for use at facility entrance points.

Table H-1. Facilities Decontamination

DECON OF:	POSSIBLE ACTIONS
Nuclear Contamination	**Flush:** Effective for removing loose radioactive contamination. However, a condition known as rainout may leave a film on some surfaces that resists flushing. Flushing combined with scrubbing the contaminated surface should remove all contamination.[1,2]
Biological Contamination	**Heat:** Large amounts of heat, both dry heat and steam, may be used to destroy/neutralize biological contamination. Heat may be combined with the application of ultraviolet (UV) light from commercially available UV lamps.[3, 4] **Do not expose personnel to UV lamps while they are being used.** **Flush:** Effective for removing biological agents, to include diluting toxins. **Flushing does not neutralize biological agents**, but transfers the contaminants from your immediate area to a contained area (sump) where they may be neutralized.[1,5] **Disinfect:** Ensure the disinfectant won't destroy the facility that is being decontaminated. Use items such as, but not limited to, those shown in the decontaminants reference for standard and nonstandard decontaminants.[2]
Chemical Contamination	**Heat:** If air filtration systems are available, reduce the agent to a vapor hazard with heat (dry) and allow the filtration system to absorb or exhaust the hazard. Remove the filter and dispose of appropriately. **Flush:** Not effective for removing some types of chemical agents, especially thickened agents. Flushing does not neutralize chemical agents, but transfers the contaminants from your immediate area to a contained area (sump) where they may be neutralized.[1] **Neutralize:** See Table H-7 and service specific manuals for standard and nonstandard decontaminants.
Monitoring Operations	Monitor surfaces immediately after decontamination operations and before use. Periodically monitor surfaces for residual/missed/resurfacing contamination.
NOTES	[1] Control of waste water is of vital importance, as flushing removes contamination but doesn't neutralize it. [2] Not all decontaminants are suitable for interior decontamination. Users must consider the agent and type of surface requiring decon. [3] When using heat, users must consider the combustibility of the materials being heated. [4] Some biological agents are heat stable; therefore, heat will not work as a decontaminant. Check with medical staff personnel to determine which agents may be destroyed/neutralized using heat. [5] Scrub rough surfaces after flushing or applying the disinfectant. This avoids embedding contamination into the surface.

a. **Radiological Decontamination.** Radioactive contaminants cannot be made safe by chemical action. They must be removed or shielded if it is impractical to wait for natural decay. Therefore, radiological decontamination is the process of reducing the radiation hazard to an acceptable level by removal and disposal of the contamination or by placing shielding over the contamination. Table H-2 describes various types of decontaminants proven effective in the removal of radiological contamination. Table H-3 discusses different pieces of equipment that may be used to remove contamination from facilities, and Table H-4 discusses types of surfaces and decontaminants that may be used on them. These tables are not all-inclusive, but should be used with caution following the safety measures discussed in Appendix G, Toxic Industrial Materials.

Table H-2. Radiological Contamination Removal Methods

Decontaminant	Type	Remarks
Soapless detergent, soap, wetting agent	Detergent	Practical for field use.
Gasoline, kerosene	Solvent	Practical for field use.
Water, steam	Solvent	Practical for field use.
Potassium hydroxide, sodium hydroxide, trisodium phosphate, sodium orthosilicate	Solvent	Practical for field use.
Acetone, alcohol, ether, paint remover	Solvent	Practical for small-scale operations only.
Citrates, citric acid, sodium versenates, polyphosphates	Complexing agent	Practical for small-scale operations only.
Aqua regia[1], hydrochloric acid[1], nitric acid[1]	Corroding agent	Practical for small-scale operations only.
[1]**To be handled by experienced personnel only.**		

Table H-3. Radiological Decontamination Equipment

Items	Use
PDDA	Can provide 400 gallons of heated water. Spray vital areas/equipment.
Broom/Brush	Brush dust from personnel, clothing, equipment, and surfaces.
Shovel	Remove/bury/dispose of contaminated objects and materials.
Fire or water hose	Spray areas/equipment and control dust.
Bulldozer	Remove/bury/dispose of contaminated objects and materials.
Long-handled scraper	Scrape paint.
Steam cleaner	Clean machinery and dirty surfaces.
Water-carrying or moving equipment	Haul water.
Containers	Move/control waste.

Table H-4. Radiological Decontamination—Fixed Site Facilities

Surface	Method	Advantages	Disadvantages
Paint	Water	Most practical method for gross decon.	Runoff must be controlled. Protection needed from contaminated spray.
	Detergent	Most commonly available reagent. Removes grease films.	Mild action. Waste must be controlled.
	Complexing agents	Holds contaminants in solution.	Requires application from 5 to 30 minutes for effectiveness. Little penetrating power; hence, of small value on weathered surfaces. Single agent not effective for all contaminants. Not always available. Waste must be controlled.
	Scrubbing with water and detergent	Greater surface action than water and detergent alone.	Personnel in close contact with contaminants. Not always available. Waste must be controlled.
	Organic solvents(gasoline, kerosene, turpentine, acetone, ether, commercial paint removers)	Quick dissolving action.	Toxic and flammable. Requires good ventilation and fire precautions. Waste must be controlled.
	Caustics	Minimum contact required with contaminated surface. Contamination reduced almost 100 percent.	Personnel hazard. Not to be used on aluminum or magnesium. Waste must be controlled.
	Abrasion (wet)	Complete removal of surface and contamination. Feasible for large-scale operations.	Too harsh for many surfaces.
	Strippable coatings	Ease of use.	Best applied before contamination occurs. Control of powder residue necessary.

Table H-4. Radiological Decontamination—Fixed Site Facilities (Continued)

Surface	Method	Advantages	Disadvantages
Glass	Detergent	Readily available.	Same as for painted surfaces.
	Complexing agents	Holds contaminants in solution.	Same as for painted surfaces.
	Oxidizing acids and agents		Single agent not universally applicable. Personnel hazard.
Metal	Water	Most practical method of gross decon.	Same as for painted surfaces.
	Detergent	Removes oil or grease films.	Same as for painted surfaces.
	Complexing agents	Holds contaminants in solution.	Same as for painted surfaces.
	Organic solvents	Stripping of grease.	Same as for painted surfaces.
	Brushing, sweeping, wiping	Removes contaminated dust when water isn't readily available.	Contaminated dust hazard to personnel.
	Inorganic acids	Fast, complete decontamination.	Removes part of surface. Good ventilation required; acid fumes toxic to personnel.
	Acid mixtures	Action of weak acid reduces contamination on unweathered surfaces.	Same as for inorganic acids.
	Oxidizing acids and agents	Decon relatively complete for inert metals.	Same as for inorganic acids.
	Ultrasonics	Removes adhering dust contaminants.	Requires specialized equipment.
Concrete and Brick	Abrasion (vacuum blasting	Direct and complete removal of contaminated dust.	Contamination of equipment.
	Vacuum cleaning	Direct removal of contaminated dust.	Same as for vacuum blasting on concrete.
	Water	For large concrete surfaces contaminated with dust and dirt.	Drives some of the contaminant into the surface. Waste must be controlled.
Wood	Planing	Complete removal of contamination. Minimum dust hazard.	May impair use.

b. **Biological Decontamination.** Many of the same decontaminants used for radiological and chemical decontamination are used for biological decontamination. Table H-5 provides a listing of standard and nonstandard decontaminants, as well as their applications and limitations for biological decon. Table H-6 provides "how to" guidance for decontamination of biological agents from fixed site facilities. Decontamination is less of an issue with biological agents than with chemical agents or radiological fallout. Biological agents, if efficiently aerosolized in particles of up to 5 microns, will remain suspended in air until they are either inhaled or destroyed by UV radiation. Personal decontamination could involve just changing clothing and showering. Decontamination of facilities generally would only be necessary in cases such as a munition being used in or adjacent to a facility.

Table H-5. Chemical Decontaminants for Biological Agents

Decon Agent	Application	Limitations	Remarks
Formalin Formalin-methanol mixture (5 parts formalin and 3 parts methanol)	Applied as aerosol from standard insecticide sprayers or vaporized by heat or steam through pan of material (contact time, 16 hrs). One qt of undiluted formalin or 4/5 qt of formalin-methanol mixture/1,000ft^3 above 70°F with a relative humidity of 85%. The minimum effective relative humidity is 70%. The minimum effective temperature is 60°F, at which temperature the exposure time should be increased to 24 hrs. Aerate after decon until odor is no longer objectionable.	Vapors are highly toxic. Vapors of formalin are not flammable; open flame should not be used for vaporizing when methanol has been added to formalin. When steam is used, source of steam should be outside area being deconned. Will not penetrate cloth and similar fabrics as effectively as other agents. Bulk and weight of large liquid quantities may damage delicate instruments. Dampness may curl and ripple paper. Vapor polymerizes and deposits white powder on horizontal surfaces; this powder may be washed off with hot water. Handlers are required to wear SCBA, rubber gloves, and protective clothing.	Once vaporization has started, personnel should not enter area until process is completed. Take care to prevent leakage of solution during storage.
STB	For horizontal surfaces, apply slurry of 7 parts STB to 93 parts water. Applied preferably from a PDDA. Avg coverage = 1gal/8 yd^2 (7 m^2) for porous surfaces such as concrete and ½ gal/m^2 for closely packed surfaces.	Corrosive to metals. Do not inhale or allow to contact the skin. Wear protective mask or other respiratory protective device when preparing slurry.	In ordinary storage, loss of available chlorine is <1%/month. When free chlorine falls below 10%, bleach should be salvaged. As available free chlorine is lost, increase STB content in slurry. Stored in unheated warehouse isolated from combustibles and metals subject to corrosion. Packaged in 8-gal drums.
DS2	Applied to surfaces with brushes, brooms, or swabs, or sprayed from portable decon apparatus. Surfaces should be flushed with water after 30 min.	FLAMMABLE. Do not allow contact with skin; remove from skin and metals. Highly corrosive to some metals; destroys some fabrics.	Packaged ready to use in 5-gal drums.
Calcium hypochlorite HTH	Use a slurry of 3 parts HTH and 97 parts water for horizontal surfaces. Approximate coverage is 1 gal/8 yd^2 (7 m^2).	Highly corrosive to metals. Loses chlorine content rapidly. Do not inhale or allow contact with skin and eyes. Wear protective mask or other respiratory protective device and rubber gloves when preparing slurry.	Packaged in 5-lb cans and 100-lb drums. Contains about 70% available chlorine when packaged.
Sodium hypochlorite (household bleach)	Apply (undiluted) with brooms, brushes, or swabs. Can be sprayed (diluted half-and-half with water) by means of a PDDA. Dilute for cotton clothing (1/2 cup to 1 gallon water). Coverage same as STB and HTH.	Undiluted, it is harmful to skin and clothing. Corrosive to metals unless rinsed, dried, and lubricated after decon.	Remove from skin and clothing by flushing with large amount of water. Contains about 5.25% available chlorine. Store in cool place.
Detro-chlorite	A thickened bleach containing (by weight) 19.3% diatomaceous earth, 0.5% anionic wetting agent, 2.9% calcium hypochlorite (70% available chlorine), and 77.3% water. Apply to vertical surfaces by means of a PDDA. Following a contact time of at least 30 min, the mixture is removed by washing the surface with water.	Very corrosive to metals. Mix wetting agent and diatomaceous earth with water before adding the calcium hypochlorite. Mixing the wetting agent and calcium hypochlorite in a dry undiluted state may result in an explosion.	Average coverage is 1 gal/8 yd^2 (7 m^2).

Table H-5. Chemical Decontaminants for Biological Agents (Continued)

Decon Agent	Application	Limitations	Remarks
Caustic soda or lye (sodium hydroxide)	Average application: 1 gal/m^2 on horizontal surfaces; solution strength should be 10% by weight.	Highly toxic. Corrosive to skin, eyes, and clothing. 5% solution will deteriorate wool and cotton. Highly corrosive to most metals. Solution should not be mixed in aluminum, tin, copper, or zinc containers.	Remove immediately from skin and eyes. Keep caustic soda solution in steel or glass containers equipped with rubber stoppers, wired or taped in place when not in use. Store solid caustic soda in sealed steel drums to keep dry.

Table H-6. Biological Agent Decontamination Methods

Item	Method	Remarks
Buildings: Exterior	Apply detrochlorite. Leave on at least 30 min, then flush with water. Apply STB slurry to vertical surfaces by manual means or PDDA. Slurry may be left on exteriors. Weather.	Sun and rain eliminate most microorganisms within 1 day.
Interior	Use betapriopiolactone (BPL) vapors to decontaminate small quantities of substate. Aerate thoroughly afterwards. Wash with soap and water. BPL is highly toxic.	Seal building before fumigation and aerate thoroughly afterwards.
Air (enclosed areas)	Filter air by means of protective collector.	Air relatively free from microorganisms.
Porous walls, and floors	Apply 2% household bleach solution.	
	Apply slurry of 7 parts STB and 93 parts water (by weight).	May be applied by PDDA on large areas.
	Apply 10% caustic soda solution.	

c. **Chemical Decontamination.** Table H-7 focuses on the type of decontaminants, standard and nonstandard, used on chemical agents. Table H-8 discusses facility decontamination, focusing on the surfaces and decontaminants rather than on how to accomplish the decontamination.

Table H-7. Decontaminants for Toxic Chemical Warfare Agents

Chemical Agents	Decontaminants	Remarks
All chemical agents	DS2 solution	Applied by apparatus or by brushes, brooms, and swabs.
All liquid agents	Fuller's earth	Powder absorbs contamination, doesn't neutralize it.
	Detergent/wetting agent; GUNK	Water-dispersible solution (1.34 lb GUNK/gal kerosene).
	Sodium hydroxide (caustic soda or lye)	Water solution (0.5 lb lye/gal water).
Blister, G- and V-agents	Sodium hypochlorite (household bleach)	Unstable as solid; more stable in solution; 5% available chlorine.
	STB	White powder containing 30% available chlorine.
	Chloramide powder	Effective against fine droplets and vapors only.
Blister and G-agents	Steam	Hydrolyzes certain chemical agents.
	Soap and water	Limited hydrolysis, surfactant helps remove agent.
Blister and V-agents	HTH	Oxidizing agent; packaged at 70% available chlorine.
G-agents and irritant agents	Sodium carbonate (washing soda)	White, alkaline powder; dissolves easily in water.
G- (GA, GB, GD) and V-agents	Slurry, hot soapy water, alkali solution, or DS2	STB and GA produce toxic vapors; use steam and ammonia in confined areas.

Table H-7. Decontaminants for Toxic Chemical Warfare Agents (Continued)

Chemical Agents	Decontaminants	Remarks
Mustards (H, HD, HN, HQ, HT)	STB, slurry, DS2, or Fuller's earth	Dry STB on liquid mustard produces flame and toxic vapors; STB stable in sealed container up to 10 years. Don't mix DS2 and STB.
Lewisite (L); mustard-lewisite mixture (HL); arsines (PD), (ED), (MD)	STB, slurry, DS2, water, or caustic soda	Decon products are toxic, fairly stable, nonvolatile, and insoluble in water; alkali solutions destroy vesicant properties. Don't mix DS2 and STB.
Phosgene oxime	Large amounts of water or DS2	Liquid above 39°F; readily soluble in water.
Phosgene (CG)	Water followed by alkali solution or DS2	CG liquid below 47°F.
Cyanogen chloride (CK), hydrocyanic acid (AC)	Sodium hydroxide solution or DS2	CK liquid below 55°F; AC liquid below 77°F.
Adamsite	Slurry or DS2	Aeration is sufficient in the field.
Diphenylchloroarsine, diphenylcyanoarsine	Alkali solution or DS2	Aeration is sufficient in the field.
Chlorobenzylmalinotriol	Water or 5% sodium bisulfite solution	Aeration for vapors; remains in soil for a long time.
Chloroacetophenone (CN), CN solution	Hot sodium carbonate solution, hot sodium hydroxide, or hot soapy water	Aeration for vapors.
Sulfur trioxide-chlorosulfonic acid	Alkali solution water followed by alkali solution or hot soapy water	Corrosive to metals when moist; acidic, destroys nylon and paint almost immediately.
Titanium tetachloride (FM)	Water or alkali solution	Corrosive to metals.
3-Quinuclidinyl Benzilate	Hot soapy water	

Table H-8. Chemical Contamination—Facilities Decontamination

Structure	Decontamination Method	Remarks
Exterior Building	Apply STB slurry to vertical surfaces by manual means or PDDA; slurry may be left on exteriors.	This applies to all types of surfaces. Apply STB or dry mix on ground where any waste water/liquids flow.
Wood or Masonry Roofs	Weather.	Extensive time requirements.
	Apply slurry with PDDA, brooms, or swabs. Let slurry remain 12-24 hrs; flush and repeat application, then flush again.	
Canvas, Tarpaulins Tents	Immerse in boiling soapy water for 1 hr. Use 5% solution of washing soda for G-agents. Launder by standard methods. Aerate (except for V-agents). Use slurry. Use chloramide powder.	**Dispose of these items.** Use these measures only for extraordinary circumstances.
Interior	Wash with soap and water. Aerate.	
Air (in inhabited, enclosed spaces)	Filter air by means of protective collector.	Renders air free from chemical agents.
Glass	Use DS2. Wash with hot soapy water. Wash with clear water or organic solvent.	Blot off surface. Aerate. Weather.

Table H-8. Chemical Contamination—Facilities Decontamination (Continued)

Structure	Decontamination Method	Remarks
Lenses	Use DS2. Wash with hot soapy water. Wash with clear water or organic solvent.	Blot off surface. Aerate. Weather.
Machinery	Use DS2 and rinse. Wash with hot soapy water. Weather.	Apply grease to moving parts.

4. Terrain Decontamination

It may also be necessary to decontaminate surfaces around or leading to a facility. The manpower and resources expended to decontaminate a road or large areas of terrain can be prohibitively expensive and time consuming. Conduct terrain decontamination only after a very careful weighing of all alternatives. Consider Table H-9 if terrain decon is essential.

Table H-9. Road/Surface Decontamination

Contaminated Surface or Object	Recommended Methods		
Asphalt Roads	Flush with water. Spray with slurry.	Cover with STB; when liquid contaminant is visible and personnel are nearby, use dry mix.	Weather. Cover small areas or paths across roads with 10 cm (4 in) of earth.
Brick and Stone Roads	Spray with slurry or apply with brushes and brooms. Let remain 24 hrs, then flush with water.	Wash with soapy water, preferably hot.	
Concrete Roads	Spray with slurry.	Cover with STB or dry mix.	
Hard Surfaced Roads (packed dirt, gravel -not loose surfaces)	Pour, spray, spread oil.	Cover with STB; when liquid contaminant is visible and personnel are nearby, use dry mix.	

Appendix I

RETROGRADE OF EQUIPMENT WITH RESIDUAL NBC CONTAMINATION

This appendix provides detailed procedures for determining and reducing residual contamination levels on equipment contaminated in an NBC battle space environment. Procedures are also included for marking this equipment, maintaining historical records, conducting periodic monitoring, and transporting this equipment out of the JOA to a CONUS retrograde destination.

1. Objective

The safety of service members and transport personnel is of foremost concern during the CONUS retrograde of equipment with potential residual or low-level NBC contamination. These procedures are intended to protect personnel against low-level NBC exposure resulting from maintenance or transportation actions, conserve valuable assets, and maintain DOD life cycle control of previously contaminated equipment. With current decon technology constraints, some equipment may require extensive weathering to meet safety objectives, and in some cases, equipment may require destruction. Generally, civil aircraft will not be used to transport equipment with residual NBC contamination due to safety and legal concerns. Additionally, execution of these procedures will require extensive support from subject matter experts, government agencies, and senior leadership.

2. Overview

a. For purposes of this document, "residual contamination" is defined as: 1) postattack/incident contamination not currently detectable by standard field detectors (e.g., CAM, M8A1, M256, RADIAC meters) and 2) contamination that remains on equipment after thorough decontamination.

