Joint Publication 3-11

Operations in Chemical, Biological, Radiological, and Nuclear (CBRN) Environments

26 August 2008

PREFACE

1. Scope

This publication provides doctrine to assist commanders and staffs in planning, preparing for, conducting, and assessing operations in which their forces may encounter chemical, biological, radiological, and nuclear threats and hazards. These principles apply across the range of military operations.

2. Purpose

This publication has been prepared under the direction of the Chairman of the Joint Chiefs of Staff. It sets forth joint doctrine to govern the activities and performance of the Armed Forces of the United States in joint operations and provides the doctrinal basis for interagency coordination and for US military involvement in multinational operations. It provides military guidance for the exercise of authority by combatant commanders and other joint force commanders (JFCs) and prescribes joint doctrine for operations, education, and training. It provides military guidance for use by the Armed Forces in preparing their appropriate plans. It is not the intent of this publication to restrict the authority of the JFC from organizing the force and executing the mission in a manner the JFC deems most appropriate to ensure unity of effort in the accomplishment of the overall objective.

3. Application

a. Joint doctrine established in this publication applies to the Joint Staff, commanders of combatant commands, subunified commands, joint task forces, subordinate components of these commands, and the Services.

b. The guidance in this publication is authoritative; as such, this doctrine will be followed except when, in the judgment of the commander, exceptional circumstances dictate otherwise. If conflicts arise between the contents of this publication and the contents of Service publications, this publication will take precedence unless the Chairman of the Joint Chiefs of Staff, normally in coordination with the other members of the Joint Chiefs of Staff, has provided more current and specific guidance. Commanders of forces operating as part of a multinational (alliance or coalition) military command should follow multinational doctrine and procedures ratified by the United States. For doctrine and procedures not ratified by the United States, commanders should evaluate and follow the multinational command's doctrine and procedures, where applicable and consistent with US law, regulations, and doctrine.

For the Chairman of the Joint Chiefs of Staff:

STANLEY A. MCCHRYSTAL
Lieutenant General, USA
Director, Joint Staff

SUMMARY OF CHANGES
REVISION OF JOINT PUBLICATION 3-11
DATED 11 JULY 2000

- **Introduces the chemical, biological, radiological, and nuclear (CBRN) construct**

- **Includes coverage of radiological threats and toxic industrial materials**

- **Provides figures that summarize CBRN threats and hazards**

- **Outlines operational elements of CBRN defense: sense, shield, sustain, and shape, which serve as a guide in conducting CBRN defensive planning and activities**

- **Consolidates considerations for CBRN planning and operations into a single chapter**

- **Contains a chapter on sustainment that covers logistic support, personnel support, and health service support**

- **Removes discussion of military operations other than war**

- **Introduces the vulnerability assessment process**

- **Adds an appendix that discusses radiological hazard considerations**

- **Adds definitions for the terms "biological hazard," "chemical, biological, radiological, and nuclear environment," "chemical, biological, radiological, and nuclear hazard," "chemical, biological, radiological, and nuclear protection," "chemical, biological, radiological, and nuclear sense," "chemical, biological, radiological, and nuclear shape," "chemical, biological, radiological, and nuclear shield," "chemical, biological, radiological, and nuclear sustain," "chemical, biological, radiological, or nuclear incident," "chemical, biological, radiological or nuclear weapon," "chemical hazard," "clearance decontamination," "collective protection," "contamination avoidance," "ionizing radiation," "personal protective equipment," "radiological exposure device," and "split-mission oriented protective posture"**

- **Modifies the definitions of the terms "biological warfare," "chemical agent," "chemical, biological, radiological, and nuclear defense," "contamination," "contamination control," "detection," "immediate decontamination," "incapacitating agent," "individual protective equipment," "mission-oriented protective posture," "mission-oriented protective posture gear," "nuclear radiation," "operational exposure guide," "pathogen," "protection," "radiation dose," "radiation dose rate," "radiation exposure status," "radiological dispersal**

device," "riot control agent," "toxic industrial biological," "toxic industrial chemical," "toxic industrial material," and "toxin"