NOTE: Any equipment present in the templated hazard attack area (per STANAG 2103, ATP 45) may demonstrate residual contamination when monitored by specialized detectors available at specified fixed sites in the JRA.

Following thorough decon, residual contamination risks include potential vapor hazards and limited contact hazards. These risks increase as residually contaminated equipment is consolidated and personnel work around this equipment for prolonged periods, particularly in areas with limited air circulation. Risks may also increase as equipment is disassembled for maintenance functions or containerized for shipment.

b. Suggested retrograde procedures involving chemical agents are based on compliance with published AEL. DA Pam 385-61, *Toxic Chemical Agent Safety Standards*, defines AEL as, "allowable concentrations in the air for occupational and general population exposures." Although that document is intended for chemical depot application as opposed to warfighting, its historical provision for the safety of chemical depot workers supports its credibility as a guide to toxic agent safety in a CONUS retrograde scenario. Companion documents include 29 Code of Federal Regulations 1910.119 and Army

Regulation (AR) 385-61. Table I-1 provides AEL for nerve agents GD, tabun (GA), GB, and VX; mustard agents H/HD/HT; and lewisite.

NOTE: Although not necessarily "agent workers," this appendix applies the AEL standards of the 8-hour time weighted average (TWA) for an unmasked "agent worker" and corresponding ceiling values to DOD/DOD contract personnel involved in CONUS retrograde operations.

Table I-1. Airborne Exposure Limits

Occupational Scenario	Chemical Agents (mg/m3)				
	GD	GA/GB	VX	H, HD, HT	L
Unmasked Agent Worker 8-hour TWA* in any work shift and max exposure in any period (ceiling value)	.00003	.0001	.00001	.003	.003
Source Emission Limit	.0001	.0003	.0003	.03	.03

NOTE:
* TWA = Average exposure limits for an 8-hour day and a 40-hour work week to which nearly all unmasked agent workers can be exposed day after day without known adverse health effects.

c. It is also recognized that variations of these chemical warfare agents or different agents may be used in the battle space, in which case, decisions at national/strategic levels may be necessary. Appendix I, Annex 1 lists military and industrial detectors capable of providing detection at these sensitivities and some practical constraints and limitations.

d. Although some nuclear and biological retrograde procedures are discussed, methods to mitigate these residual hazards are primarily functions of removal and "death" of the agent as defined by nuclear and biological decay rates, except for spores. For residual radiation, if the particles cannot be removed, the time required for natural decay is a function of the isotope's half-life and cannot be hurried. At this point, distance, limited exposure time, and shielding between personnel and the contaminated equipment are the only means of reducing exposure risks. Biological agents generally "die" within hours after dissemination and exposure to UV light (sunlight). For more robust biological agents, thorough decon and preparation of equipment to US Department of Agriculture (USDA) import standards will eliminate most health threats; even so, continuing precautions are warranted. Because of the small particle size of the typical BW agent, some agent may adhere to internal equipment surfaces, creating a risk to unwarned maintenance personnel touching facial areas after contact with these internal surfaces.

e. In addition to the NBC considerations, this appendix addresses two equipment retrograde scenarios: emergency equipment retrograde and nonemergency equipment retrograde. The emergency scenario is predicated upon immediate mission requirements such as the depot-level rebuild of a critical shortage end item (e.g., a jet engine). The nonemergency scenario is basically a postconflict redeployment of military equipment. Although an infinite amount of time is unrealistic for nonemergency retrograde, planning should address significant time requirements for agent weathering.

3. Concept of the Operation

The safe retrograde and long-term disposition of equipment with residual contamination require a thorough understanding at all levels of the associated risks and the minimum requirements necessary to mitigate those risks. Figure I-1 identifies the minimum essential tasks associated with these retrograde operations. Responsibilities and detailed guidance for performing these tasks follow later in the appendix.

Minimum Essential Tasks

Mark Equipment.

- Equipment is marked as precautionary measure to indicate possible/actual contamination. Applies to equipment in templated attack areas regardless of decon values.

Determine Residual Contamination.

- Residual Contamination is confirmed/denied using specialized equipment in the JRA.

Reduce Residual Contamination.

- Reduction may require additional thorough decon, extreme decon, or extensive weathering. Some equipment may require destruction/approved disposal.

Maintain Historical Records.

- Historical records maintain precautionary controls for remaining equipment life.

Conduct Periodic Monitoring of Equipment.

- Monitoring before, during, and after transport requires specialized equipment and provides warning of increasing risks of off-gassing.

Transport Equipment.

- Regardless of contamination levels, crew areas are monitored and protection is available.
- Coordinate early with customs and ensure appropriate security throughout trip.

Figure I-1. Minimum Essential Tasks

Generally, three words capture the goals of NBC retrograde operations: mission, protection, and control (Figure I-2). Prioritization of these three goals is a function of operational timing and the extent of contamination. For example, under emergency conditions, strategic and operational objectives may warrant increased risks and require increased protective postures to meet mission requirements. However, in a nonemergency situation, those same risks may be unacceptable and more stringent contamination control measures may be required to support lower individual protection levels.

NBC RETROGRADE GOALS

Mission

- Support strategic and operational objectives.

Protection

- Protect the force and mission resources from NBC hazards.

Control

- Control contamination and previously contaminated equipment for the remainder of its life cycle, including its final destruction.

Figure I-2. NBC Retrograde Goals

a. **Emergency Retrograde Concept.** The emergency retrograde concept shown in Figure I-3 is based on the presumption a conflict is ongoing and failure to return critical items to the CONUS or intermediate locations results in an unacceptable strategic and operational situation. If mission requirements necessitate a speedy return to depot, then risks must be mitigated with additional contamination control measures, increased detection, and protection for transporters and maintainers.

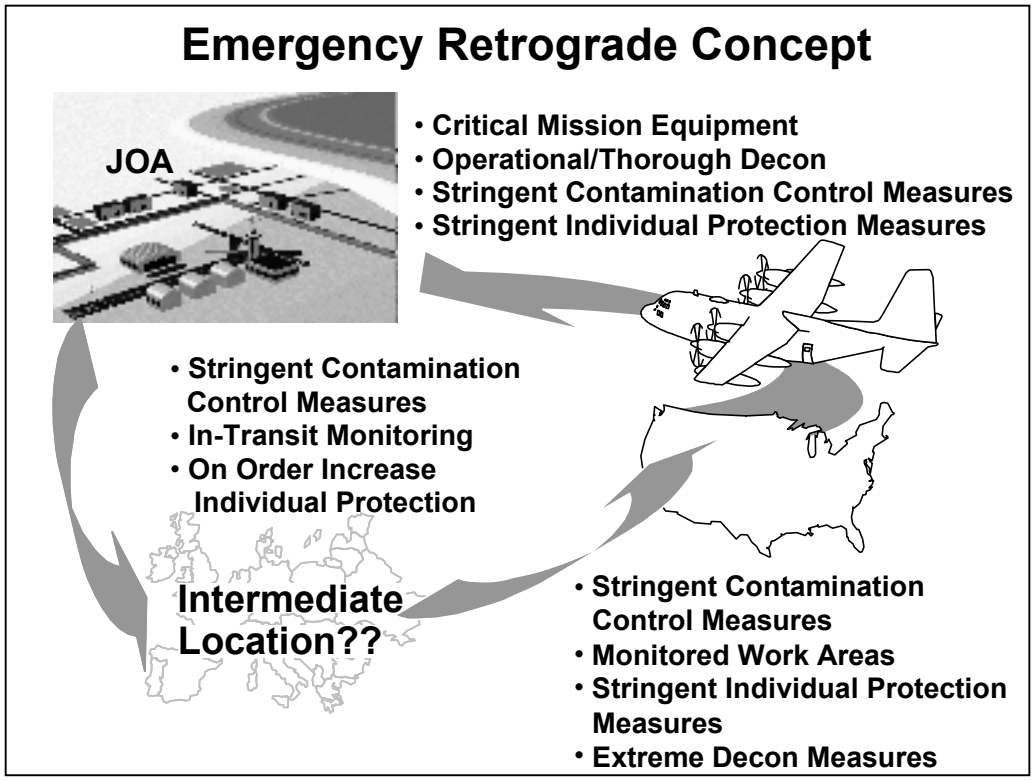

Figure I-3. Emergency Retrograde Concept

(1) **Emergency retrograde requirements.**

(a) **Define and communicate the emergency.** Before initiating actions to retrograde potentially contaminated equipment to the CONUS for repair/rebuild, the JRAC determines if the emergency conditions and risks involved warrant such action. In some cases, providing new items via CONUS repair/rebuild is more effective. Regardless, the intent to retrograde residually contaminated equipment must be communicated through the Chairman of the Joint Chiefs of Staff (CJCS) due to potential risks and political/environmental sensitivities.

(b) **Determine the impact(s).** Emergency retrograde requires valuable lift assets that must be protected for future use. Additionally, selected aircraft will require the use of CAMs in the cockpit and cargo compartment to test for vapors. If airtight containers are unavailable to containerize the cargo, crew risks increase, as well as the likelihood of crewmembers having to wear MOPP gear. Crews respond to increasing vapor levels inflight by donning IPE. **In most cases, these risks are not acceptable.**

(2) **Emergency retrograde procedures.**

(a) **Preparation.** When mission requirements outweigh the potential risks of NBC emergency retrograde, the following actions should occur as minimum preparation for movement:

- **Conduct thorough decontamination.** Take additional time to remove any parts not necessary for the CONUS action. Be meticulous with thorough decon procedures. If commercial, high-pressure steam cleaners are available, use them to augment the final rinse station. If low-level detectors are available at the decon site, use them at the check/monitor station.

- **Mark equipment and initiate historical record.** Use the procedures addressed in subparagraph b, Nonemergency Retrograde Concept.

- **Prepare shipping container(s).** AFJMAN 24-204, *Preparing Hazardous Materials For Military Air Shipments*, addresses the packaging of chemically contaminated cargo in hermetically sealed bags and open-head, metal drums with airtight gaskets or using double airtight drums. Advanced coordination with the Air Mobility Command is essential for cargo not in these containers. Extreme measures to protect the aircraft from contamination are warranted since these aircraft support missions worldwide. Most jet engines and some other major end items have airtight shipping containers. However, some of these containers also have pressure relief valves that must be sealed to ensure containment of off-gassing vapors.

When preparing to modify containers for NBC retrograde shipments, do not assume that "water-tight" equals airtight. Many containers are constructed with baffles to keep out water, but they allow air circulation unless all air entry/exit points are sealed. Container modifications may also include modified gaskets around doors and one-way ports for in-transit air monitoring if necessary. In addition to modifying American National Standards Institute/International Standards Organization containers, the Equipment Deployment Storage System quadruple container, triple container, and International Standards Unit offer smaller volume options (see FM 55-80, *Army Container Operations*).

- **Monitor the sealed container.** If time permits, use a low-level detector and previously discussed modifications to monitor the sealed container for at least 2 hours to verify AEL compliance.

- **Follow the checklist.** Use the pretransport checklist, Figure I-18, to ensure appropriate actions are rehearsed and protective equipment is readily available. Ensure monitors are installed in the crew and cargo compartments. The US Army Materiel Command can provide assistance with detector installation.

(b) **Shipment.** Escort personnel from the US Army Materiel Command help monitor crew and cargo compartments during the flight. If not, loadmasters should receive training on the operation of the installed detectors.

(3) **CONUS actions.** Receiving agencies monitor inbound containers before opening. If container modifications do not include internal air sampling ports, move the container(s) to a designated isolation area to be opened by a qualified toxic agent worker in Level A protection. After determining vapor concentrations, proceed with necessary actions in the appropriate protective posture. Although work without protective masks may be permissible at AEL levels, contact hazards may continue to pose risks mitigated by wearing protective butyl rubber gloves. As the item is disassembled and repaired, work in a monitored environment. Exchange economically replaceable subcomponents prior to reassembly and remember any parts removed must be controlled or destroyed (currently by incineration) as chemically contaminated materiel. If possible, hold the retrograded item as an operational float for issue only under extreme mission requirements and send a replacement item back to the JOA.

Return procedures and precautions are the same as those used to ship to the CONUS; likewise, for JOA handling procedures follow the CONUS precautions noted above.

b. **Nonemergency Retrograde Concept.** The nonemergency retrograde concept shown in Figure I-4 assumes postconflict conditions allowing time for extraordinary decon and weathering in the JOA before transport to CONUS destinations. Personnel assisting the JRAC with retrograde detection, monitoring, and preparation of the equipment require stringent personal protection and specialized detectors. These preparations require continuous operations for weeks or months. As suspect equipment is consolidated for monitoring, decon, and weathering, security and buffer zones around the consolidation site provide additional contamination control measures to protect forces and HN personnel. Although extensive measures focus on obtaining AEL for the 8-hour TWA, agent worker standards, in-transit monitoring, and readily available crew protection remain mandatory. Once in CONUS, precautionary measures continue throughout the remaining equipment life cycle. This includes DOD control requirements, premaintenance monitoring, and periodic monitoring. Additional air quality control and future legislative requirements may drive considerations yet to be determined.

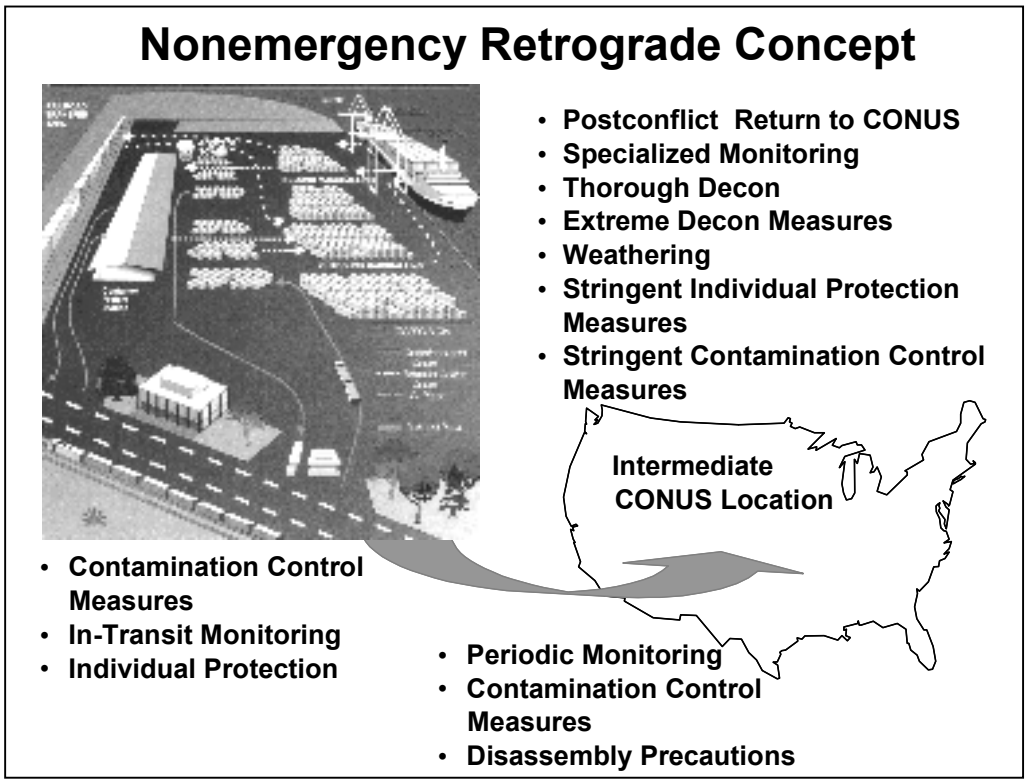

Figure I-4. Nonemergency Retrograde Concept

(1) **Roles and responsibility.** Figures I-5 through I-7 outline significant roles and responsibilities of commanders and personnel involved in the retrograde of equipment with residual NBC contamination. Resolution of this challenge requires extensive inter- and intra-agency coordination as well as cooperation. Critical actions begin at the operator level and continue through to the organization ultimately receiving the shipped equipment. The remainder of this appendix provides TTP for how these roles/responsibilities are supported or accomplished.

General Roles and Responsibilities

Equipment Operator

- ❑ Check Equipment for Contamination.
- ❑ Conduct Immediate Decon.
- ❑ Mark Equipment for Residual Contamination.

Equipment Owner

- ❑ Conduct Operational Decon.
- ❑ Support Thorough Decon.
- ❑ Mark Equipment for Residual Contamination.
- ❑ Initiate/Maintain Historical Record of Contamination.
- ❑ Coordinate through Chain of Command to JRAC all NBC Retrograde Requirements.
- ❑ Monitor Equipment Operators.
- ❑ Receive Retrograde Equipment (Nonemergency Retrograde).

Figure I-5. General Roles and Responsibilities

Joint Rear Area Coordinator (JRAC) Roles and Responsibilities

- ❑ Task Organize NBC Retrograde Support Elements (RSE).
- ❑ Train and Equip NBC RSE.
- ❑ Determine Residual Contamination Levels.
- ❑ Reduce Residual Contamination Levels.
    - Time/Weathering.
    - Thorough Decon.
    - Extreme Measures.
- – Decon and Replace Parts.
- – Destroy and/or Replace Parts.
- ❑ Initiate/Maintain Equipment Markings/Records.
- ❑ Certify Hazardous Cargo (Emergency Retrograde).

Figure I-6. JRAC Roles and Responsibilities

Roles and Responsibilities

Army Materiel Command

- Provide Technical Advice and Assistance to JFC/JRAC.
- Provide Subject Matter Experts to Augment/Train RSE Transport Personnel.
- Provide Additional Equipment Support to Augment RSE/Transport Commanders.

USTRANSCOM

- Designate Transport Means (Sea/Air/Ground).
- Approve Transport Plans/ Protective Measures.
- Request/Coordinate Emergency Waivers through DOS (Emergency Retrograde).
- Coordinate with USDA.
- Coordinate with USPHS.
- Coordinate with US Customs.
- Coordinate with DOT.
- Coordinate with International In-transit Waivers.

Designated Transport Commander (Sea/Air/Ground)

- Determine Cargo Movement Status (Go/No Go).
- Transport Equipment.
- Protect Personnel/Equipment.
- Monitor Transport Personnel/Cargo Areas During Movement.
- Maintain Markings/Records.

Receiving Organization (Emergency Retrograde)

- Protect Personnel/Facilities.
- Monitor Personnel/Facilities.
- Perform Emergency Actions.
- Maintain Markings/Records.
- Return Equipment to Theater by Designated Transport Commander.

Figure I-7. Roles and Responsibilities

c. **Possible Techniques.**

(1) **Equipment operator procedures.** Operators have no capability to detect low-level NBC hazards on their equipment; therefore, with minor exception, their post-NBC attack actions follow standard service procedures (see Figure I-8). If the operator finds gross contamination, he conducts immediate decon and marks the equipment as contaminated.