- **Removes the terms "absorbed dose," "aerosol," "avoidance," "binary chemical munition," "biological ammunition," "biological defense," "biological environment," "biological operation," "biological threat," "chemical ammunition," "chemical ammunition cargo," "chemical, biological, and radiological operation," "chemical contamination," "chemical defense," "chemical environment," "chemical operations," "collective nuclear, biological, and chemical protection." "contaminate," "fallout," "improvised nuclear device," "individual protection," "industrial chemicals," "nuclear, biological, and chemical capable nation," "nuclear, biological, and chemical conditions," "nuclear, biological, and chemical defense," "nuclear, biological, and chemical environment," "nuclear defense," "survey," "toxic chemical," and "toxin agent" from Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms***

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- **Discusses the CBRN Defense Framework**
- **Provides Considerations for CBRN Planning and Operations**
- **Describes Sustainment Considerations in a CBRN Environment**

Overview

The US military must train for and remain prepared to conduct the full range of military operations throughout the operational environment undeterred by the threat of chemical, biological, radiological, and nuclear (CBRN) weapons.

The employment or threat of chemical, biological, radiological, and nuclear (CBRN) weapons, including toxic industrial materials (TIMs) pose serious challenges to US military operations worldwide. The deadly, destructive, and disruptive effects of these weapons and materials merit continuous consideration by the joint force commander (JFC) and supporting commanders. **The use of CBRN weapons should provide no advantages to adversaries, only harsh additional adverse consequences.**

CBRN hazards include chemical, biological, radiological, and nuclear elements created from accidental or deliberate releases, TIMs (especially air and water poisons), chemical and biological agents, biological pathogens, and radioactive material and those hazards resulting from the employment of weapons of mass destruction (WMD), or encountered by the Armed Forces of the United States during the execution of military operations.

Strategic Environment

A variety of crisis and conflict situations may emerge in the international security environment to challenge US interests.

The **worldwide availability of advanced military and commercial technologies** (including dual-use), combined with commonly available transportation and delivery means, may allow adversaries opportunities to develop and employ CBRN weapons without regard for national or regional boundaries. Such situations could also expose US military operations to CBRN threats and hazards.

Nation states and non-state actors alike may have incentives to operate outside of international regulations/agreements, especially when important interests are involved. Even if an adversary does not intend to use a CBRN weapon, the potential existence of CBRN threats and hazards in any operational area creates potential risks.

Chemical, Biological, Radiological, and Nuclear Threats and Hazards

Threats

Adversaries may be of the nation state or non-state actor persuasion and could have local, regional, or global reach. A number of adversaries have, or could rapidly acquire, biological and chemical weapons, radiological or other toxic materials and, in some cases, nuclear capabilities. They may also have or seek to acquire clandestine or long-range delivery systems that can reach beyond their geographic regions or to employ weapons in defended US or allied regions by using innovative or unanticipated delivery mechanisms.

Hazards

Chemical agents are chemical substances which are intended for use in military operations to kill, seriously injure, or incapacitate humans or animals through their physiological effects. Chemical agents are categorized according to their physiological effects: choking, blister, blood, incapacitating, and nerve agents.

Biological agents are capable of spreading disease through humans and agriculture and are microorganisms categorized as either pathogens or toxins. Pathogens are microorganisms (e.g., bacteria, viruses, rickettsia) that directly attack human, plant, or animal tissue and biological processes. Toxins are poisonous substances that are produced naturally (by bacteria, plants, fungi, snakes, insects, and other living organisms) but may also be produced synthetically.

Radiological materials cause physiological damage through the ionizing effects of neutron, gamma, beta, and/or alpha radiation. Radiological hazards include any electromagnetic or particulate radiation capable of producing ions so as to cause damage, injury, or destruction.

A **nuclear weapon** refers to a complete assembly (i.e., implosion type, gun type, or thermonuclear type), in its intended ultimate configuration which, upon completion of the prescribed arming, fusing, and firing sequence, is capable of producing the **intended nuclear reaction and energy release.** Nuclear weapons effects are qualitatively different from biological or chemical weapons.

Principles of Chemical, Biological, Radiological, and Nuclear Defense

CBRN defense is based on three general principles.

CBRN defense is based on three general principles that specifically address the hazards created by CBRN incidents: **contamination avoidance** of CBRN hazards; **protection** of individuals, units, and equipment from unavoidable CBRN hazards; and **decontamination** in order to restore operational capability. Application of these principles helps to minimize vulnerabilities, protect friendly forces, and maintain the force's operational tempo in order to achieve operation or campaign objectives.

Preparedness — either to sustain readiness, prepare for deployment, or to conduct major combat operations — for conducting operations in a potential CBRN environment is integral to any planning effort. Even when an adversary does not possess CBRN weapons, easy global access to materials such as radiation sources and toxic industrial chemicals represent significant potential hazards to be considered during planning.

Operational Elements of Chemical, Biological, Radiological, and Nuclear Defense

The operational elements of CBRN defense are sense, shield, sustain, and shape.

CBRN sense entails activities that provide CBRN threat and hazard information and intelligence to support the common operational picture. CBRN sense is intended to continually provide critical information about potential or actual CBRN hazards in a timely manner through early detection, identification, and determination of the scope of hazards in all physical states (air, water, land), as well as personnel, equipment, or facilities. CBRN sense is also key to contamination avoidance.

CBRN shield consists of individual and collective protection measures essential to mitigating the effects of CBRN hazards. Protecting the force from CBRN hazards may include hardening systems and facilities, preventing or reducing individual and collective exposures, and applying medical prophylaxes. Additional considerations also include designated nonmilitary personnel as defined and designated by strategic and national authorities.

CBRN sustain consists of the decontamination and medical activities to restore combat power and continue operations. Mitigation includes planning, initiating, and continuing operations despite threats from CBRN materials through the conduct of contamination control, and medical countermeasures that additionally enable the quick restoration of operational capability; maintaining and recovering essential functions and assets; and facilitating the return to pre-incident operational capability as soon as possible.

CBRN shape is the command and control activity that integrates the sense, shield, and sustain operational elements to characterize CBRN hazards and threats and employ necessary capabilities to counter their effects. This facilitates transformation of CBRN information and capabilities into situational awareness, which is essential for establishing viable active and passive defense measures. This allows the JFC to make informed use of CBRN information and defensive capabilities for future operations: to plan, conduct, and integrate CBRN defense with other defenses; to optimize the capability to operate in the CBRN environment; and to minimize negative psychological effects.

Planning Considerations

The Armed Forces of the United States must be prepared to conduct prompt, sustained, and decisive military operations in CBRN environments.

An adversary's CBRN capabilities or the existence of significant quantities of TIM in the operational environment can have **a profound impact on US and multinational objectives,** the concept of operations, and supporting actions, and therefore must be taken into account. Some CBRN considerations for planning are listed below.

Establish priority intelligence requirements.

Take pre-incident actions to prevent adversary CBRN weapons employment.

Plan offensive and active defense operations to prevent or minimize CBRN attacks.

Plan actions to counter, mitigate, and manage the effects of a CBRN incident, including disease containment strategies.

Emphasize early warning and detection.

Take actions to prepare United States and indigenous military forces.

Protect threatened civilians, infrastructures, and facilities
Detect and monitor acquisition and development of WMD.

Enablers for Operating in CBRN Environments.

In considering the challenges to sustained combat operations in such situations, **six areas merit special emphasis**: conducting joint intelligence preparation of the operational environment; reducing vulnerability to adversary CBRN use; preventing adversary employment of CBRN capabilities; performing force protection; conducting multinational operations; and synchronizing operations. Information operations core, supporting, and related capabilities are applied across these joint functions and independently.

CBRN Defense Planning Considerations.

The basic CBRN defense planning process remains the same across the range of military operations and occurs within and among all levels. Nevertheless, **specific CBRN defense planning considerations may vary considerably among strategic-, operational-, and tactical-level operations** due to differences in missions, available resources, and the size of the operational areas and area of interest. An adversary's use of CBRN weapons can quickly change the character of an operation or campaign. The use or the threat of use of these weapons can cause large-scale shifts in strategic and operational objectives, phases, and courses of action. Planning at all levels should ensure the integration of CBRN considerations into the overall planning and decision-making processes. A key task for all commanders is the establishment of protection against CBRN attacks in the operational area and in other areas providing forces and sustaining capabilities. These goals include prevention of adversarial use of CBRN weapons, rapid and uninterrupted force preparation and deployment, and comprehensive force protection.

Sustainment

Operations in CBRN environments make sustainment planning more complex.