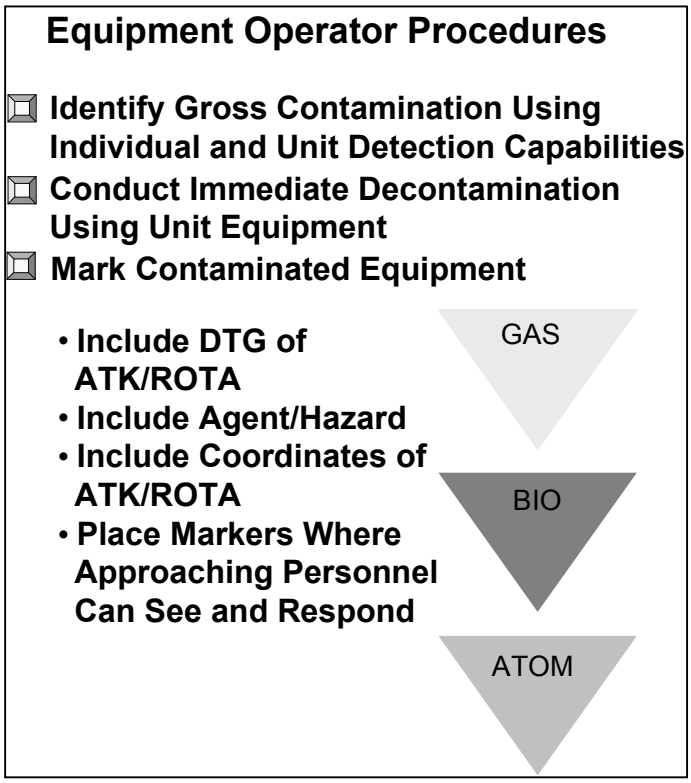

Figure I-8. Operator Procedures

Marking NBC hazards is essential to warning approaching personnel and avoiding agent transfer. This marking begins the record of contamination that follows the equipment for its remaining life cycle. Using standard NATO NBC markers, the operator marks the equipment so that any approaching personnel can see the hazard warning (i.e., front, back, and sides). This marker also identifies the requirement for subsequent operational or thorough decon. Markers should indicate date-time group (DTG) of attack or release other than attack (ROTA), agent or hazard, and coordinates for attack or ROTA. If markers are not available, the operator performs this action at the earliest opportunity.

(2) **Equipment owner (unit) procedures.** Unit commanders are responsible for ensuring their personnel are protected against gross and residual contamination hazards. Actions such as operational and thorough decon are common service procedures in the NBC battle space environment. In most cases, these procedures reduce NBC hazards to negligible risk levels.

Negligible risk levels allow combat and combat support missions to continue at reduced MOPP postures, although precautions for certain groups may continue. For example, mechanics working on previously contaminated equipment should always monitor or take protective measures before disassembling equipment components. Also, operators in restricted airflow cabs or compartments use the “buddy system” to observe for any responses to low-level contamination left after thorough decon.

However, the concern with residual contamination is low-level exposure over extended periods; in other words, long-term occupational exposure outside the context of accomplishing specific combat mission objectives. Low-level agent exposures will be annotated to appropriate personnel and medical records. Mitigating these risks requires unit commanders to implement certain command-directed procedures (see Figure I-9) including the following:

(a) **Special markings for residual contamination.** These markings shown in Figure I-9 are placed on any equipment present in the templated STANAG 2103, ATP 45 attack area that has not already been marked as grossly contaminated by the operator. Grossly contaminated equipment receives operational or thorough decon, and its marker replaced by "residual contamination markers" when unit field detectors indicate negligible risks as identified in FM 3-5/Marine Corps Warfighting Publication (MCWP) 3-37.3, *NBC Decontamination* or other applicable service manuals. Commanders may choose to centralize execution of this task to their unit NBC reconnaissance or decon teams.

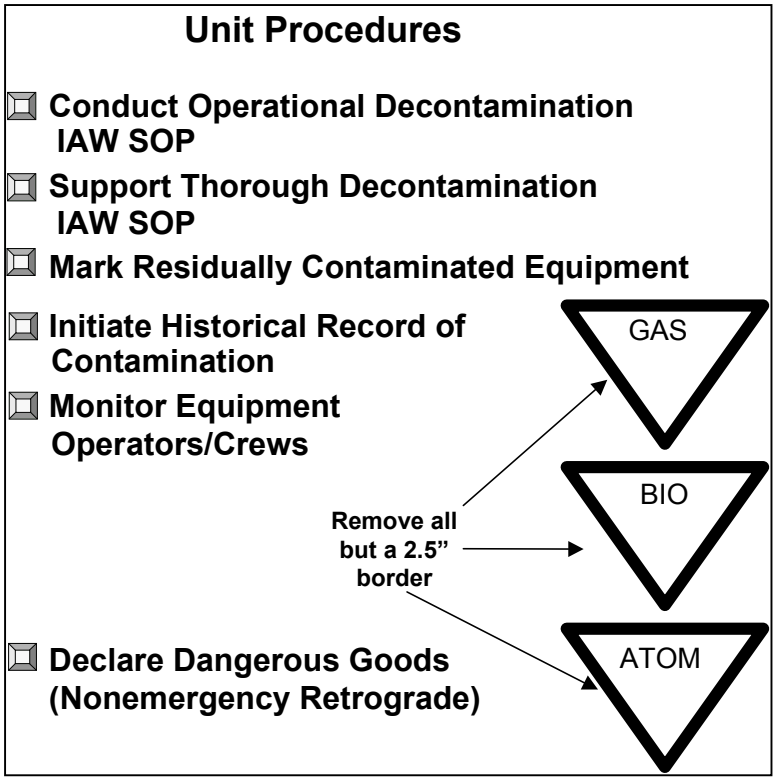

Figure I-9. Unit Procedures

(b) **Initiation of historical contamination records.** Service maintenance records for equipment with field-detectable contamination are annotated with the following information:

- DTG of the attack/ROTA.
- Agent/hazard.

- Coordinates for attack/ROTA.
- Means of determining contamination.
- Detector reading/time of reading (if applicable).

Figure I-10 provides an example using DA Form 2404 as the maintenance record. Other services use their own corresponding forms for recording maintenance status. These records provide important information to the NBC Retrograde Support Element (NBCRSE) for postconflict nonemergency retrograde. For instance, in the given example, it is possible the operator tested an M8 paper interferent that created a green color change (V-nerve). When the NBCRSE does not detect any residual contamination on the equipment, they can correlate attack information on the form with known NBC attacks to help validate or deny the original detection results. Additionally, this form provides an extra warning to maintenance personnel who read it before conducting maintenance procedures.

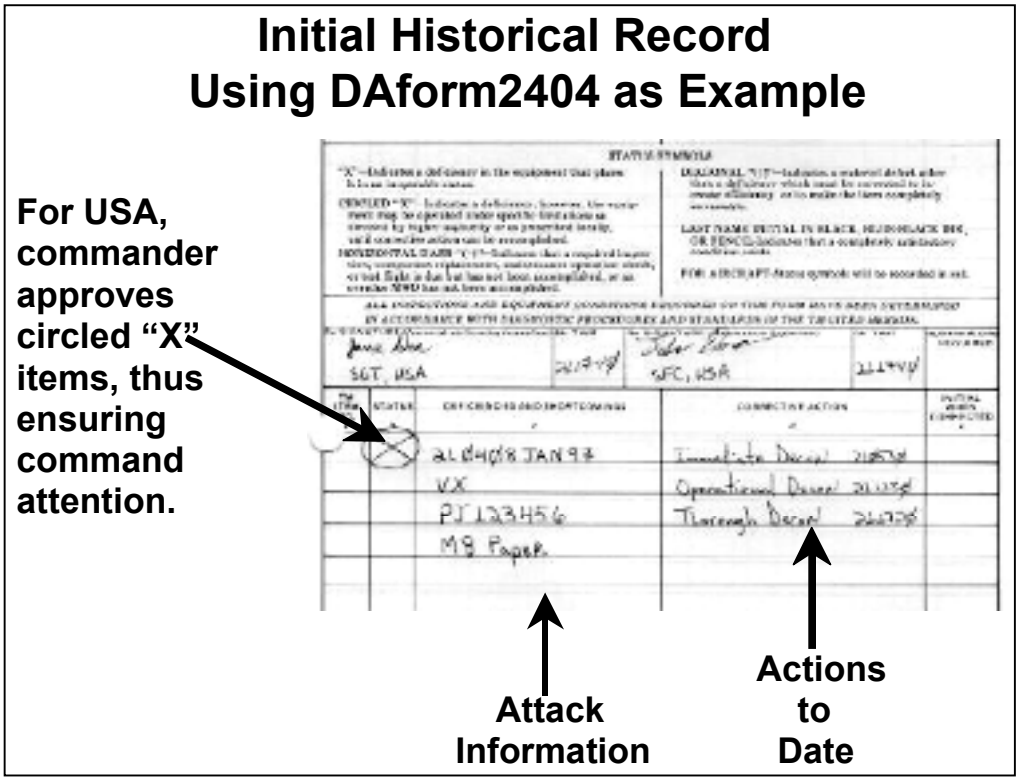

Figure I-10. Example DA Form 2404

(c) **Coordinate retrograde requirements.** During redeployment planning or when otherwise directed, unit commanders provide detailed listings of any contaminated equipment and any suspect equipment (equipment present in templated NBC attack areas) through their chain of command to the JRAC. This information allows detailed planning for equipment consolidation sites and necessary decontamination assets required by the NBCRSE.

NOTE: To avoid overload of NBC retrograde sites, it is imperative unit commanders and staffs conduct equipment screening. The equipment <u>does not go to the NBC retrograde site</u> if it was not contaminated, has not been in templated NBC attack/release areas, or has not driven through contaminated areas.

(d) **Monitor equipment operators.** Commanders implement procedures to ensure personnel continuing combat mission support at reduced MOPP levels are alert for signs and symptoms of agent exposures. After operational or thorough decon, commanders may consider periodic monitoring of equipment and personnel, especially as rising temperatures increase the risk of agent off-gassing.

(e) **Receive retrograde equipment.** Commanders will receive their retrograded equipment in CONUS. This equipment will have received extensive decon by the NBCRSE and/or weathering; therefore, delays in shipping should be expected. In some cases, contaminant levels may warrant issuing new unit equipment. Although the NBCRSE will decon IAW Table I-1 AEL levels, commanders will ensure historical records are maintained and periodic monitoring is conducted IAW DOD policy.

4. JRAC and NBC Retrograde Support Element Procedures

The JRAC plays a pivotal role in the retrograde of residually contaminated equipment, whether under emergency or non-emergency conditions. In coordination with the JFC and component commanders, the JRAC determines if mission requirements warrant the risk of emergency retrograde or if another COA is acceptable. To assist with nonemergency retrograde requirements, the JFC/JRAC will task-organize the NBCRSE to accomplish specified tasks shown in Figure I-11.

a. **NBC Retrograde Support Element.** Figure I-11 identifies tasks conducted by the NBCRSE and recommended units/organizations that may have organic capabilities to support the element's mission.

NBCRSE Tasks	Functions and Possible Support Units/ Organizations

• Isolate Equipment with Suspected/Actual Contamination
• Verify/Deny Contamination
• Reduce Contamination
  • Time/Weathering
  • Thorough Decon
  • Extreme Decon
• Apply Permanent Markings
• Prepare Permanent History
• Declare Hazardous Cargo/Certify Shipment
	• Command and Control
	  • JRAC/Staff
	  • USA Theater Support Command Staff
	• Support (Extent Determined by Total Equipment Requirements)
	  • US Army Material Command Subject Matter Experts
	  • USA Chemical Corps Brigade/Battalion
	  • Service Decontamination Units/Assets
	  • Construction Engineers
	  • Medical Support Unit
	  • Occupational Safety and Health Administration Representative
	  • USDA Representative
	  • US Customs Service Representative
	  • US EPA Representative
	  • US Department of Energy Representative
	  • Site Support Personnel (Security, Labor, Transportation)
	  • USTRANSCOM
	  • Coordinate with USPHS

Figure I-11. NBCRSE Tasks and Organization Options

b. **Isolate/quarantine equipment.** As equipment with known or suspected residual contamination is consolidated into assembly areas, risk of vapor exposure may increase due to equipment off-gassing. Redeployment planning addresses requirements for isolated consolidation point(s) for equipment with NBC residual contamination. Figure I-12 provides suggestions for layout or construction of such a site. Anticipate using engineer forces or contractors to construct complex sumps allowing pretreatment of decon effluents prior to release into water systems or existing sanitation/waste water treatment facilities.

Construction of buildings to support monitoring and laboratory operations, labor force change houses, and security facilities are added requirements if existing areas do not provide for these critical functions. Commander, Army Materiel Command can provide critical expertise to design, equip, man, and operate this facility. For example, this command already has mobile laboratories and change houses mounted on trailers for use at its various depots. A subordinate command, SBCCOM, can provide additional expertise for inclusion of local micrometeorological sensors and centralized detector networks emplaced throughout and outside the site.

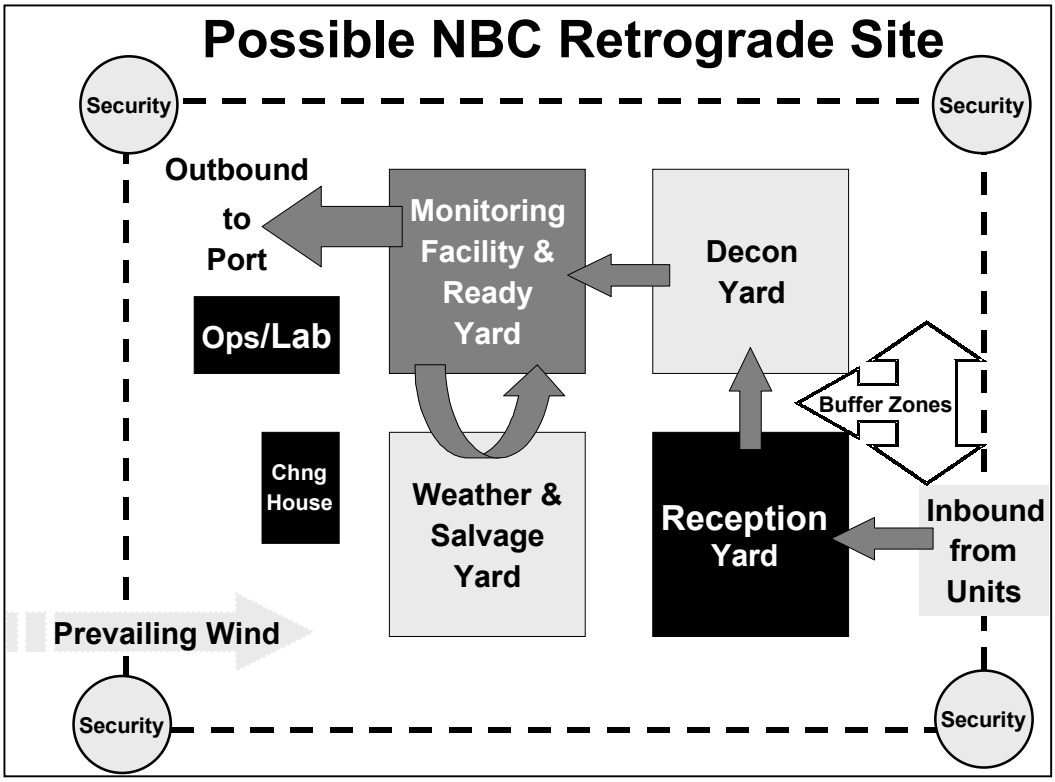

Figure I-12. Possible NBC Retrograde Site

c. **Reception yard operations.** During Operation DESERT STORM, retrograde operations required over 800,000 gallons of water per day just to clean dirt from equipment at a single port facility. This drives the requirement that unit commanders are responsible for conducting or supporting thorough decon before arrival at the NBC retrograde site. Reception yard operations (Figure I-13) require extensive areas to allow separation of various functions such as property book and accountability transactions, containerization of small or loose items, or segregation of equipment types. Large numbers of equipment at the NBC retrograde site will create months of delay prior to shipment home. Permanent property book transactions may occur to remove the property from the delivering unit's records, allowing new equipment to be issued at home station.

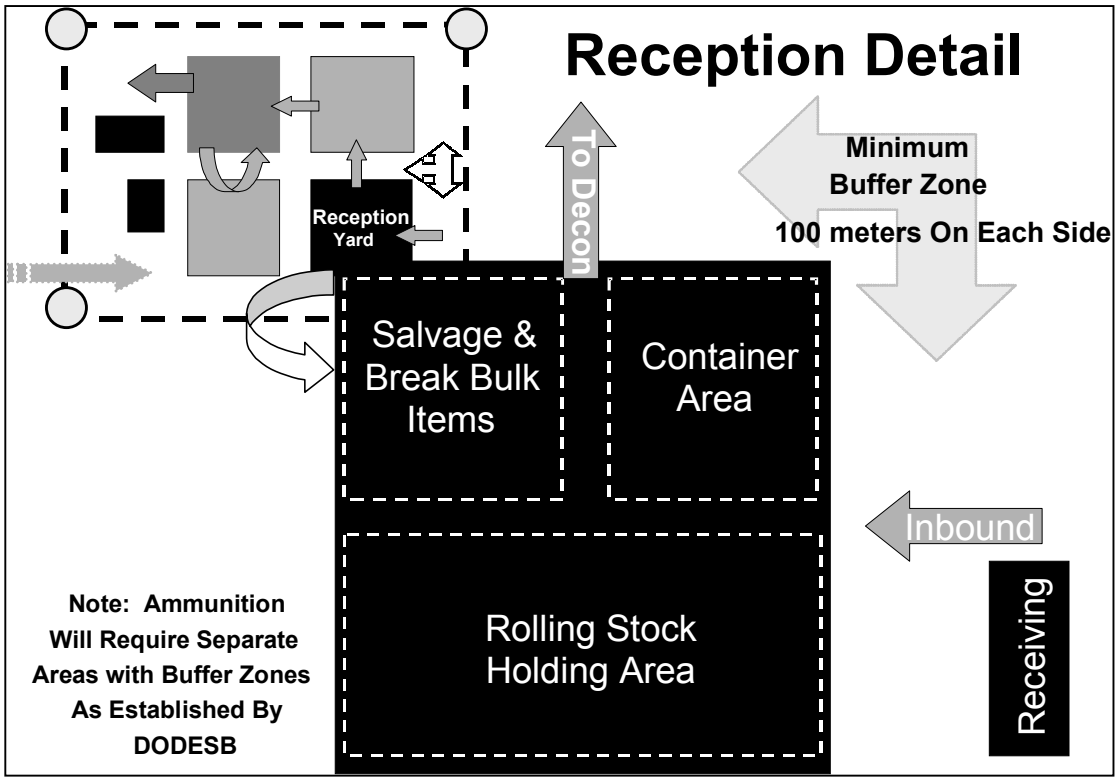

Figure I-13. Receiving Yard Detail

d. **Decon yard operations.** In the decon yard, the last attempts are made to use water and decontaminants to reduce contaminant levels IAW AEL standards. As such, it has some features normally not associated with thorough decon, and as a fixed site decon facility, it has additional contamination control measures for runoff (see Figure I-14).

NOTE: Due to its neutralizing affects on some agents, concrete is the preferred surface for the decon yard.

Decon yard operations will be labor intensive and require detailed management of work/rest cycles. Fielded decon equipment has been selected, in addition to other criteria, to minimize high pressure damage to equipment; as such, **it may not be the best choice for decon operations at this site**. At this point of the retrograde operation, potential paint and glass damage from commercial, high-pressure cleaners is probably an acceptable alternative to unacceptable contamination emission levels. After decon, equipment is monitored using a low-level alarm system such as automatic chemical agent monitoring system (ACAMS), miniature continuous air monitor (MINICAMS), and real-time analytical platform (RTAP) (see Appendix I, Annex 1) and modified air sampling procedures. These procedures range from drawing air samples from containerized equipment to using large plastic sheeting and sandbags to capture off-gassing vapors for analysis. Further monitoring occurs in the monitoring facility; however, the intent here is to recycle equipment through the disassembly point and decon line based on preliminary detection results. Maintenance specialists for identified critical end items must be trained and available to perform disassembly in protective clothing since removal of items such as hubs and road wheels improves decon results. Assistance and special handling equipment are

required to move these disassembled end items back through the decon line and monitoring areas. The intent of such drastic measures in the decon yard is that **no equipment returns to this yard**; if it fails monitoring standards in the monitoring facility, the only remaining alternative is extensive weathering.

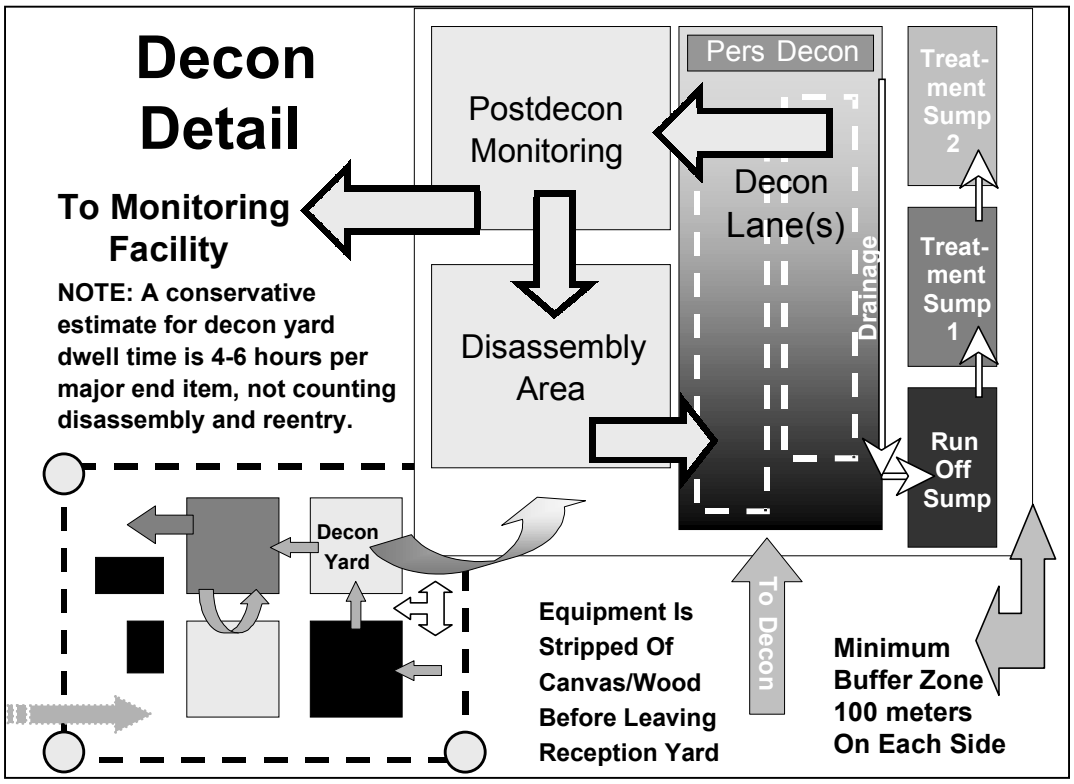

Figure I-14. Decon Yard Operations

e. **Monitoring facility and ready yard operations.** Equipment leaving the decon yard has passed a preliminary screening using low-level alarms. At the monitoring facility, equipment is monitored at known temperatures and, in some cases, heated temperatures over an established time period (generally 24 hours). This process uses low-level detectors such as absorption air samplers (bubblers) and depot area air monitoring system (DAAMS) (see Annex 1). As in the decon yard, modified sampling procedures may be required. Figure I-15 offers some suggestions for preparing large equipment for sampling. Equipment meeting AEL standards moves to the ready yard until transported to port for shipment to CONUS. Before shipment, permanent markings like those shown in Figure I-9 are painted on the equipment where approaching personnel will see them. Additionally, the same entries made on the operator maintenance form (see Figure I-10) are made permanently on the equipment's DD Form 314. Failure to meet AEL standards results in movement to the weather and salvage yard for extensive weathering and decisions on final disposition.

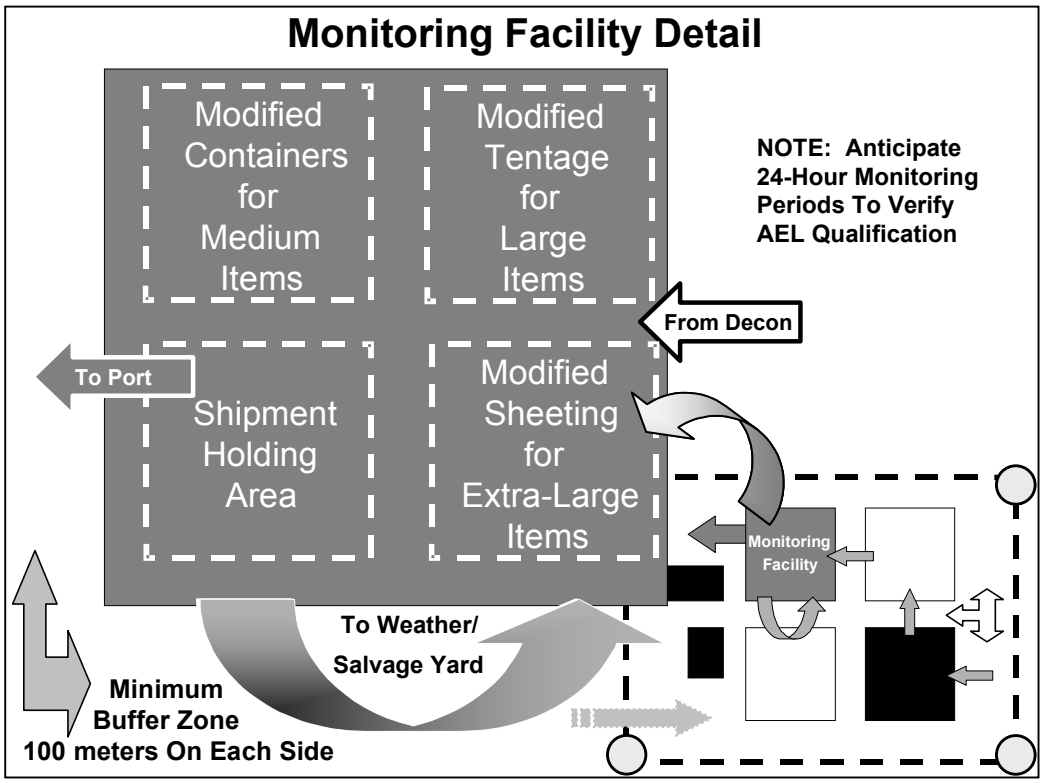

Figure I-15. Monitoring Facility Detail

NOTE: Efforts to save or decon items to an acceptable standard must be balanced against their replacement cost. It is feasible that a large number of items will require destruction and/or treatment as hazardous waste.

f. **Weathering and salvage yard operations.** Operations here include continued contamination reduction using weather and removal of suspected vapor-producing parts. Disassembly may mirror that at the decon yard or may be even more drastic. For example, tires and wheel hubs may have already been removed so further efforts may focus on wheel wells, running boards, and air filter systems. Contract sells to commercial decontamination ventures are already used to resolve hard-to-handle radioactive equipment contamination problems, and similar approaches may be considered for chemical contamination as well. Additional options include the use of mobile decontamination technologies currently under development by SBCCOM. Figure I-16 suggests a layout for this area.

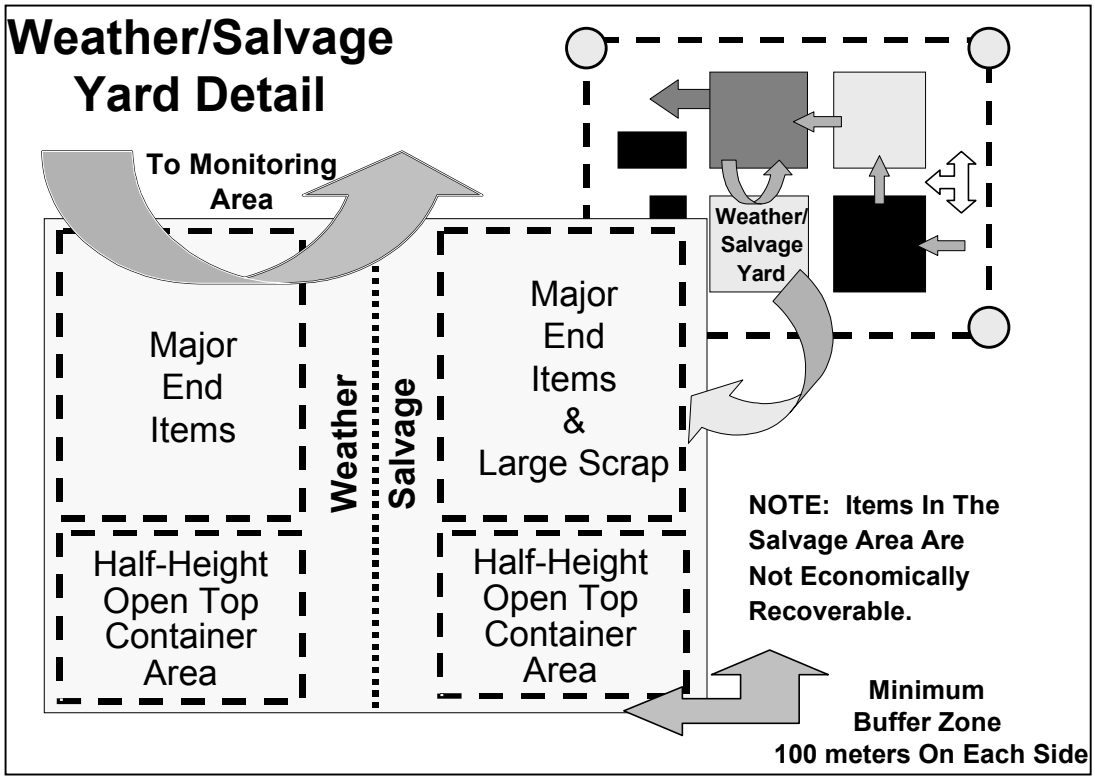

Figure I-16. Weathering/Salvage Yard Detail

g. **Site support and operations.** The NBC retrograde site requires extensive support and operations oversight. Figure I-17 identifies some major areas of consideration necessary for protecting site personnel and equipment; namely, networked detection and warning systems as well as physical security. Additionally, laboratory support is necessary to provide quick results for sampling operations. In addition to the personnel decon site in the decon yard, site personnel require a change house and rest areas. A medical surveillance station can be collocated in a separate section of the change house or in another building other than operations. The operations center should have communications with every functional yard/area, as well as a public address system capable of warning any yard/area at the site. Agencies such as the USDA, Department of Energy, Customs Service, and EPA will provide critical input to procedures and decisions regarding acceptability for transport to the CONUS.

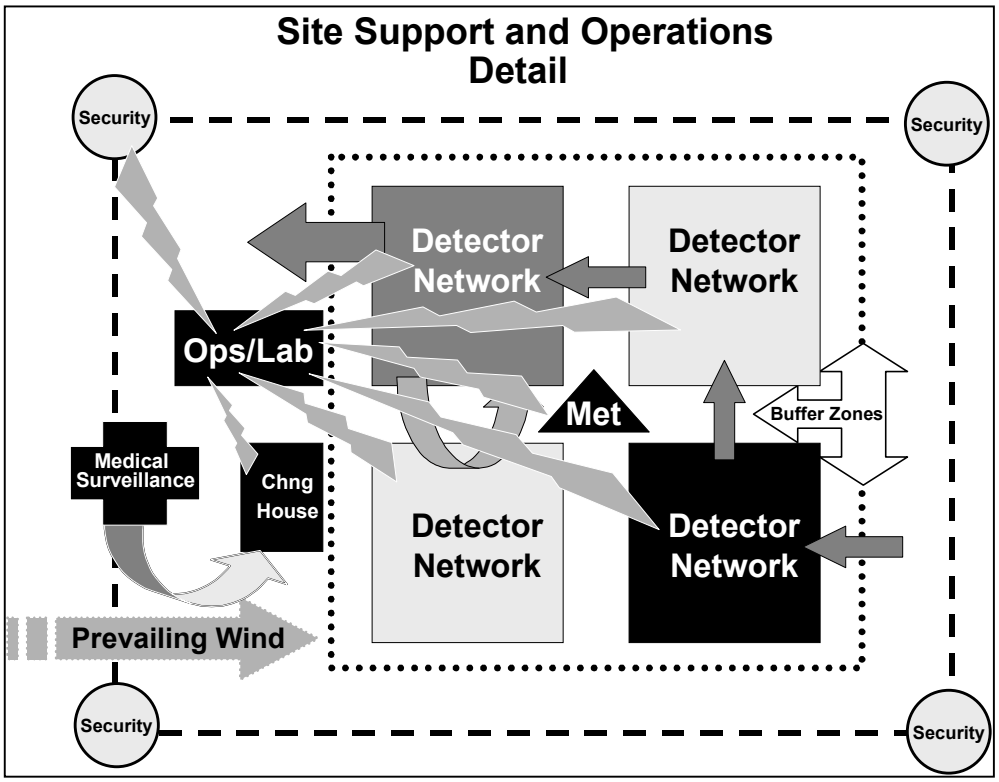

Figure I-17. Site Support and Operations Detail

5. Designated Transport Commander

The designated transport commander, whether sea, air, or land, has the final decision authority regarding the transport of NBC retrograde items and the safety of the crew. To help determine the risk involved, transport commanders are encouraged to observe retrograde site operations either directly or by representative. An alternative is to conduct separate monitoring operations; however, that requires additional resources already stressed from supporting the NBC retrograde site. In either retrograde scenario, the Commander, US Army Materiel Command can be requested to provide trained personnel to monitor cargo and crew areas while in transit. Under emergency retrograde conditions, the optimum situation is postdecon shipment in an airtight container. This minimizes risks of cargo compartment vapor hazards and allows the crew to conduct operations unencumbered by MOPP in monitored crew and cargo compartments. In most cases, nonemergency retrograde is expected to occur by sea. If cargo cannot be shipped topside to maximize air circulation or in airtight containers, monitor the cargo hold area and designated crew areas based on equipment location and ship design. Regardless of the transport or configuration means, commanders will have to ensure crews are proficient at

recognizing signs and symptoms of agent exposure or contamination, as well as immediate actions and warnings. Premission rehearsals and drills should also address abort criteria as determined at CJCS level. Figure I-18 provides a minimum checklist of mission considerations.

Pretransport Checklist

- Cargo Meets AEL Standard
- Crew Recognizes Signs & Symptoms
- Crew Has Rehearsed Immediate Actions including Self/Buddy Aid
- IPE/First Aid Is Readily Available
- Detectors/Monitors Are Installed & Operational
- Escorts Are On Board & Ready
- Abort Plan Is Approved & Rehearsed

Figure I-18. Pretransport Checklist

6. Receiving Organizations

Upon arrival in the CONUS, equipment requires clearance through the US Customs Service as a minimum. Early coordination with this and other US agencies at the NBC retrograde site is intended to expedite CONUS arrival procedures. Containers may be opened without protective equipment once the accompanying escort confirms the AEL standard. After clearance, the cargo will continue by designated means to its final destination. Escorts continue with the cargo to its final destination and ensure any stops or transfers include appropriate security measures to preclude risk of exposure to curious civilians. Receiving installations will store equipment in designated areas determined by the DOD in coordination with the EPA and USPHS. Commanders will conduct periodic monitoring IAW directive policies and will ensure all previously contaminated equipment remains under DOD control for the remaining equipment life cycle. This includes the maintenance of markings and historical records, as well as any parts that may be removed for subsequent maintenance. Removed parts not repaired and replaced must be destroyed as hazardous material (currently by incineration).

Appendix I, Annex 1

Low-Level Chemical Agent Detectors

1. Low-Level Chemical Agent Detectors

Low-level chemical agent detectors are those detection devices that can provide detection capability and alarm for concentrations below the detection thresholds of currently fielded detectors used by most DOD units and organizations. Current detection capabilities include 0.003mg/m^3 for mustard, 0.0001mg/m^3 for GA/GB, and 0.00001mg/m^3 for VX. Examples include bubblers, DAAMS, ACAMS, and real-time monitor (RTM). Table I-1-1 provides available detectors and their corresponding sensitivities and response times.

2. Low-Level Chemical Agent Alarms

Low-level chemical agent alarms are devices used in conjunction with a low-level monitor or detector, which produce audible sounds when a predetermined level of detection below the AEL is obtained. Examples include ACAMS, MINICAMS, and RTAP. Table I-1-1 provides available detectors and their corresponding sensitivities and response times. These detectors/alarms are used primarily at USA chemical depots and activities. Remember that AEL is based on 8-hour TWA; therefore, sensitivity levels and response times shown allow alarms to respond before the AEL is reached.

Table I-1-1. Low-Level Chemical Agent Detectors, Sensitivities, and Response Times

Detector Type	Response Time	Agent Sensitivities (mg/m3)					
		L	H	GA	GB	GD	VX
Bubbler	2-4 hrs 8 hrs	0.005 0.003	0.003	0.0001	0.0001	0.00003	0.00001
DAAMS	1 hr	N/A	0.003	0.0001	0.0001	0.00003	0.00001
ACAMS*	3-5 min	N/A	0.003		0.0001		0.00001
RTM	8-12 min	N/A	N/A		0.0001		0.00001
MINICAMS*	≤ 15 min	N/A	0.003		0.0001		0.00001
RTAP*	≤ 15 min	N/A	0.003		0.0001	0.00003	0.00001

NOTES:
Information from DA PAM 385-61.
***Detectors have alarm capability.**

Appendix J

NBC PROTECTION OPTIONS

1. NBC Protection

There are two components of NBC protection, individual and collective. NBC protection is needed when the chance of contamination from NBC weapons is anticipated or unavoidable. Fixed site commanders must ensure their personnel have adequate protection against NBC hazards and the means to sustain continuous operations throughout the hazard's duration.

a. **Individual NBC Protection.** Individual protective measures are taken by personnel to survive and continue the mission with a minimal loss in efficiency. At a minimum, personnel at fixed sites must have IPE against NBC hazards. This individual protection consists of protective mask, suit, gloves, and boots. Individual protection levels are referred to as MOPP. There are various levels of MOPP adopted by the armed forces. These levels are designed to allow commanders to increase or decrease the level of protection rapidly without providing long explanations. A commander determines the initial level of MOPP based on MOPP analysis, which finds the balance between reducing the risk of casualties and accomplishing the mission. The level is adjusted as NBC risks change. Remember, degradation in efficiency will occur for personnel placed in heightened individual protection for extended periods. Although IPE provides for survival, both individual and collective protection are necessary to maintain continuous operations.

In many cases, fixed site mission support functions may not allow the benefit of working inside a TFA. Basic IPE provides the required protection but produces significant performance degradation. Additionally, certain work activity places the integrity of the protective overgarment at risk. The SCALP shown in Figure J-1 provides an impermeable disposable cover to protect (less respiratory tract and eye protection) and enhance the protective capabilities of IPE.

- LIGHTWEIGHT, IMPERMEABLE SUIT
- WORN OVER THE CP OVERGARMENT
- PROTECTS CP OVERGARMENT FROM GROSS LIQUID CONTAMINATION
  - LIQUID AGENT
  - POL AND DECONTAMINANTS
  - WATER

- PRIMARY USERS
  - PERSONNEL IN COLLECTIVE PROTECTION (FOR PERSONNEL EMERGING FOR SHORT DURATIONS [1 HOUR OR LESS] LESSENS REENTRY TIME)
  - DECONTAMINATION PERSONNEL
- INEXPENSIVE AND DISPOSABLE

Figure J-1. Suit, Contamination Avoidance and Liquid Protective

Selected personnel performing hazardous duties or requiring long hours in a contaminated environment can use special encapsulating suits where no collective protection exists for rest and relief (for example, heavy maintenance bays). This special suit is connectable to portable cooling stations, is operable without the protective mask, and is a system with very high protection factors for extremely hazardous conditions. For more details on MOPP and IPE, see corresponding service doctrine and regulations.

b. **Collective Protection.** Collective protection is an important aspect of fixed site NBC defense. Ideally, it provides a contamination-free environment for personnel, allowing relief from continuous wear of MOPP equipment. The basic concept applied for collective protection is overpressure and filtration. By filtering incoming air and maintaining higher internal air pressure than external pressure, the contaminated external air is prevented from infiltrating the shelter and results in a TFA for work and relief. The human factor is the most variable input of the collective protection equation due to potential contamination inside the shelter as a result of poor entry procedures. Figure J-2 shows the basic areas required to ensure the TFA remains safe for its occupants.