Operational tempo, logistic operations, the health service support system (HSS), personnel support system (PSS), and reconstitution efforts may be profoundly affected by the introduction of CBRN material. CBRN materials present separate and distinct threats to personnel, units, equipment, and operations. The ability to assess the potential effects of CBRN hazards on the mission is a critical factor in deciding priorities for CBRN protection and efficiently allocating resources.

Generally, **operations will slow as tasks are performed by personnel encumbered by protective equipment or exposed to CBRN effects.** Hazards may require abandonment or limited use of contaminated areas, transfer of missions to uncontaminated forces, or avoidance of planned terrain and routes. Additionally, CBRN use or contamination resulting in a major disruption of normal personnel and materiel replacement processes in the theater could severely hamper the component commanders' capabilities for force generation and sustainment.

Logistics.

Theater sustainment capabilities must be protected. CBRN contamination at an essential port of embarkation or debarkation, or other critical logistic facility can significantly affect campaign plans and execution. Measures to prevent and mitigate the effects of CBRN contamination must focus on maintaining support to combat operations and rapidly restoring the degraded capabilities.

Protecting forces from the effects of a CBRN environment is logistically taxing. Resupply requirements for protective clothing, medical supplies (antidotes, antibiotics, and antivirals), and sustainment supplies for quarantine/isolation facilities will be time sensitive. Low density CBRN protective equipment may require movement within the theater. Personnel and equipment decontamination requires great amounts of water, and then creates great amounts of contaminated water.

Personnel Services.

Providing PSS to assigned forces is a Service responsibility; however, the geographic combatant commander (GCC) may determine that centralizing some support functions (postal; religious; legal; morale, welfare, and recreation; or other appropriate services) within the area of responsibility would be beneficial and may designate a single Service component to provide or coordinate the support. These **PSS functions may be impacted in an area experiencing a CBRN incident.** Some services may be curtailed or stopped due to mission degradation while others may require augmentation due to an increased workload.

Health Service Support.

The GCC must consider and plan for all aspects of HSS requirements, including the possibility of a CBRN incident. Failure to plan for preventive medicine support as part of the early entry force can cause mission failures due to disease and nonbattle injuries. Planning for and maintaining a sound medical surveillance program for all operations can maximize force effectiveness by eliminating or reducing the effects of medical threats, such as the existence of indigenous diseases and their effect on the physiological and psychological health of military forces. Sound preparation and thorough disease containment planning will ensure the greatest range of options is available to respond to CBRN events while balancing mission requirements with the risk to personnel.

CONCLUSION

This publication provides doctrine to assist commanders and staffs in planning, preparing for, conducting, and assessing operations in which their forces may encounter chemical, biological, radiological, and nuclear threats and hazards.

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CHAPTER I
THE STRATEGIC CONTEXT

"The greatest threat before humanity today is the possibility of [a] secret and sudden attack with chemical or biological or radiological or nuclear weapons."

President George W. Bush
Remarks at the National Defense University
11 February 2004

1. General

a. The employment or threat of chemical, biological, radiological, and nuclear (CBRN) weapons including toxic industrial materials (TIMs) pose serious challenges to US military operations worldwide. The deadly, destructive, and disruptive effects of these weapons and materials merit continuous consideration by the joint force commander (JFC) and supporting commanders. The US military must train for and remain prepared to conduct the full range of military operations throughout the operational environment undeterred by the threat of CBRN weapons. The use of CBRN weapons should provide no advantages to adversaries, only harsh additional adverse consequences.

b. This publication focuses on maintaining the joint force's ability to continue military operations in a CBRN environment by describing the CBRN environment in a strategic context, providing a CBRN defense framework, discussing planning and operational considerations, and highlighting the complexities of sustainment. It expands Joint Publication (JP) 3-40, *Combating Weapons of Mass Destruction*, discussion of CBRN passive defense actions, to include those plans and activities intended to mitigate or neutralize adverse effects on operations and personnel resulting from the use or threatened use of CBRN weapons and devices, and the release, or risk of release, of TIMs into the environment. Furthermore, this publication provides guidance to JFCs to assist in planning and conducting combat operations when an adversary is capable of employing CBRN weapons. Finally, this publication carefully considers how logistics, personnel services, and health service support are critical components of military operations in a CBRN environment.

c. Planning for joint forces operations in CBRN environments must include consideration of the threats and hazards posed by CBRN materials, and the operational limitations that employing CBRN defense may impose on joint operations. CBRN hazards include chemical, biological, radiological, and nuclear elements created from accidental or deliberate releases, TIMs (especially air and water poisons), chemical and biological agents, biological pathogens, and radioactive material and those hazards resulting from the employment of weapons of mass destruction (WMD), or encountered by the Armed Forces of the United States during the execution of military operations. CBRN hazards could pose a hazard to individuals, equipment, animals, agricultural, and infrastructure and impact the overall operational environment and may impose limitations on joint operations.

For additional information on CBRN passive defense in context with combating WMD, see JP 3-40, Combating Weapons of Mass Destruction*.*

2. Strategic Environment

a. A variety of crisis and conflict situations may emerge in the international security environment to challenge US interests. Such situations could encompass disputes and hostilities between and among nation states, coalitions of nation states, and non-state actors. These situations may threaten global or regional stability; the territory and populations of the United States, its allies, multinational partners, and other friendly states; democratic processes; economic progress; and a range of other US interests.

b. The worldwide availability of advanced military and commercial technologies (including dual-use), combined with commonly available transportation and delivery means, may allow adversaries opportunities to develop and employ CBRN weapons without regard for national or regional boundaries. Such situations could also expose US military operations to CBRN threats and hazards..

c. **Nation states and non-state actors alike may have incentives to operate outside of international regulations/agreements, especially when important interests are involved.** In some cases, nation states may acquire CBRN weapons despite being signatories or parties to international agreements and treaties forbidding such actions. Non-state actors normally do not consider themselves bound by such agreements and treaties. Additionally, adversaries not party to an ongoing conflict involving US forces or affecting US interests may, for their own purposes, attempt to hold US interests at risk at locations outside their own geographic regions, including within the United States.

d. Even if an adversary does not intend to use a CBRN weapon, the potential existence of CBRN threats and hazards in any operational area creates potential risks. **Commanders shall consider the implications of a deliberate or inadvertent CBRN release not only in the adversary's geographic region, but also in other regions, including the United States.** This responsibility extends to a comprehensive assessment of belligerent opportunists who are not directly engaged in an operational area, but have interests in threatening US interests.

Appendix A, "Threat Considerations," provides information on categories of potential CBRN-capable adversaries, their objectives, capabilities, and employment concepts.

3. Strategic Guidance

a. US policies and strategies seek to prevent or limit the proliferation of CBRN capabilities through international agreements and treaties, multilateral initiatives, and unilateral actions. The Armed Forces of the United States support these policies and strategies within their respective roles and functions. The geographic combatant commander (GCC) is the vital link between those who determine national security policy and strategy and the military forces commanders that conduct operations within their area of responsibility (AOR). A GCC is responsible for a large geographical area requiring single responsibility for effective coordination of the operations within that area. Directives flow from the President and Secretary of Defense (SecDef) through the Chairman of the Joint Chiefs of Staff (CJCS) to the GCC, who then plans and conducts the operations that achieve national, alliance, or coalition strategic objectives.

b. Where proliferation or indigenous CBRN development has occurred, **deterrence of an adversary's employment of CBRN weapons is a principal US national objective**. To support deterrence, commanders must ensure that their forces and supporting facilities are universally known to be able to operate effectively in CBRN environments. The US forces will need to survive, avoid, or mitigate the effects of CBRN employment in order to, fight and win in a potentially contaminated operational environment. The key to operational success may be the joint force's ability to neutralize the adversary's CBRN capabilities. Security cooperation activities by US forces can shape the operational environment to dissuade or deter CBRN use. US forces may be called upon to conduct operations to neutralize CBRN threats. The JFC incorporates passive defenses measures into operational planning and execution in order to survive, mitigate, or avoid the effects of CBRN hazards, and to fight, and win in a potentially contaminated operational environment.

See JP 3-40, Combating Weapons of Mass Destruction*, for more information on the various strategic measures that the US is prepared to simultaneously employ to eliminate an adversary's ability to employ WMD.*

c. Situational awareness and assessment are critical to US forces ability to advance and defend US interests under both unpredictable and simultaneous occurring situations. CBRN risks assessments are integral parts of situational awareness and shall include CBRN use in the adversary's geographic region as well as in the United States against civilian targets, military forces, and facilities supporting prospective military operations. The general characteristics of CBRN threats and hazards are outlined in Figure I-1.