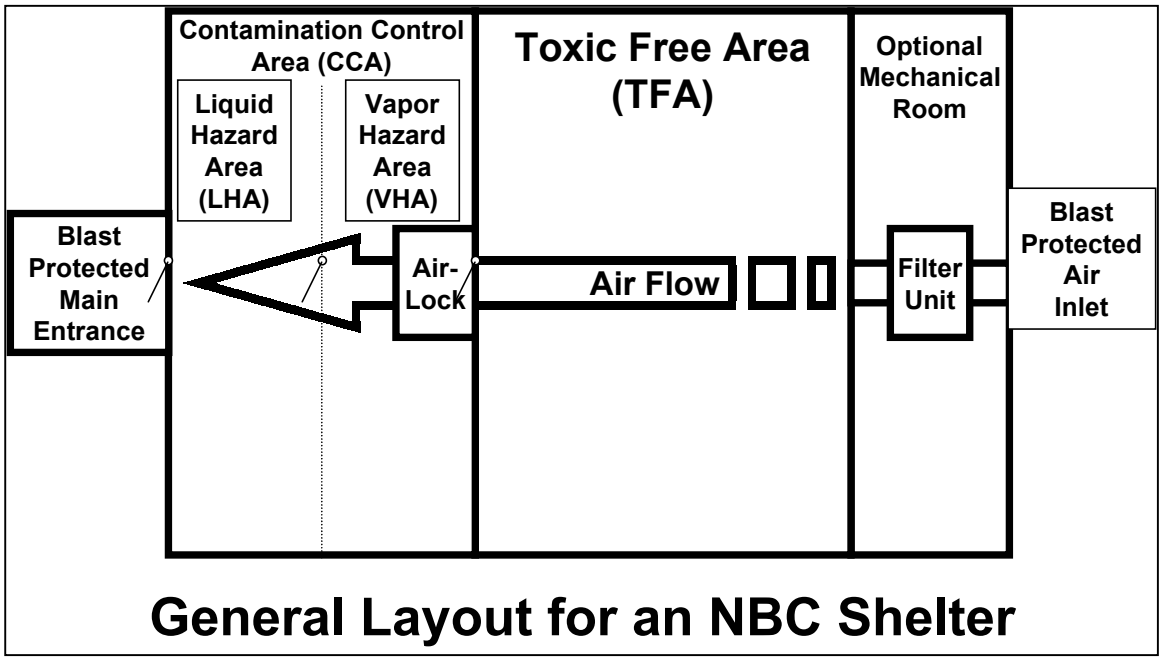

Figure J-2. Basic Shelter Design

Collective protection supports three primary areas that quickly erode in an NBC environment: personnel rest/relief (breaks and sleeping), work relief (C^4I, maintenance, supply, medical treatment, etc.), and protection of logistics storage areas (for example, war and theater reserve materiel storage sites). Based on different mission requirements, each fixed site requires customized collective protection. For example, personnel perform C^4I

and light maintenance operations more efficiently in some form of collective protection than when encumbered by high MOPP levels and IPE. Because of the large machinery and frequent need to breach the building's air integrity, personnel performing heavy maintenance and supply operations may have to endure IPE and use collective protection for rest and relief. Fixed sites can use a combination of permanent, mobile, or temporary collective protection shelters. Subsequent discussion addresses permanent modifications to existing structures and expedient/temporary modifications to provide collective protection. Refer to service-specific technical manuals and regulations for details on integrated vehicular collective protection systems.

c. **Training.** Fixed site personnel must demonstrate proficiency in all individual and collective protection measures and rehearse before, during, and after NBC attack actions. Commanders with a predominantly civilian work force may encounter extensive training program requirements in this area. Frequent drills conducted during different shifts and during shift changes help prepare the fixed site to minimize the potential impacts of NBC weapons or TIM on fixed site operations.

2. NBC Collective Protection

The selection and application of NBC collective protection techniques can be classified into the following four categories:

a. **Class I: full integration.** Permanent modifications are made to the building(s), and NBC filter units are fully integrated with existing heating, ventilating, and air conditioning (HVAC) system(s). Dampers controlling ventilation openings automatically actuate when filter units turn on. There are permanent accommodations for a CCA.

b. **Class II: partial integration.** Permanent modifications and sealing measures are made to the building or a portion of it, and partial integration of HVAC filter units or alternate collective protection systems allows heating/cooling. Manual dampers control outside air and exhaust. The CCA may be permanent or temporary (e.g., a tent).

c. **Class III: expedient.** Selected portions of the building are sealed by temporary measures such as plastic sheeting and tape. Transportable filter units are temporarily mounted to the building. Heating/cooling systems may or may not be employed. A temporary CCA is established.

d. **Class IV: secondary enclosure**. The building is not tight enough to economically maintain pressurization, but it is suitable for using portable internal enclosures or liner systems such as M28 or M20 collective protection equipment. The system allows use of the existing HVAC or alternate system. Examples include warehouses, hangers, and deployable medical-systems-equipped hospitals and maintenance bays. Figure J-3 shows the M20 SCPE used to provide a TFA for a command post.

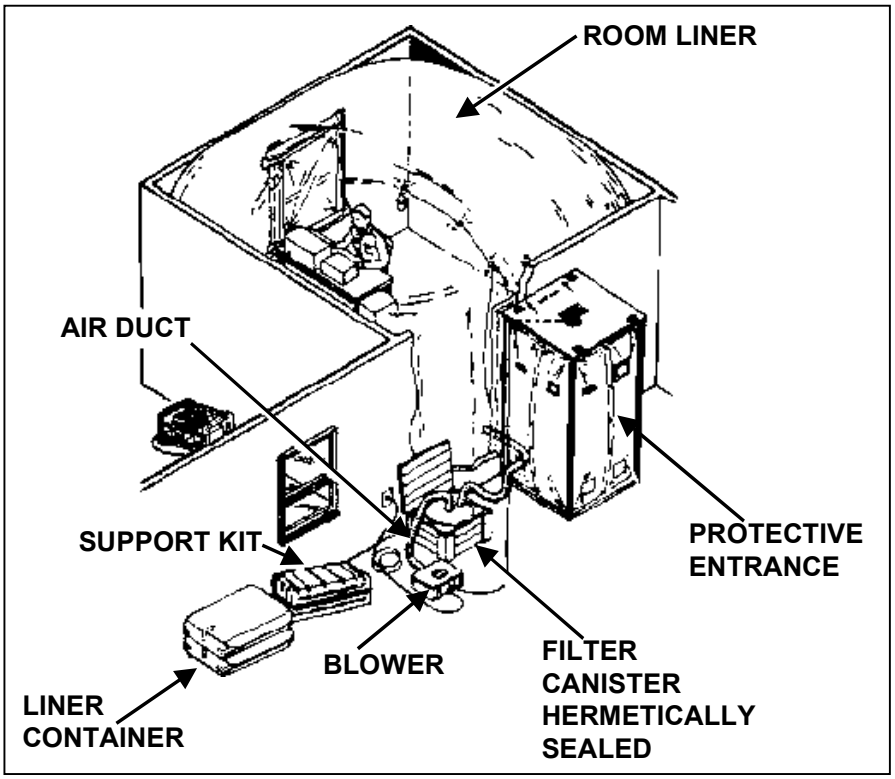

Figure J-3. M20 SCPE

3. Considerations for Applying Collective Protection to Existing Buildings

The following considerations help determine suitability or choice of collective protection applied. For more detail on specific engineering and equipment specifications, contact the Joint Service Collective Protection Assessment Team through the Edgewood Research, Development, and Engineering Center (ERDEC); the Army Corps of Engineers, Omaha; or Pacific Air Forces.

a. **Tightness of Selected Building.** Building tightness (ability to maintain pressure) can vary greatly with the condition of the building and its hidden defects such as unsealed construction openings hidden by drop ceilings or false walls. Fan-pressurization (blower door) testing is the most common technique used for measuring tightness. There is no specific level of leakage that disqualifies a building from collective protection modifications; however, "tighter is better" due to air filtration unit costs and potential heating/cooling costs. The average expected leakage reduction from weatherizing measures is about 25 percent.

b. **Methods of Tightening the Building.** Each time a collectively protected building is pressurized, its protection envelope must be tightened by closing all intentional openings (e.g., outside air vents, exhaust vents, windows, and doors). Other openings (e.g., cracks, crevices, joints, and penetrations for pipes and cables) must be closed to the maximum extent feasible using permanent means such as caulking and weather stripping.

c. **Integration of Filter Units with HVAC System.** HVAC systems in most buildings are ill-suited for the integration of positive pressure collective protection. The least costly approach is often to shut off the HVAC system and block the supply and return vents to the protected envelope when the system is pressurized. Such measures may require alternate heating or cooling methods. Short of major modifications to the HVAC system, the user may have to accept uncomfortable conditions in winter and summer. Figure J-4 shows a modification of an existing environmental control unit with a gas particulate filter.

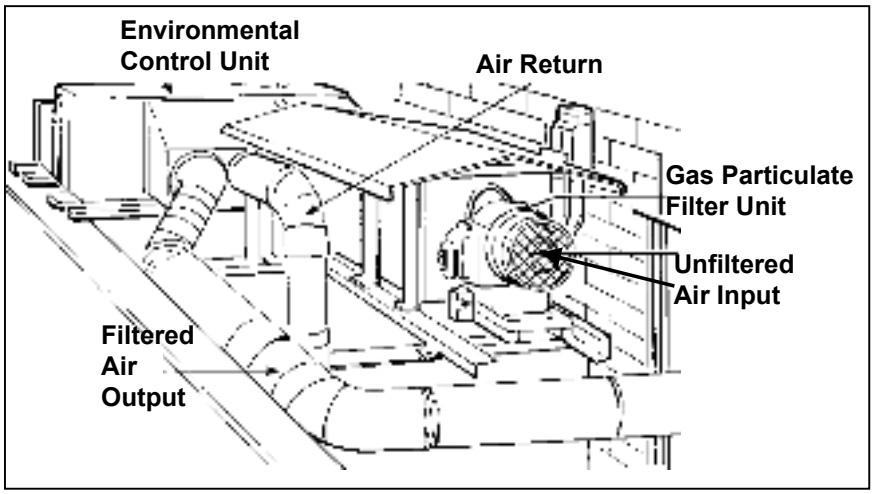

Figure J-4. Modified Environmental Control Unit

d. **Overpressure Levels.** The minimum overpressure recommended for stationary collective protection shelters is 0.1 inches water gage (iwg) or 25 Pascal, based on preventing air infiltration at ambient wind speeds greater than 15 mph. At 15 mph, the wind reduces the concentration and dosage of mustard evaporating from the ground by about 98 percent, compared with calm conditions. When preparing buildings and conducting test measurements, it is advisable to provide for a higher pressurization (0.2 iwg) to ensure 0.1 iwg is still achieved over time, as sealing measures and building structures may deteriorate.

NOTE: When overpressure is applied to a hospital, the operating rooms must have overpressure at least 0.2 iwg higher than the rest of the hospital; this provides increased positive pressure in the area and prevents infectious organisms from being introduced into the operating room suites from the rest of the hospital.

e. **Filter Units.** The Joint Collective Protection Assessment Team evaluations and methodologies established in 1997 recommend the Fan Filter Assembly (FFA) 580-filter unit for collectively protecting buildings. This 600 cubic feet per meter (cfm) filter unit is also integrated into the Survivable Collective Protection Shelter-2 (SCPS-2) shown later in Figure J-9. The FFA 580 employs the Modular Collective Protection Equipment Filter Set, which is the most widely used filter set among the USA, USN, and USAF. Where the building would require more than 10 FFA 580 units, employ the M49 Filter Unit or a large-capacity, commercial filter unit built to military specifications.

f. **Airlock(s).** An airlock is a transition enclosure—a protected entryway in which people wait for a period of 3-5 minutes before entering or exiting the TFA. The main function of the airlock is to prevent direct vapor transport into the TFA. During the airlock purging period, the flow of filtered air through the airlock flushes out airborne contaminants introduced with the opening of the outer door. The airlock also ensures that TFA overpressure is not compromised during entry or exit. For filtered, pressurized air, the airlock may rely on TFA airflow and pressurization that creates a variable demand on the TFA pressurization. Using a dedicated filter unit for the airlock reduces the variable demand on the TFA and helps maintain TFA integrity. Figure J-5 shows a locally fabricated airlock with a dedicated filter unit from the M20/M28 CPE set as constructed by ERDEC.

Figure J-5. Fabricated Airlock with Filter-Blower Unit

g. **Contamination Control Area.** The CCA and airlock allow people to transition from individual protection to collective protection without introducing contaminants into the TFA. Personnel remove contaminated outer garments in the CCA before entering the airlock. Permanent or interior CCAs have a filtered airflow rate sufficient to suppress vapor concentrations from contaminated garments worn into the CCA. Open-air CCAs have high air flow rates, but the air may not be clean, filtered air. Figure J-6 shows a tent used as a CCA and attached to the airlock.

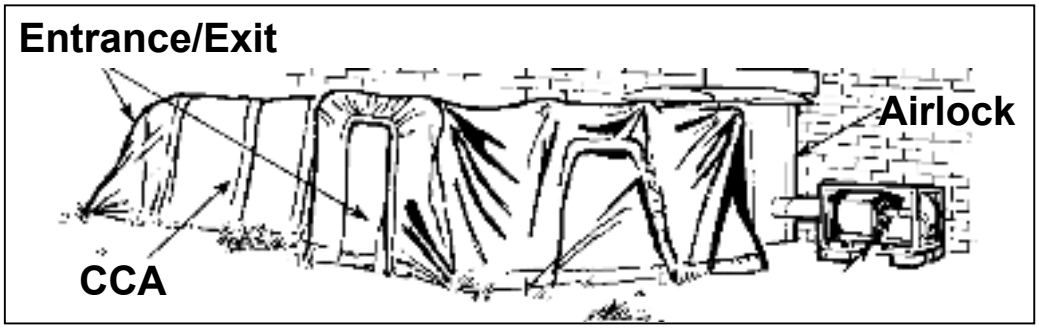

Figure J-6. Tent Used as CCA

Vapor sorption or the adherence of agent vapors to surrounding materials/objects is the primary problem in most CCA. Recent studies indicate CCA procedures require improvements in four areas: integration of chemical detectors, CCA decontaminant requirements, use of exchange masks, and reuse of protective garments.

(1) **Integration of chemical detectors.** The agent vapors in the open-air CCA can actually adhere to the individual after doffing the overgarment and before entry into the airlock. There are four options for detecting and dealing with this problem:

(a) Halt entry processing if vapor hazards are detected outside the shelter.

(b) Use a CAM to screen/halt entry candidates with desorbing vapor.

(c) Require removal of all garments if CAM or exterior monitors detect vapor and issue new or temporary garments inside the TFA.

(d) Combine showers with the previous option.

NOTE: Using M8 paper to check for contamination prior to shelter entry is undesirable as a preentry screening tool unless driven by operational requirements.

(2) **CCA decontaminant requirements.** Recent reports indicate unless under extreme liquid contamination conditions (10 g/m^2), use of decontaminants/sorbents (e.g., diatomaceous earth or bleach) inside the CCA have little effect on reducing the desorption of vapor inside the TFA.

(3) **Use of exchange masks.** The requirement to maintain eye/respiratory protection throughout the transition process from individual to collective protection and to have masks inside the TFA is common to all services. Due to logistics constraints, the USA procedures do not include an exchange mask, but rather the partial decon and bagging of the individual mask remains with the owner. Other options being considered include disposable eye respiratory protection and neck-dam emergency escape masks. Units with the M40-series protective mask might consider modifying doff procedures to include disposal of the quick-doff hood and lens outserts, which would be replaced inside the TFA.

(4) **Reuse of protective garments.** Protective overgarments are not issued in quantities allowing discard each time a person enters a collective protection shelter. The SCALP shown in Figure J-1 provides a low cost option that would allow discard of the outer SCALP while avoiding the discard or reuse of a contaminated protective overgarment.

h. **Shelter operating instructions.** Ideally, a collective protection system requires only a single power switch to activate the entire system. Except for closing doors and windows, Class I systems function this way. Other systems rely on operator action to close intentional openings not always obvious to the operator. For example, a Class III modified dormitory may require covering over 100 toilet fan grilles. Written operating

instructions are therefore essential and should take two forms: a checklist permanently mounted by the control panel and a set of detailed, written instructions for operations, troubleshooting, and maintenance. Figure J-7 provides an example instruction card for Class II or III operations.

Chapter I Class II or III Instructions

- ❑ Turn on the NBC filter unit(s).
- ❑ Close and lock all windows and exterior doors.
- ❑ Turn off and close normal outside air fans and dampers.
- ❑ Turn off and close all exhaust fans and dampers.
- ❑ Mount protective window covers.
- ❑ Turn off and cover window air conditioners.
- ❑ Seal all entries except airlock with duct tape.
- ❑ Turn off heating/cooling system.
- ❑ Close covers for supply diffusers and return registers (only for buildings where HVAC can not be used with NBC system).
- ❑ Install airlock and turn on filter unit.
- ❑ Place CCA decontaminant supplies at main entrance.
- ❑ The designated shelter manager for this building is: _____ ; phone _____.
- ❑ Detailed instructions for this collective protection system are located at:_____.

Figure J-7. Example Shelter Checklist

i. **Shelter preparation time, manpower, and training.** For large buildings, transition to collective protection may require substantial time and manpower. These factors become considerations for deciding which buildings to modify as Class II and III shelters. Training and manning SMTs require a focused and well-supervised effort to ensure personnel execute shelter management tasks to standard and without delay. To avoid personnel turnover problems, consider assigning SMTs by position and conducting frequent training/drills. Ensure shelter management candidates will not be diverted to other missions when the NBC threat requires shelter operations. Additionally, plan shelter management assignments to provide 24-hour manning, and anticipate additional support requirements due to changes in shelter occupant loads.

j. **Other shelter considerations.** In Class I, II, and III shelters, mission equipment, toilet facilities, drinking water, and stored supplies are accessible without requiring additional manpower and preparation time; all of which are planning factors required for Class IV shelters. Table J-1 provides a summarized listing of the major design elements and considerations for NBC shelters.

Table J-1. NBC Shelter Elements

MAJOR DESIGN ELEMENTS AND REQUIREMENTS FOR NBC SHELTERS	
ELEMENT	**REQUIREMENT**
Air Filtration	Integration of gas/particulate filter unit w/existing HVAC.
Ventilation	10 cfm of filter air/occupant.
Positive Pressure	Minimum 0.2 iwg w/alarm to warn of low over-pressure.
Entry Facility (CCA)	Area w/overhead cover for removal, storage, decontamination and/or disposal of IPE. Decontaminants for mask, hood, and gloves. Instructions for entry procedures. Airlock entry (sealed, pressurized, filtered ventilation) is preferred but not required.
Airlocks	One between the CCA and the TFA with purging flow of filtered air (multiple airlocks for high entry rates). Timer to indicate completion of purge cycle, and pressure gauges to indicate proper pressure.
TFA	30-35 ft^2/person. Showers near airlock are desirable. Recirculation filters are desirable.
Detection	Detector for monitoring entries and TFA air. A MICAD-linked detector network is desirable.
Communication	Intercom or phone between TFA and CCA. Communication linkage w/C^4I networks.
Blast Protection	Essential for filter inlets and TFA windows. Blast doors at main entrance.
Toilet Facilities	1/20 personnel.
IPE Storage	1 ft^2/person.
Potable Water	100 liters/person.
Electrical Power	Backup generator w/reserve fuel.
Emergency Masks	Rapid access to personal mask or transient mask for emergency exits.
Food Storage	Reserve Meals Ready to Eat (MRE)/person.