For detailed information on national security and military strategies applicable to CBRN see the following: The National Security Strategy of the United States of America*;* The National Strategy to Combat Weapons of Mass Destruction*;* The National Defense Strategy of the United States of America*;* The National Military Strategy of the United States of America*;* The National Military Strategic Plan for the War on Terrorism*; and the* National Military Strategy to Combat Weapons of Mass Destruction*. See Department of Defense Instruction (DODI) 2000.18,* Department of Defense Installation Chemical, Biological, Radiological, Nuclear and High-Yield Explosive Emergency Response Guidelines*, for guidance on the establishment of a chemical, biological, radiological, nuclear, and high-yield explosives preparedness program for emergency responders at all Department of Defense (DOD) installations.*

d. The GCC, Service components, and supporting organizations must develop theater strategies and plans that ensure force and facility sustainment and operation in CBRN environments while executing the national military strategy. Commanders of joint and

GENERAL CHARACTERISTICS OF CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR THREATS AND HAZARDS

CHARACTERISTICS	Chemical	Biological	Radiological	Nuclear
AREA AFFECTED	Relatively Small	Potentially Very Large	Relatively Small	Large
ABILITY TO DETECT	Difficult without Specialized Instruments	Very Difficult	Impossible without Specialized Instruments	Distinctive Signature
TIME TO DETECT AND IDENTIFY	Seconds	Minutes to Days	Minutes to Hours	Near Real Time
TIME FROM EXPOSURE TO ONSET OF EFFECTS	Seconds to Hours	Normally Days Except for Toxins	Varies with Dose	• Blast and Heat = Immediate • Radiation = Varies with Dosage
MEDICAL TREATMENT	Effective Treatment for Some Chemicals, Not Others	Effective Prevention/ Treatment for Some Agents, Not Others	Varies with Dose	Variable Based on Type and Severity of Injury and/or Dose

Figure I-1. General Characteristics of Chemical, Biological, Radiological, and Nuclear Threats and Hazards

multi-Service installations are also responsible for ensuring that the tactical execution of the principles of CBRN defense (as described in Chapter II, "Chemical, Biological, Radiological, and Nuclear Defense Framework") by all tenant units are integrated and coordinated to maximize operational capabilities in CBRN environments.

4. Chemical, Biological, Radiological, and Nuclear Threats and Hazards

a. **Threats.** Adversaries may be of the nation state or non-state actor persuasion and could have local, regional, or global reach. A number of adversaries have, or could rapidly acquire, biological and chemical weapons, radiological or other toxic materials and, in some cases, nuclear capabilities. They may also have or seek to acquire clandestine or long-range delivery systems that can reach beyond their geographic regions or to employ weapons in defended US or allied regions by using innovative or unanticipated delivery mechanisms. **Adversaries who might possess CBRN capabilities include global, regional, and non-state adversaries** (see Figure I-2).

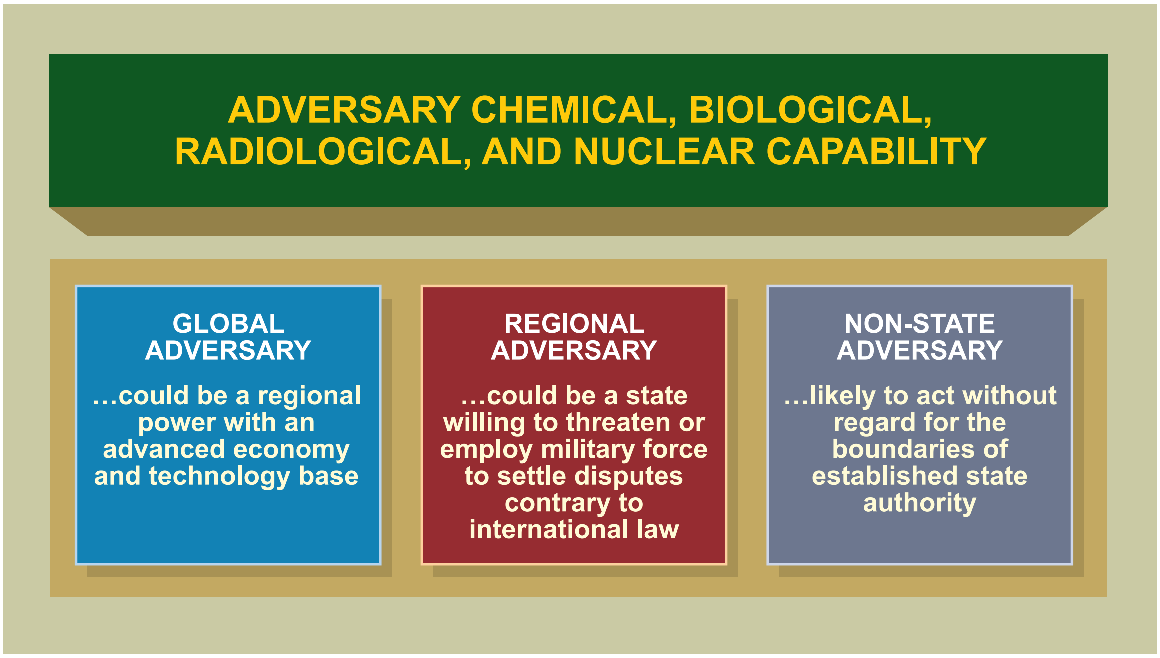

Figure I-2. Adversary Chemical, Biological, Radiological, and Nuclear Capability

Appendix A, "Threat Considerations," provides additional information on categories of CBRN-capable adversaries, their objectives, capabilities, and employment concepts.

b. **Hazards.** Depending on the adversary's specific objectives, widespread or limited methods may be used to create CBRN hazards. These hazards present both physical and psychological effects well beyond the immediate target area. The subsequent subparagraphs describe the characteristics and effects of CBRN hazards and selected toxic materials (see Figure I-3).

(1) **Chemical Agents.** Chemical agents are chemical substances which are intended for use in military operations to kill, seriously injure, or incapacitate humans or animals through their physiological effects. These agents exclude riot control agents (RCAs) when used for law enforcement purposes, herbicides, and substances generating smoke and flames. Chemical agents are categorized according to their physiological effects: choking, blister, blood, incapacitating, and nerve agents. An adversary may have to expend large quantities of chemical agents in order to cause mass casualties, or achieve area denial.

Appendix B, "Chemical Hazard Considerations," describes general chemical agent characteristics and their effects and identifies other potential toxic chemical hazards.