4. Expedient NBC Protection

Expedient protection includes steps taken to provide immediate protection of personnel/materiel and to enhance protection of mission-essential facilities in the event of an NBC attack or TIM incident. These procedures are often included in emergency action discussions of "protection in place." The following discussion focuses on four basic concepts.

a. **Sealing Air Infiltration Points.** Sealing the inside of a building/room must be done prior to the attack or incident. Particular care must be taken to ensure that all openings that can possibly be sealed are ready for immediate sealing at first warning. Precut sealing materials for doors and position materials so that final sealing requires minimum response time. Once an attack occurs, this door is no longer usable; label the door as being sealed. Based on weather, preseal windows and other openings. Seal all HVAC vents and ducts leading to the inside/outside. Materials should be precut and positioned, ready for use. Some openings lend themselves to a sealing/packaging material generically referred to as "Foam-In-Place" (Figure J-8.); packaging systems are available through local procurement.

"Foam-In-Place" is a generic term for a commercially available packaging/sealing material that expands when sprayed onto a surface/into an enclosed area (such as window openings, spaces between wall studs etc.). The system consists of 120- to 300-gal drums (two containers of equal size are required), two hoses, a gun assembly, and an oxygen bottle. The foam consists of two chemicals that are added to the drums and are mixed in the gun assembly as the mixture is sprayed through the gun.

Figure J-8. Foam-In-Place

CAUTION: Since air circulation and ventilation are restricted using these techniques, execution relies on early warning and rapid action to complete "sealing" and dissipation of the vapor hazard and/or personnel evacuation.

b. **Using NBC or Expedient Covers.** Keep supplies indoors if possible, but always keep them covered whether stored indoors or outdoors. Uncover supplies only long enough to retrieve needed items. When practicable, cover all equipment. When not in use, park equipment under overhead cover. See Appendix B for protective covers suitable for equipment. If insufficient covers are available for the amount of equipment/supplies to be covered, prioritize by need and availability to determine which supplies and equipment will be covered.

c. **Using NBC or Expedient Shelters.** Designate and prepare shelters prior to an attack/incident and routinely use them during exercises. These shelters may include approved NBC shelters from various countries or expedient measures. In addition, there are currently several mobile, transportable shelter systems under evaluation and/or procurement by the various services. These systems are self-contained and require minimal set-up time. Examples of this type of equipment are the CBPS, the CP DEPMEDS, the Chemically Hardened Air-Transportable Hospital, and the Transportable Collective Protection System, as described in Appendix B.

d. **Using Multilevel Buildings (Vertical Separation).** Chemical agents tend to be heavier than air (blood agents excluded). Prepare alternate C^2 and medical facilities to use floors above ground level to avoid the full impact of chemical agents. Prepare and use sealing techniques as well.

NOTE: These procedures are offered primarily for hard-to-protect facilities and unprotected HN facilities/residences. DOD agencies should strive to provide approved NBC collective protection at designated critical facilities.

Train all personnel where, when, and how to protect themselves and equipment under NBC conditions. Follow up with exercises and drills to reinforce and sustain training proficiency. Postattack actions should also be addressed during attack/incident exercises. Establish and enforce protective postures for required civilians, as well as military forces. Establish and maintain protective equipment serviceability programs IAW specific items' technical references. Table J-2 is designed to assist the commander in providing protection-in-place.

Table J-2. Protection-In-Place Options

PROTECTION-IN-PLACE OPTIONS		
For This Function:	**Use These Items:**	**With This Guidance:**
Sealing Air Infiltration Points	• Plastic Canvas • Plastic Sheeting • NBC-PC • Foam-In-Place • Gasket forming materials (silicon, rubber gaskets, foam sealing materials)	• Place plastic around inside of windows and doors. • Close holes and windows with plywood; seal using items shown and duct tape. • Spray foam into doorways and windows, overlapping all sills and openings. Foam spray will not work well on overhead horizontal surfaces. • Spray foam into all air intakes and exhausts. • Cut and fit plastic as necessary; use duct tape to hold in place. **CAUTION:** Turn off HVAC systems before sealing air intakes/exhausts.
Individual Covers	• Plastic Sheet • Plastic Canvas • NBC-PC • Military/Civilian Wet Weather Gear/Rain Suits (Rubber) • Ponchos • Modular Chemically Hardened Tent (MCHT) • TEMPER	• Cut plastic sheet, plastic canvas, and NBC-PC 1.5 times taller and wider than the individual using it. Use as cover to provide protection-in-place for personnel caught in the open. • Make rain suits/ponchos part of daily work uniform, use in conjunction with plastic sheet, plastic canvas, and NBC-PC. • Pre-position MCHT and TEMPER throughout fixed sites, concentrate on areas with few approved shelters, but high personnel concentrations.
Materiel Covers	• Plastic Sheeting • Plastic Coated Canvas • NBC-PC • Large Area Shade Systems • Large Area Maintenance Shelter	• Cut and fit as necessary, use duct tape to hold in place. • Place covered material under shade systems or shelters for additional protection.
Shelters	• Container Express (CONEX) • Military-Owned Demountable Container (MILVAN) • MCPS • Modular General Purpose Tent System (MGPTS)	• Place CONEX/MILVAN at regular intervals around fixed sites. Attach plastic sheet/NBC-PC to front of CONEX/MILVAN of sufficient size to cover the opening and to act as a liquid barrier. Attach weight (piece of wood/iron bar, etc) to bottom edge of plastic to hold in place when being used. • Erect MCPS/MGPTS at specified intervals (based on personnel concentrations). • Use these measures in conjunction with individual and materiel covers.
Vertical Separation	• Plastic Sheeting • Plastic Coated Canvas • NBC-PC	• Move operations to upper floor/levels. • Block entryways and openings with multiple sheets of plastic. Place a plastic sheet at foot of stairs, another partway up the stairs, a third at the top of the stairs, etc.
CAUTION: The duration of protection using these measures is not quantified and is provided for emergency situations only. This table does not preclude using other expedient measures afforded by available materials and common sense.		

For example, plan and provide hospital treatment facilities temporary protection by sealing all windows, doors, and other outside openings with tape and plastic sheeting; turning off the air conditioners/heaters; and establishing an airlock-type entry/exit. This procedure can increase time for the hospital staff to provide the patients with individual protection. They require patient protective wraps or MOPP for protection or during evacuation to another medical treatment facility. The hospital gains extended protection by applying the above procedures, plus adding air handlers with CB filters. The air handlers can provide overpressure, thus preventing CB agent infiltration into the facility. Training, resourcing, and executing plans to this level of detail requires active, aggressive planning and implementation.

5. Collective Protection Examples

The following discussion provides graphic examples of various forms/modifications for collective protection. Figure J-9 depicts the SCPS-2, and although intended as a permanent shelter, several were moved from Germany during recent DOD realignments. Figure J-10 shows the CBPS used for medical support in an NBC environment.

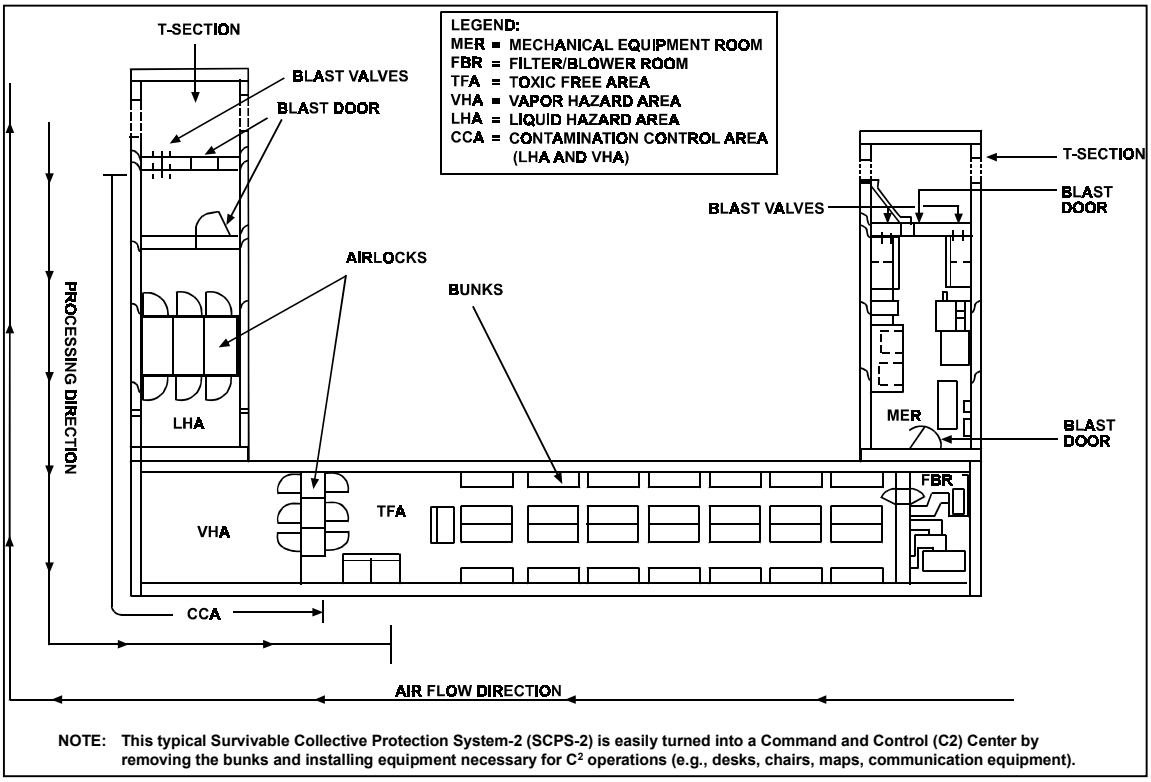

Figure J-9. Survivable Collective Protection System-2 (SCPS-2)

Figure J-10. Chemical Biological Protective Shelter (CBPS)

REFERENCES

NOTE: Since inception of this doctrinal revision process, joint and service doctrinal literature numbering hierarchies have undergone major revisions. If searching for a listed reference, try searching by the document's title without the numerical designation if unsuccessful using only the numerical designation.

Department of Defense

DOD Directive 32025.14, *Protection and Evacuation of US Citizens and Certain Designated Aliens in Danger Areas Abroad*, 5 Nov 90 w/change 2, 13 Jul 92.

Joint

Joint Pub 0-2, *Unified Action Armed Forces (UNAAF)*, 24 Feb 95.

Joint Pub 1-01, *Joint Publication System: Joint Doctrine and Joint Tactics, Techniques, and Procedures Development Program*, 14 Sep 93.

Joint Pub 1-02, *DOD Dictionary of Military and Associated Terms*, as amended through 6 Apr 99.

Joint Pub 2-0, *Doctrine for Intelligence Support to Joint Operations*, 5 May 95.

Joint Pub 2-01.2, *Joint Doctrine and Tactics, Techniques, and Procedures for Counterintelligence Support to Operations*, 5 Apr 94.

Joint Pub 2-01.3*, JTTP for Joint Intelligence Preparation of the Battlespace (JIPB) (Second Draft)*, 4 Feb 98.

Joint Pub 3-0, *Doctrine for Joint Operations, (First Draft)*, 30 Mar 99.

Joint Pub 3-02, *Joint Doctrine for Amphibious Operations*, 8 Oct 92.

Joint Pub 3-07, *Joint Doctrine for Military Operations Other Than War*, 16 Jun 95.

Joint Pub 3-07.2, *JTTP for Antiterrorism*, 17 Mar 98.

Joint Pub 3-07.6, *(Preliminary Draft) JTTP for Foreign Humanitarian Assistance Operations*, 16 Jun 97.

Joint Pub 3-07.7, *(Preliminary Draft) JTTP for Domestic Support Operations*, 20 Aug 97.

Joint Pub 3-09, *Doctrine for Joint Fire Support*, 12 May 98.

Joint Pub 3-10, *Doctrine for Joint Rear Area Operations*, 28 May 96.

Joint Pub 3-10.1, *JTTP for Base Defense,* 23 Jul 96.

Joint Pub 3-11, *Joint Doctrine for Nuclear, Biological, and Chemical Defense*, 10 Jul 95.

Joint Pub 3-13.1, *Joint Doctrine for Command and Control Warfare (C2W)*, 7 Feb 96.

Joint Pub 3-33, *(Final Coordination Draft) Joint Force Capabilities*, 5 Aug 98.

Joint Pub 3-52, *Doctrine for Joint Airspace Control in the Combat Zone*, 22 Jul 95.

Joint Pub 3-53, *Doctrine for Joint Psychological Operations*, 10 Jul 96.

Joint Pub 3-54, *Joint Doctrine for Operations Security*, 24 Jan 97.

Joint Pub 3-57, *Doctrine for Joint Civil Affairs*, 21 Jun 95.

Joint Pub 3-58, *Joint Doctrine for Military Deception*, 31 May 96.

Joint Pub 4-0, *(Preliminary Draft), Doctrine for Logistic Support of Joint Operations*, 14 Dec 98.

Joint Pub 4-01.3, *JTTP for Movement Control,* 21 Jun 96.

Joint Pub 4-02, *(Second Draft) Doctrine for Health Service Support in Joint Operations*, 30 Mar 99.

Joint Pub 4-04, *(First Draft) Joint Doctrine for Civil Engineering Support*, 4 Feb 99.

Joint Pub 4-06, *JTTP For Mortuary Affairs in Joint Operations*, 28 Aug 96.

Joint Pub 6-0, *Doctrine for C4 Systems Support to Joint Operations*, 30 May 95.

Multi-Service

AFJMAN 24-204, *Preparing Hazardous Materials For Military Air Shipments*, 1 Mar 97.

FM 3-3/MCWP 3-37.2A, *Chemical and Biological Contamination Avoidance*, 16 Nov 92.

FM 3-3-1/MCWP 3-37.2B, *Nuclear Contamination Avoidance*, 9 Sep 94.

FM 3-4/FMFM 11-9, *NBC Protection,* 29 May 92.

FM 3-5/MCWP 3-37.3, *NBC Decontamination,* 17 Nov 93.

FM 3-6/FMFM 7-11-H/AFM 105-7, *Field Behavior of NBC Agents (Including Smoke and Incendiaries)*, 3 Nov 86.

FM 3-7, *NBC Field Handbook*, 29 Sep 94.

FM 8-284 (NAVMED) P-5042/AFMAN(I) 44-156/MCRP 4-11.1C, *Treatment of Biological Warfare Agent Casualties*, 17 Jul 00.

FM 8-33/NAVMED P-5038, *Control of Communicable Diseases Manual (16th Edition)*, 9 Apr 96.

FM 3-9/NAVFAC P-467/AFR 355-7, *Potential Military Chemical/Biological Agents and Compounds*, 12 Nov 90.

FM 3-14, *NBC Vulnerability Analysis*, 12 Nov 97.

FM 8-9/NAVMED P-5059/AFJMAN 44-151, *NATO Handbook on the Medical Aspects of NBC Defensive Operations*, 1 Feb 96.

FM 8-10-7, *Health Service Support In a Nuclear, Biological, and Chemical Environment, 22 Apr 93 w/change 1*, 26 Nov 96.

FM 8-285/NAVMED P-5041/AFJMAN 44-149/FM FM 11-11, *Treatment of Chemical Agent Casualties and Conventional Military Chemical Injuries*, 22 Dec 95.

FM 34-81/AFM 105-4, *Weather Support for Army Tactical Operations*, 1 Aug 89.

FM 100-19/FMFM 7-10, *Domestic Support Operations,* 1 Jul 93.

FM 101-5-1/MCRP 5-2A, *Operational Terms and Graphics,* 30 Sep 97.

Army

AR 385-61, *The Army Chemical Agent Safety Program*, 28 Feb 97.

DA Pamphlet 385-61, *Toxic Chemical Agent Safety Standards*, 31 Mar 97.

FM 1-111, *Aviation Brigades,* 27 Oct 97.

FM 3-7, *NBC Field Handbook*, 29 Sep 94.

FM 3-19, *NBC Reconnaissance*, 19 Nov 93.

FM 5-116, *Engineer Operations: Echelons Above Corps*, 9 Feb 99.

FM 8-500, *Hazardous Materials Injuries - A Handbook for Pre-Hospital Care (HTA Edition),* 17 Jan97.

FM 9-6, *Munitions Support in Theater of Operations*, 20 Mar 98.

FM 9-207, *Operation and Maintenance of Ordnance Materiel in Cold Weather*, 20 Mar 98.

FM 10-64, *Mortuary Affairs Operation*, 16 Feb 99.

FM 19-1, *Military Police Support for the Air Land Battle*, 23 May 88.

FM 21-10, *Field Hygiene and Sanitation*, 22 Nov 88.

FM 21-11, *First Aid For Soldiers*, 27 Oct 88 w/change 1, 28 Aug 89 & w/change 2, 4 Dec 91.

FM 33-1, *Psychological Operations*, 5 May 94.

FM 34-1, *Intelligence and Electronic Warfare Operations*, 27 Sep 94.

FM 34-37, *Echelons Above Corps Intelligence and Electronic Warfare Operations*, 15 Jan 91.

FM 34-60, *Counterintelligence*, 3 Oct 95.

FM 34-130, *Intelligence Preparation of the Battlespace*, 8 Jul 94.

FM 41-10, *Civil Affairs Operations*, 11 Jan 93.

FM 55-10, *Movement Control in a Theater of Operations*, 9 Feb 99.

FM 55-80, *Army Container Operations, 13 Aug 97.*

FM 63-3, *Corps Support Command*, 30 Sep 93.

FM 63-4, *Combat Service Support Operations: Theater Army Area Command*, 24 Sep 84.

FM 100-5, *Operations*, 14 Jun 93.

FM 100-7, *Decisive Force, the Army in Theater*, 31 May 95.

FM 100-16, *Army Operational Support*, 31 May 95.

FM 100-22, *Installation Management*, 11 Oct 94.

FM 101-5, *Staff Organization and Operations*, 31 May 97.

FM 5-116, *Engineer Operations: Echelons Above Corps*, 9 Feb 99.

Air Force

AFI 10-212, *Air Base Operability Program*, April 1994.

AFI 32-4001, *Disaster Preparedness Planning and Operations*, 1 May 98.

AFMAN 32-4004, *Emergency Response Operations*, 1 Dec 95.

AFMAN 32-4005, *Personal Protection and Attack Actions*, 1 Mar 99.

AFI 32-4007, *Camouflage, Concealment, and Deception*, 7 Mar 94.

AFMAN 32-4013, *Hazardous Material Emergency Planning and Response Guide*, 1 Aug 97.

AFH 32-4014, *Volume 1, USAF Operations in a Chemical and Biological (CB) Warfare Environment, Planning and Analysis*, 1 Mar 98.

AFH 32-4014, *Volume 2, USAF Operations in a Chemical and Biological (CB) Warfare Environment, CB Hazards*, 1 Dec 97.

AFH 32-4014, *Volume 3, USAF Operations in a Chemical and Biological (CB) Warfare Environment, Defense Equipment*, 1 Feb 98.

AFH 32-4014, *Volume 4, USAF Ability to Survive and Operate Procedures in a Nuclear, Biological, and Chemical (NBC) Environment*, 1 Mar 98.

AFMAN 32-4017, *Civil Engineer Readiness Technician's Manual for Nuclear, Biological, and Chemical Defense*, 1 Jun 98.

AFPAM 32-4019, *Chemical-Biological Warfare Commander's Guide*, 1 Apr 98.

AFD 41-317, *Compendium of Aeromedical Evacuation Terminology*, 1 Aug 96.

Marine Corps

MCWP 3-41.1, *MAGTF Rear Area Security*, May 1991.

MCWP 3-1, *Ground Combat Operations*, April 1995.

MCWP 3-34.1, *Employment of Military Police in Combat*, February 1992.

MCWP 3-37, *MAGTF NBC Defense Operations*, 28 Sep 98.

Navy

NWP 3-20.31, *Surface Ship Survivability*, May 1997.

NWP 4-02.4 Part A, *Deployable Health Service Support Platforms—Fleet Hospitals*, August 1996.

OPNAVINST 3400.10 (F), *Chemical, Biological and Radiological Defense (CBR) Defense Requirements Supporting Operational Fleet Readiness*, 22 May 98.

OPNAVINST 3440.16 C, *Naval Civil Emergency Management Program*, 10 Mar 95.

NAVFACINST 3440.17 B, *Chemical, Biological, and Radiological Warfare Defense (CBR-D) Material and Equipment Allowance for Naval Shore Activities* 8 May 95.

NATO Standardization Agreements (STANAG) and Publications

STANAG 2002 Edition 8, *Warning Signs for the Marking of Contaminated or Dangerous Land Areas, Complete Equipments and Supplies*, 29 Jan 99.

STANAG 2047 Edition 7, *Emergency Alarms of Hazards or Attack*, 24 Jul 98.

STANAG 2083 Edition 5, Amendment 4, *Commander's Guide on Nuclear Radiation Exposure of Groups*, 24 Jun 94.

STANAG 2103 Edition 7, Amendment 4, *Reporting Nuclear Detonations, Radioactive Fallout, and Biological and Chemical Attacks and Predicting Associated Hazards—ATP-45*, 14 Jan 98.

STANAG 2104 Edition 7, Amendment 1, *Friendly Nuclear Strikewarn,* 28 Jun 95.

STANAG 2111 Edition 4, *Target Analysis—Nuclear Weapons,* 18 Sep 98.

STANAG 2133 Edition 1, Amendment 5, *Vulnerability Assessment of Chemical and Biological Hazards*, 11 Sep 95.

STANAG 2150 Edition 5, *NATO Standards of Proficiency for NBC Defense*, 13 Jun 97.

STANAG 2352 Edition 4, *NBC Equipment Operational Guidelines*, 9 Feb 98.

STANAG 2353 Edition 3, *Evaluation of NBC Defense Capability*, 24 Jun 94.

STANAG 2426 Edition 1, *Contamination Control Policy*, 2 Aug 95.

STANAG 2451 Edition 2, *Doctrine for the NBC Defence of NATO Forces*, 23 Oct 98.

STANAG 2500 Edition 4, *NATO Handbook on the Medical Aspects of NBC Operations*, 2 Nov 97.

STANAG 2984 Edition 4, *Graduated Levels of NBC Threat and Minimum Protection*, 24 Jul 95.

STANAG 3946 Edition 1, Amendment 4, *Maximum Dosage of Nerve Agent Vapour to the Eyes Acceptable for Aircrew*, 8 Jul 97.

STANAG 4192 Edition 2, Amendment 1, *Design Criteria and Construction Parameters for CCAs Associated with COCs and PBFs on Air Force Installations*, 8 Feb 96.

NATO AmedP-6(B), *NATO Handbook on Medical Aspects of NBC Defensive Operations*, Jul 94.

Other Sources

29 CFR 1910.119 series (OSHA).

Applying Collective Protection to Existing Buildings at Osan Air Base and Kunsan Air Base, Korea: A Report of the Joint Service Collective Protection Assessment Team, W. K. Blewett, et al, 10 January 1998.

Jane's NBC Protection Equipment, Tenth Edition, 1997-98.

Physiological and Psychological Effects of the NBC (P^2NBC^2) Environment and Sustained Operations on Systems in Combat Report, Extended Operations in Chemically Contaminated Areas, numerous reports, '85-'95.

Inviting Disaster, *"How Weapons of Mass Destruction Undermine US Strategy for Projecting Military Power"* by Greg Weaver and J. David Glaes, USACMLS, Material Systems Division, DCD Briefing.

1996 North American Emergency Response Guidebook (NAERG), developed under the supervision of the Office of Hazardous Materials Initiatives and Training, Research, and Special Programs Administration, U.S. Department of Transportation.

2000 Emergency Response Guidebook, developed jointly by Transport Canada, the US Department of Transportation, and the Secretariat of Transport and Communications of Mexico, http://hazmat.dot.gov/gydebook.htm and http://www.tc.gc.ca/canutec/en/guide/guide-e.htm.

GLOSSARY

PART I—ABBREVIATIONS AND ACRONYMS

A

AC	hydrocyanic acid–blood agent
ACADA	automatic chemical agent detector alarm
ACAMS	automatic chemical agent monitoring system
ACPG	advanced chemical protective garment, Navy term for JSLIST
ACR	armored cavalry regiment
AEL	airborne exposure limit
AFDC	air force doctrine center
AFI	air force instruction
ALSA	air land sea application center
AO	area of operations
APOD	aerial port of debarkation
AR	Army Regulation
ASCC	army service component command
ATK	attack
ATP	allied tactical publication

B

BCOC	base cluster operations center
BDO	battle dress overgarment
BDOC	base defense operations center
BE	battlefield environment
BIDS	biological integrated detection system
bio	biological
BPL	betapriopiolactone
bubblers	absorption air samplers
BW	biological warfare

C

C^2	command and control
C^4I	command, control, communications, computers, and intelligence
CAM	chemical agent monitor
CANA	convulsant antidote nerve agent
CB	chemical/biological
CBIRF	chemical/biological incident response force
CBPS	chemical/biological protective shelter
CBRD	chemical, biological, and radiological defense
CBR-N	chemical/biological, radiological - nuclear
CCA	contamination control area
CCD	camouflage, concealment, and deception

CCIR	commander's critical information requirements
CCT	contamination control teams
CDE	chemical defense equipment
CDM	chemical downwind message
CDR	commander
cfm	cubic feet per meter
CG	phosgene (choking agent)
chng	changing
CINC	commander of a combatant command; commander in chief
CJCS	Chairman of the Joint Chiefs of Staff
CJCSM	Chairman of the Joint Chiefs of Staff Manual
CK	cyanogen chloride
CLS	contractor logistics support
cm	centimeters
cmd	command
cml	chemical
CN	chloroacetophenone
COA	course(s) of action
ColPro	collective protection
COM	chief of mission (US Ambassador to host nation)
COMMZ	communication zone
CONEX	container express
CONOPS	concept of operations
CONUS	continental United States (contiguous United States)
CP	command post, chemical protective
CPC	command post computer
CPE	chemical protective ensemble
CP DEPMEDS	Chemically Protected Deployable Medical Systems
CPU	chemical protective undergarment
CRAF	Civil Reserve Air Fleet
CSD	civil support detachment
CTA	common table of allowances
CW	chemical warfare

D

DA	Department of the Army; diphenylchloroarsine (vomiting agent)
DAAMS	depot area air monitoring system
DED	detailed equipment decontamination
DNBI	disease and nonbattle injury
DOD	Department of Defense
DODESB	Department of Defense Explosives Safety Board
DOS	Department of State
DOT	Department of Transportation
DPO	disaster preparedness officer
DS2	decon solution number 2
DS	direct support
DSN	defense switched network

DTG	date-time group
DTRA	Defense Threat Reduction Agency

E

ED	ethyldichloroarsine (blister agent)
EDM	effective downwind message
EOD	explosive ordnance disposal
EMP	electromagnetic pulse
EPA	Environmental Protection Agency
ERDEC	Edgewood Research, Development, and Engineering Center
ERT	emergency response teams

F

FFA	fan filter assembly
FFBAT	unit type code designator (AF)
FFGLA	unit type code designator (AF)
FFGLB	unit type code designator (AF)
FFGL1	unit type code designator (AF)
FFGL2	unit type code designator (AF)
FFHA1	unit type code designator (AF)
FFHA5	unit type code designator (AF)
FM	field manual; titanium tetachloride
FMFM	fleet marine force manual
FOX	NBC reconnaissance system (NBCRS)
freq	frequency
ft	feet

G

g	grams
G1	Army or Marine Corps component manpower or personnel staff officer (Army division or higher staff, Marine Corps brigade or higher staff)
G2	Army or Marine Corps component intelligence staff officer (Army division or higher staff, Marine Corps brigade or higher staff)
G3	Army or Marine Corps component operations staff officer (Army division or higher staff, Marine Corps brigade or higher staff)
G4	Army or Marine Corps component logistics staff officer (Army division or higher staff, Marine Corps brigade or higher staff)
G5	Army or Marine Corps component civil affairs staff officer (Army division or higher staff, Marine Corps brigade or higher staff)
G6	Army or Marine Corps component communications staff officer (Army division or higher staff, Marine Corps brigade or higher staff)
GA	tabun (nerve agent)
gal	gallons
GB	sarin (nerve agent)
GD	soman (nerve agent)

gph	gallons per hour
gpm	gallons per minute
GPS	global positioning system
GS	general support

H

H	mustard gas (blister agent)
ha	hectares
HAZCAT	hazardous material category
HAZMAT	hazardous materials
HD	distilled mustard (blister agent)
HL	mustard-lewisite mixture (blister agent)
HMMWV	high mobility multipurpose wheel vehicle
HN	host nation; nitrogen mustard (blister agent)
HQ	headquarters; mustard agent
hr	hour
HTH	high test hypochlorite
HVAC	heating, ventilating, and air condition system

I

IAW	in accordance with
IBADS	interim biological agent detection system
ID	identification
IDLH	immediately dangerous to life and health
in	inches
IPB	intelligence preparation of the battlespace
IPE	individual protective equipment
IR	intelligence requirements, infrared
IRF	initial response force
ISSA	inter-service support agreement
iwg	inches water gage

J

JA	unit designator, has no basis in a code
JBPDS	joint biological point detection system
JCS	Joint Chiefs of Staff
JFC	joint force commander
JIPB	joint intelligence preparation of the battlespace
JOA	joint operations area
JP	joint publication
JRA	joint rear area
JRAC	joint rear area coordinator
JRSOI	joint reception, staging, onward movement, and integration
JSLIST	joint service lightweight integrated suit technology
JTF	joint task force

JSOTF	joint special operations task force
JWARN	joint warning and reporting network

K

km	kilometers
kmph	kilometers per hour

L

L	lewisite (blister agent)
lb	pound
LB	unit designator, has no basis in a code
LDS	lightweight decontamination system
LOC	lines of communication, logistics operations center
LR-BSDS	long range biological standoff detection system
LU	link-up

M

m	meters
MCCDC	Marine Corps Combat Development Command
MCHT	modular chemically hardened tent
MCPS	modular command post system
MCWP	Marine Corps warfighting publication
MD	Maryland , methyldichloroarsine (blister agent)
MDS	modular decontamination system
MET	meteorological
METL	mission-essential task list
METT-T	mission, enemy, terrain and weather, troops and support available, time available
mg	milligrams
MHE	material handling equipment
mi	miles
MICAD	multipurpose integrated chemical agent detector
MILVAN	military-owned demountable container
min	minutes
MINICAMS	miniature continuous air monitor
mm	millimeters
MOA	Memorandum of Agreement
MOPP	mission-oriented protective posture
MOU	memorandum of understanding
mph	miles per hour
MSDS	material safety data sheets
msn	mission
MTF	medical treatment facility
MTTP	multiservice tactics, techniques, and procedures

N

NAAK	nerve agent antidote kit
NAERG	North American Emergency Response Guidebook
NAI	named area of interest
NAPP	nerve agent pyridostigmine pre-treatment
NATO	North Atlantic Treaty Organization
NBC	nuclear, biological, and chemical
NBCC	NBC control center
NBC-PC	NBC protective covers
NBCRS	NBC reconnaissance system (FOX)
NBCRSE	NBC retrograde support element
NBCWRS	NBC warning and reporting system
NCO	noncommissioned officer
NEO	noncombatant evacuation operation
NET	network
NK	grid identifier (nonspecific)
NSF	national strike force
NWDC	Navy Warfare Development Command

O

OCONUS	outside the continental United States
OIC	officer-in-charge
O/O	on order
OP	operational
OPCON	operational control
OPLAN	operation plan
OPORD	operation order
ops	operations
OPTEMPO	operational tempo

P

P3I	pre-planned product improvement
PATS	protection assessment test system
PB	pyridostigmine bromide
PD	phenyldichloroarsine (blister agent)
PDDA	power-driven decontaminating apparatus
PIR	priority intelligence requirements
pkg	package
PLT	platoon
POD	port of debarkation
POL	petroleum, oil, lubricants
PSU	port security unit

Q

qt	quart

R

R&S	reconnaissance and surveillance
RAD	radiation absorbed dose
RADIAC	radiation detection identification and computation
RCA	riot control agents
ROTA	release other than attack
ROWPU	reverse osmosis water purification unit
RSCAAL	remote sensing chemical agent alarm
RSE	retrograde support element
RTAP	real-time analytical platform
RTM	real-time monitor
RV	radius of vulnerability

S

S1	battalion or brigade manpower or personnel staff officer (Army; Marine Corps battalion or regiment)
S2	battalion or brigade intelligence staff officer (Army; Marine Corps battalion or regiment)
S3	battalion or brigade operations staff officer (Army; Marine Corps battalion or regiment)
S4	battalion or brigade logistics staff officer (Army; Marine Corps battalion or regiment)
SBCCOM	US Army Soldier and Biological Chemical Command
SCALP	suit contamination avoidance liquid protective
SCBA	self-contained breathing apparatus
SCPE	simplified collective protection equipment (NBC)
SCPS-2	survival chemical protection system-2
SCUD	surface-to-surface missile system
SMT	shelter management team
SN	strategic national
SOF	special operations forces
SOP	standing operating procedure
SPOD	seaport of debarkation
SRD	secret restricted data
ST	strategic theater
STANAG	standardization agreement
STB	super tropical bleach

T

TA	tactical, theater army
TACON	tactical control

TAI	target of interest
TAP	toxicological agent protective
TBM	theater ballistic missile
TEMPER	tent extendable modular personnel
TFA	toxic-free area
TGD	thickened nerve agent GD
TIM	toxic industrial material(s)
TMD	theater missile defense
TPFDL	time-phased force deployment list
TRADOC	Training and Doctrine Command (Army)
TTP	tactics, techniques, and procedures
TWA	time weighted average

U

UJTL	universal joint task list
US	United States
USA	United States Army
USACMLS	US Army Chemical School
USAF	United States Air Force
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USMC	United States Marine Corps
USN	United States Navy
USPHS	United States Public Health Services
USTRANSCOM	United States Transportation Command
UTL	universal task list
UTM	universal transverse mercator
UV	ultraviolet

V

VAC	volts alternating current
VAT	vulnerability assessment tool
VX	no common name - nerve agent

W

WMD	weapons of mass destruction
WMDT	wartime medical decontamination team

Z

ZULU	time zone indicator for universal time

PART II—TERMS AND DEFINITIONS

antiterrorism. Defensive measures used to reduce the vulnerability of individuals and property to terrorist acts, to include limited response and containment by local military forces. Also called AT. (JP 1-02)

area air defense commander. Within a unified command, subordinate unified command, or joint task force, the commander will assign overall responsibility for air defense to a single commander. Normally, this will be the component commander with the preponderance of air defense capability and the command, control, and communications capability to plan and execute integrated air defense operations. Representation from the other components involved will be provided, as appropriate, to the area air defense commander's headquarters. Also called AADC. (JP 1-02)

area command. A command that is composed of those organized elements of one or more of the armed services, designated to operate in a specific geographical area, which are placed under a single commander. (JP 1-02)

area damage control. Measures taken before, during or after hostile action or natural or manmade disasters, to reduce the probability of damage and minimize its effects. (JP 1-02)

area of operations. An operational area defined by the joint force commander for land and naval forces. Areas of operation do not typically encompass the entire operational area of the joint force commander, but should be large enough for component commanders to accomplish their missions and protect their forces. (JP 1-02)

area of responsibility. 1. The geographical area associated with a combatant command within which a combatant commander has authority to plan and conduct operations. 2. In naval usage, a predefined area of enemy terrain which supporting ships are responsible for covering by fire on known targets or targets of opportunity and by observation. Also called AOR. (JP 1-02)

base. 1. A locality from which operations are projected or supported. 2. An area or locality containing installations which provide logistic or other support. 3. Home airfield or home carrier. (JP 1-02)

base cluster. In base defense operations, a collection of bases geographically grouped for mutual protection and ease of command and control. (JP 1-02)

base cluster commander. In base defense operations, the senior officer in the base cluster (excluding medical officers, chaplains, and commanders of transient units) with responsibility for coordinating the defense of bases within the base cluster and for integrating base defense plans of bases into a base cluster defense plan. (JP 1-02)

base cluster operations center. A command and control facility that serves as the base cluster commander's focal point for defense and security of the base cluster. (JP 1-02)

base commander. In base defense operations, the officer assigned to command a base. (JP 1-02)

base defense. The local military measures, both normal and emergency, required to nullify or reduce the effectiveness of enemy attacks on, or sabotage of, a base to ensure that the maximum capacity of its facilities is available to US forces. (JP 1-02)

base defense forces. Troops assigned or attached to a base for the primary purpose of base defense and security, and augmentees and selectively armed personnel available to the base for base defense from units performing primary missions other than base defense. (JP 1-02)

base defense operations center. A command and control facility established by the base commander to serve as the focal point for base security and defense. It plans, directs, integrates, coordinates, and controls all base defense efforts. It also coordinates and integrates into area security operations with the rear area operations center/rear tactical operations center. (JP 1-02)

base defense zone. An air defense zone established around an air base and limited to the engagement envelope of short-range air defense weapons systems defending that base. Base defense zones have specific entry, exit, and identification, friend or foe procedures established. Also called BDZ. (JP 1-02)

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

casualty. Any person who is lost to the organization by having been declared dead, duty status–whereabouts unknown, missing, ill, or injured. (JP 1-02)

centers of gravity. Those characteristics, capabilities, or localities from which a military force derives its freedom of action, physical strength, or will to fight. (JP 1-02)

civil affairs. The activities of a commander that establish, maintain, influence, or exploit relations between military forces and civil authorities, both governmental and nongovernmental, and the civilian populace in a friendly, neutral, or hostile area of operations in order to facilitate military operations and consolidate operational objectives. Civil affairs may include performance by military forces of activities and functions normally the responsibility of local government. These activities may occur before, during, or after other military actions. They may also occur, if directed, in the absence of other military operations. (JP 1-02)

civil-military operations. Group of planned activities in support of military operations that enhance the relationship between the military forces and civilian authorities and population and which promote the development of favorable emotions, attitudes, or behavior in neutral, friendly, or hostile groups. (JP 1-02)

coastal sea control. The employment of forces to ensure the unimpeded use of an offshore coastal area by friendly forces and, as appropriate, to deny the use of the area to enemy forces. (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) (Also referred to as collective protection.)

combatant commander. A commander in chief of one of the unified or specified combatant commands established by the President. (JP 1-02)

combat service support. The essential capabilities, functions, activities, and tasks necessary to sustain all elements of operating forces in theater at all levels of war. Within the national and theater logistic systems, it includes but is not limited to that support

rendered by service forces in ensuring the aspects of supply, maintenance, transportation, health services, and other services required by aviation and ground combat troops to permit those units to accomplish their missions in combat. Combat service support encompasses those activities at all levels of war that produce sustainment to all operating forces on the battlefield. (JP 1-02)

combat support elements. Those elements whose primary missions are to provide combat support to the combat forces and which are a part, or prepared to become a part, of a theater, command, or task force formed for combat operations. (JP 1-02)

command and control. The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission. (JP 1-02)

communications zone. Rear part of theater of operations (behind but contiguous to the combat zone) which contains the lines of communication, establishments for supply and evacuation, and other agencies required for the immediate support and maintenance of the field forces. (JP 1-02)

concept of logistic support. A verbal or graphic statement, in broad outline, of how a commander intends to support and integrate with a concept of operations in an operation or campaign. (JP 1-02)

contaminate. To introduce an impurity; for instance, a foreign microorganism placed in a culture or environment. Clothing containing microorganisms is contaminated. (FM 3-4-1)

contamination. 1. The deposit and/or absorption of radioactive material or biological or chemical agents on and by structures, areas, personnel, or objects. 2. Food and/or water made unfit for consumption by humans or animals because of the presence of environmental chemicals, radioactive elements, bacteria, or organisms. 3. The by-product of the growth of bacteria or organisms in decomposing material (including food substances) or waste in food or water. (JP 1-02)

coordinating authority. A commander or individual assigned responsibility for coordinating specific functions or activities involving forces of two or more military departments or two or more forces of the same service. The commander or individual has the authority to require consultation between the agencies involved, but does not have the authority to compel agreement. In the event that essential agreement cannot be obtained, the matter shall be referred to the appointing authority. Coordinating authority is a consultation relationship, not an authority through which command may be exercised. Coordinating authority is more applicable to planning and similar activities than to operations. (JP 1-02)

counterintelligence. Information gathered and activities conducted to protect against espionage, other intelligence activities, sabotage, or assassinations conducted by or on behalf of foreign governments or elements thereof, foreign organizations, or foreign persons, or international terrorist activities. Also called CI. (JP 1-02)

deception. Those measures designed to mislead the enemy by manipulation, distortion, or falsification of evidence to induce him to react in a manner prejudicial to his interests. (JP 1-02)

decontaminant. Any substance used to break down, neutralize, or remove a chemical, biological, or radioactive material posing a threat to equipment or personnel. (FM 3-100/MCWP 3-37.1)

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)

dispersal. Relocation of forces for the purpose of increasing survivability. See also **dispersion**. (JP 1-02)

dispersion. (1) The spreading or separating of troops, material, establishments, or activities which are usually concentrated in limited areas to reduce vulnerability. (2) The dissemination of agents in liquid or aerosol form. (JP 1-02)

effective US control. Merchant ships, majority owned by US citizens or corporations that are operated under Liberian, Panamanian, Honduran, Bahamian, and Marshall Islands registries. These ships are considered requisitionable assets available to the US government in time of national emergency and therefore under the effective control of the US government. (JP 1-02)

electromagnetic pulse. The electromagnetic radiation from a nuclear explosion caused by Compton-recoil electrons and photoelectrons from photons scattered in the materials of the nuclear device or in a surrounding medium. The resulting electric and magnetic fields may couple with electrical/electronic systems to produce damaging current and voltage surges. May also be caused by nonnuclear means. Also called EMP. (JP 1-02)

essential elements of information. The critical items of information regarding the enemy and the environment needed by the commander by a particular time to relate with other available information and intelligence in order to assist in reaching a logical decision. Also called EEI. (JP 1-02)

evacuation. 1. The process of moving any person who is wounded, injured, or ill to and/or between medical treatment facilities. 2. The clearance of personnel, animals, or materiel from a given locality. 3. The controlled process of collecting, classifying, and shipping unserviceable or abandoned materiel, United States and foreign, to appropriate reclamation, maintenance, technical intelligence, or disposal facilities. (JP 1-02)

fixed site. Developed real estate (facilities and supporting equipment) required to accomplish an operational mission. For example: C^4I, SPOD, and APOD sites; ammunition storage points/depots; hospitals; supply depots; maintenance sites; bridges; etc. Fixed sites can be further categorized as permanently or operationally fixed. (Proposed in JP 3-11 revision and FM 3-4-1)

frustrated cargo. Any shipment of supplies and/or equipment which while en route to destination is stopped prior to receipt and for which further disposition instructions must be obtained. (JP 1-02)

host nation. A nation which receives the forces and/or supplies of allied nations and/or NATO organizations to be located on, to operate in, or to transit through its territory. (JP 1-02)

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

immediate decontamination. (1) Aim – minimize casualties, save lives, and limit the spread of contamination. (2) When – conducted as soon as someone suspects they have been contaminated. (3) Who – individual. (4) What – skin, personal clothing, and equipment. (AFI 32-4001)

joint base. For purposes of base defense operations, a joint base is a locality from which operations of two or more of the military departments are projected or supported and which is manned by significant elements of two or more military departments or in which significant elements of two or more military departments are located. (JP 1-02)

joint force commander. A general term applied to a combatant commander, subunified commander, or joint task force commander authorized to exercise combatant command (command authority) or operational control over a joint force. Also called JFC. (JP 1-02)

joint logistics. The art and science of planning and carrying out, by a joint force commander and staff, logistic operations to support the protection, movement, maneuver, firepower, and sustainment of operating forces of two or more military departments of the same nation. (JP 1-02.)

joint movement center. The center established to coordinate the employment of all means of transportation (including that provided by allies or host nations) to support the concept of operations. This coordination is accomplished through establishment of transportation policies within the assigned area of responsibility, consistent with relative urgency of need, port and terminal capabilities, transportation asset availability, and priorities set by a joint force commander. (JP 1-02)

joint rear area. A specific land area within a joint force commander's operational area designated to facilitate protection and operation of installations and forces supporting the joint force. (JP 1-02)

joint rear area coordinator. The officer with responsibility for coordinating the overall security of the joint rear area in accordance with joint force commander directives and priorities in order to assist in providing a secure environment to facilitate sustainment, host nation support, infrastructure development, and movements of the joint force. The joint rear area coordinator also coordinates intelligence support and ensures that area management is practiced with due consideration for security requirements. Also called JRAC. (JP 1-02)

joint rear area operations. Those operations in the joint rear area that facilitate protection or support of the joint force. (Approved for inclusion in the next edition of JP 1-02.)

joint rear tactical operations center. A joint operations cell tailored to assist the joint rear area coordinator in meeting mission responsibilities. Also called JRTOC. (JP 1-02)

lines of communication. All the routes—land, water, and air—which connect an operating military force with a base of operations and along which supplies and military forces move. Also called LOC. (JP 1-02)

logistics. The science of planning and carrying out the movement and maintenance of forces. In its most comprehensive sense, those aspects of military operations which deal with design and development, acquisition, storage, movement, distribution, maintenance, evacuation, and disposition of materiel; movement, evacuation, and hospitalization of personnel; acquisition or construction, maintenance, operation, and disposition of facilities; and acquisition or furnishing of services. (JP 1-02)

logistics-over-the-shore operations. The loading and unloading of ships without the benefit of fixed port facilities, in friendly or nondefended territory, and, in time of war, during phases of theater development in which there is no opposition by the enemy. (JP 1-02)

military capability. The ability to achieve a specified wartime objective (win a war or battle, destroy a target set). It includes four major components: force structure, modernization, readiness, and sustainability. Force structure—numbers, size, and composition of the units that comprise our defense forces; e.g., divisions, ships, air wings. Modernization—technical sophistication of forces, units, weapon systems, and equipment. Unit readiness—the ability to provide capabilities required by the combatant commanders to execute their assigned missions. This is derived from the ability of each unit to deliver the outputs for which it was designed. Sustainability—the ability to maintain the necessary level and duration of operational activity to achieve military objectives. Sustainability is a function of providing for and maintaining those levels of ready forces, materiel, and consumables necessary to support military effort. (JP 1-02)

MOPP. Mission-oriented protective posture; a flexible system for protection against a chemical or biological attack devised to maximize the unit's ability to accomplish its mission in a toxic environment. This posture permits maximum protection from chemical or biological attack without unacceptable reduction in efficiency. (FM 101-5-1/MCRP 5-2A)

MOPP gear. Protective clothing and equipment worn appropriate to the threat, work rate imposed by the mission, temperature, and humidity. (FM 3-3/FMFM 11-17)

movement control. 1. The planning, routing, scheduling, and control of personnel and cargo movements over lines of communications. 2. An organization responsible for the planning, routing, scheduling, and control of personnel and cargo movements over lines of communications. Also called movement control center. (JP 1-02)

naval advanced logistic support site. An overseas location used as the primary transshipment point in the theater of operations for logistic support. A naval advanced logistic support site possesses full capabilities for storage, consolidation, and transfer of supplies and for support of forward-deployed units (including replacement units) during major contingency and wartime periods. Naval advanced logistic support sites, with port and airfield facilities in close proximity, are located within the theater of operations but not near the main battle areas and must possess the throughput capacity required to accommodate incoming and outgoing intertheater airlift and sealift. When fully activated, the naval advanced logistic support sites should consist of facilities and services provided by the host nation and/or augmented by support personnel located in the theater of operations. Also called ALSS. See also **naval forward logistic site**. (JP 1-02)

naval coastal warfare. Coastal sea control, harbor defense, and port security, executed both in coastal areas outside the United States in support of national policy and in the United States as part of this nation's defense. Also called NCW. (JP 1-02)

naval coastal warfare area. An assigned geographic area of operations which includes offshore waters, harbor approaches, harbors, ports, waterfront facilities, and those internal waters and rivers which provide access to port facilities. (Approved for inclusion in the next edition of JP 1-02)

naval coastal warfare commander. An officer designated to conduct naval coastal warfare missions within a designated naval coastal geographic area. Also called NCWC. (JP 1-02)

naval forward logistic site. An overseas location, with port and airfield facilities nearby, which provides logistics support to naval forces within the theater of operations during major contingency and wartime periods. Naval forward logistic sites may be located in close proximity to main battle areas to permit forward staging of services, throughput of high priority cargo, advanced maintenance, and battle damage repair. Naval forward logistic sites are linked to in-theater naval advanced logistics support sites (ALSSs) by intratheater airlift and sealift, but may also serve as transshipment points for intertheater movement of high-priority cargo into areas of direct combat. In providing fleet logistic support, naval forward logistic site capabilities may range from very austere to near those of a naval advanced logistic support site. Also called FLS. See also **naval advanced logistic support site**. (JP 1-02)

nongovernmental organizations. Transnational organizations of private citizens that maintain a consultative status with the Economic and Social Council of the United Nations. Nongovernmental organizations may be professional associations, foundations, multinational businesses, or simply groups with a common interest in humanitarian assistance activities (development and relief). "Nongovernmental organizations" is a term normally used by non-United States organizations. Also called NGO. (JP 1-02)

operational control. Transferable command authority that may be exercised by commanders at any echelon at or below the level of combatant command. Operational control is inherent in combatant command (command authority). Operational control may be delegated and is the authority to perform those functions of command over subordinate forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction necessary to accomplish the mission. Operational control includes authoritative direction over all aspects of military operations and joint training necessary to accomplish missions assigned to the command. Operational control should be exercised through the commanders of subordinate organizations. Normally this authority is exercised through subordinate joint force commanders and service and/or functional component commanders. Operational control normally provides full authority to organize commands and forces and to employ those forces as the commander in operational control considers necessary to accomplish assigned missions. Operational control does not, in and of itself, include authoritative direction for logistics or matters of administration, discipline, internal organization, or unit training. Also called OPCON. (JP 1-02)

operational decontamination. (1) Aim – minimize contact or transfer hazard and sustain operations. (2) When – conducted when operations require. (3) Who – individuals, crews, teams, or units. (4) What – specific parts of operationally essential equipment, material, work areas, and exchange of individual protective equipment. (AFI 32-4001)

operational environment. A composite of the conditions, circumstances, and influences which affect the employment of military forces and bear on the decisions of the unit commander. Some examples are: permissive environment—operational environment in which host country military and law enforcement agencies have control and the intent and capability to assist operations that a unit intends to conduct; uncertain environment—operational environment in which host government forces, whether opposed to or receptive to operations that a unit intends to conduct, do not have totally effective control of the territory and population in the intended area of operations; and hostile environment—operational environment in which hostile forces have control and the intent and capability to effectively oppose or react to the operations a unit intends to conduct. (JP 1-02)

operationally fixed sites. Facilities transportable or mobile, but due to ongoing operational constraints, they are not moved. Examples include the movement of field hospitals or critical communications nodes just prior to commencing offensive operations. (FM 3-4-1)

permanently fixed sites. Facilities than cannot move. These include preexisting facilities such as ports, airfields, railheads, and hospitals. If war or conflict comes to these facilities, they may be abandoned, but not moved. Additionally, if WMD make these facilities unusable, they are abandoned at least until transition to post-conflict operations. (FM 3-4-1)

port. A place at which ships may discharge or receive their cargoes. It includes any port accessible to ships on the seacoast, navigable rivers, or inland waterways. The term "ports" should not be used in conjunction with air facilities which are designated as aerial ports, airports, etc. (JP 1-02)

port security. The safeguarding of vessels, harbors, ports, waterfront facilities, and cargo from internal threats such as: destruction, loss, or injury from sabotage or other subversive acts; accidents; thefts; or other causes of similar nature. (JP 1-02)

presumptive identification. The identification process using aerosol samples collected in a liquid medium to detect unique chemical antibody markers to determine the presence of a specific antigen (e.g., BW agent).

private voluntary organizations. Private, nonprofit humanitarian assistance organizations involved in development and relief activities. Private voluntary organizations are normally United States-based. "Private voluntary organization" is often used synonymously with the term "nongovernmental organizations." Also called PVO. (JP 1-02)

psychological operations. Planned operations to convey selected information and indicators to foreign audiences to influence their emotions, motives, objective reasoning, and ultimately the behavior of foreign governments, organizations, groups, and individuals. The purpose of psychological operations is to induce or reinforce foreign attitudes and behavior favorable to the originator's objectives. Also called PSYOP. (JP 1-02)

rear area. For any particular command, the area extending forward from its rear boundary to the rear of the area assigned to the next lower level of command. This area is provided primarily for the performance of support functions. (Approved for inclusion in the next edition of JP 1-02)

rear area operations center/rear tactical operations center. A command and control facility that serves as an area/sub-area commander's planning, coordinating, monitoring, advising, and directing agency for area security operations. (JP 1-02)

reception. 1. All ground arrangements connected with the delivery and disposition of air or sea drops. Includes selection and preparation of site, signals for warning and approach, facilitation of secure departure of agents, speedy collection of delivered articles, and their prompt removal to storage places having maximum security. When a group is involved, it may be called a reception committee. 2. Arrangements to welcome and provide secure quarters or transportation for defectors, escapees, evaders, or incoming agents. (JP 1-02)

reconstitution. Those actions that commanders plan and implement to restore units to a desired level of combat effectiveness commensurate with mission requirements and available resources. Reconstitution operations include regeneration and reorganization. (FM 101-5-1/MCRP 5-2A)

reconstitution. Decontamination that involves: (1) Aim – eliminate contamination to restore mission critical resources to a condition which permits unrestricted use, handling or operation, and release from military control. (Decontaminate to the national standard of the location to which the resources will be sent. If no national standards are available, use US standards.) (2) When – conducted after hostile actions have terminated, when the commander determines it is in the unit's best interest, or when directed by higher authority. (3) Who – units or wings with external support. (4) What – mission-critical aircraft, equipment, material, work areas, and terrain. (AFI 32-4001)

reconstitution site. A location selected by surviving command authority as the site at which a damaged or destroyed headquarters can be reformed from survivors of the attack and/or personnel from other sources, predesignated as replacements. (JP 1-02)

recovery and reconstitution. Those actions taken by one nation prior to, during, and following an attack by an enemy nation to minimize the effects of the attack, rehabilitate the national economy, provide for the welfare of the populace, and maximize the combat potential of remaining forces and supporting activities. (JP 1-02)

redeployment. The transfer of a unit, an individual, or supplies deployed in one area to another area, or to another location within the area, or to the zone of interior for the purpose of further employment. (JP 1-02)

remediation. The act or process of remedying [correcting or counteracting].

response force. A mobile force with appropriate fire support designated, usually by the area commander, to deal with Level II threats in the rear area. (JP 1-02)

restoration. The systematic removal of pollution or contaminants from the environment, especially from the soil or ground water, by physical, chemical, or biological means. Restoration is also known as remediation or environmental cleanup. (FM 101-5-1/MCRP 5-2A)

restoration operations. Measures taken to return personnel and units to near-normal operating capability after NBC attack. (Joint Services Integration Group, *Joint Concept for NBC Force Protection*)

retrograde cargo. Cargo evacuated from a theater of operations. (JP 1-02)

retrograde movement. Any movement of a command to the rear, or away from the enemy. It may be forced by the enemy or made voluntarily. Such movements may be classified as withdrawal, retirement, or delaying action. (JP 1-02)

rules of engagement. Directives issued by competent military authority which delineate the circumstances and limitations under which United States forces will initiate and/or continue combat engagement with other forces encountered. Also called ROE. (JP 1-02)

security. 1. Measures taken by a military unit, activity, or installation to protect itself against all acts designed to impair its effectiveness. 2. A condition that results from the establishment and maintenance of protective measures that ensure a state of inviolability from hostile acts or influences. 3. With respect to classified matter, it is the condition that prevents unauthorized persons from having access to official information that is safeguarded in the interests of national security. (JP 1-02)

status-of-forces agreement. An agreement defining the legal position of a visiting military force deployed in the territory of a friendly state. Agreements delineating the status of visiting military forces may be bilateral or multilateral. Provisions pertaining to the status of visiting forces may be set forth in a separate agreement, or they may form a part of a more comprehensive agreement. These provisions describe how the authorities of a visiting force may control members of that force and the amenability of the force or its members to the local law or to the authority of local officials. To the extent that agreements delineate matters affecting the relations between a military force and civilian authorities and population, they may be considered civil affairs agreements. Also called SOFA. (JP 1-02)

subordinate command. A command consisting of the commander and all those individuals, units, detachments, organizations, or installations that have been placed under the command by the authority establishing the subordinate command. (JP 1-02)

supporting forces. Forces stationed in, or to be deployed to, an area of operations to provide support for the execution of an operation order. Combatant command (command authority) of supporting forces is not passed to the supported commander. (JP 1-02)

sustainability See **military capability**. (JP 1-02)

tactical combat force. A combat unit, with appropriate combat support and combat service support assets, that is assigned the mission of defeating Level III threats. (JP 1-02)

tactical control. Command authority over assigned or attached forces or commands, or military capability or forces made available for tasking, that is limited to the detailed (and usually local) direction and control of movements or maneuvers necessary to accomplish missions or tasks assigned. Tactical control is inherent in operational control. Tactical control may be delegated to, and exercised at, any level at or below the level of combatant command. Also called TACON. (JP 1-02)

thorough decontamination. (1) Aim – reduce contamination to the lowest possible levels, to permit partial or total removal of IPE and maintain operations with minimum

degradation. (2) When – conducted when operations, manning, and resources permit. (3) Who – units or wings, with or without external support. (4) What – personnel, equipment, material, or work areas (may include some terrain beyond the scope of operational decontamination). (AFI 32-4001)

time-phased force and deployment data. The Joint Operation Planning and Execution System data base portion of an operation plan; it contains time-phased force data, non-unit-related cargo and personnel data, and movement data for the operation plan, including in-place units, units to be deployed to support the operation plan with a priority indicating the desired sequence for their arrival at the port of debarkation, routing of forces to be deployed, movement data associated with deploying forces, estimates of non-unit-related cargo and personnel movements to be conducted concurrently with the deployment of forces, and estimate of transportation requirements that must be fulfilled by common-user lift resources, as well as those requirements that can be fulfilled by assigned or attached transportation resources. Also called TPFDD. (JP 1-02)

unit type code. A five-character, alphanumeric code that uniquely identifies each type of the armed forces. (JP 1-02)

weapons of mass destruction. In arms control usage, 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. Can be nuclear, chemical, biological, and radiological weapons, but excludes the means of transporting or propelling the weapon where such means is a separable and divisible part of the weapon. (JP 1-02)

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