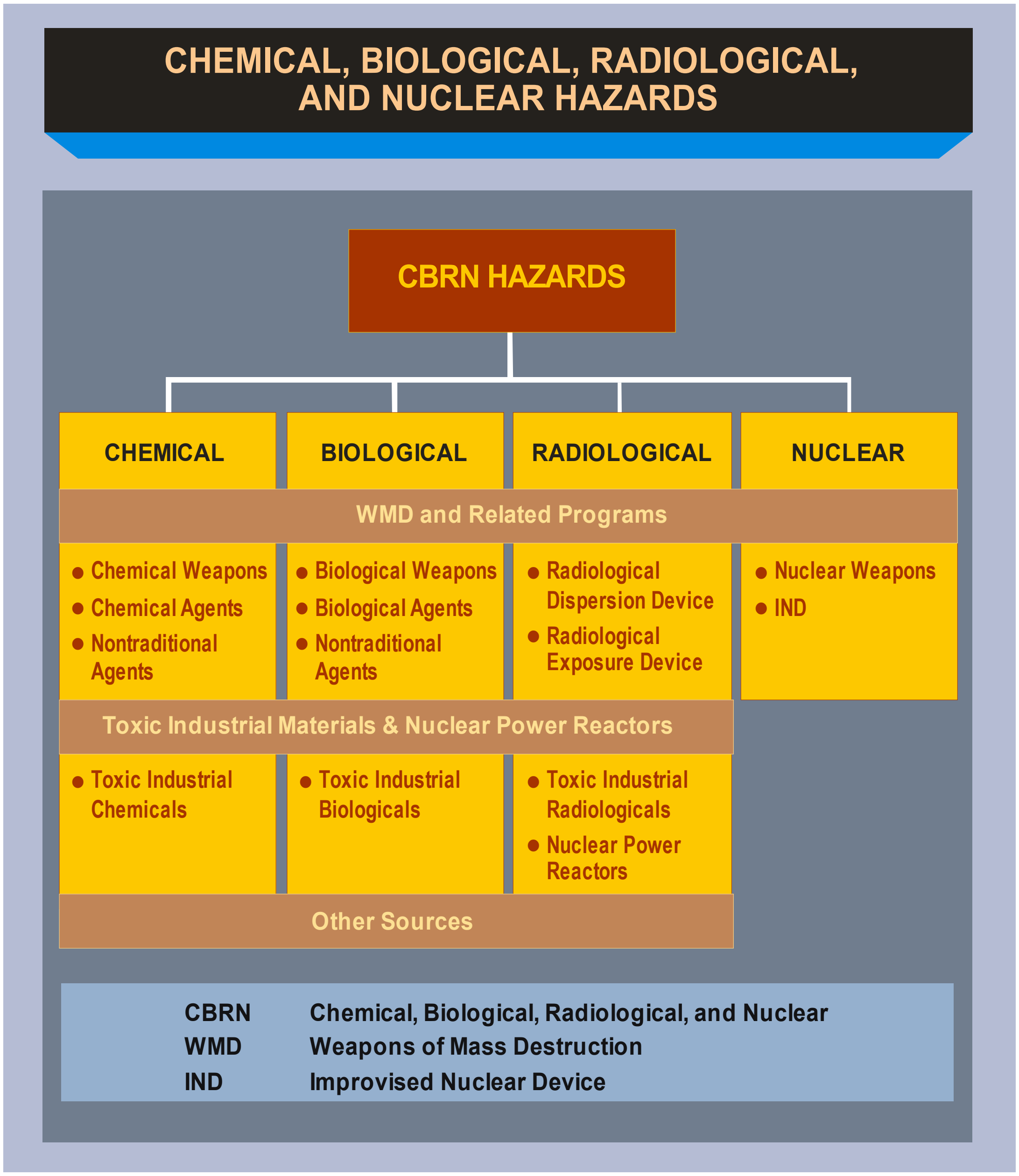

Figure I-3. Chemical, Biological, Radiological, and Nuclear Hazards

(2) **Biological Agents.** Biological agents are capable of spreading disease through humans and agriculture and are microorganisms categorized as either pathogens or toxins. Pathogens are microorganisms (e.g., bacteria or, viruses, rickettsia) that directly attack human, plant, or animal tissue and biological processes. Toxins are poisonous substances that are produced naturally (by bacteria, plants, fungi, snakes, insects, and other living organisms) but may also be produced synthetically. Biological agents pose a threat due to five factors: small doses of biological agents can produce lethal or incapacitating effects over an extensive area; detection in a timely manner; they are easy to conceal; they can be covertly deployed; and the variety of potential biological agents significantly

complicates effective preventative or protective treatment. These factors, combined with small employment signatures, delayed onset of symptoms, detection, identification, and verification difficulties, and agent persistence and communicability, can confer important advantages to adversaries who use biological agents.

Appendix C, "Biological Hazard Considerations," provides additional information on the variety of potential agents and their effects.

(3) **Radiological Material.** Radiological materials cause physiological damage through the ionizing effects of neutron, gamma, beta, and/or alpha radiation. These types of radiation are referred to as ionizing radiation and, for the purpose of this publication, the term radiation will mean ionizing radiation unless otherwise stated. Radiological materials can be found in a number of military and civilian environments, including nuclear power plants, hospitals, universities, and construction sites. Radiological hazards include any electromagnetic or particulate radiation capable of producing ions so as to cause damage, injury, or destruction.

(a) Radiological dispersal devices (RDDs) are designed to scatter radioactive material to cause destruction, damage, area denial, or injury without producing a nuclear explosion. One design, popularly called a "dirty bomb," uses conventional explosives to disperse radioactive contamination. A dirty bomb typically generates its immediate casualties from the direct effects of the conventional explosion (i.e., blast injuries and trauma). However, one of the primary purposes of a dirty bomb is to frighten people by contaminating their environment with radioactive materials and threatening large numbers of people with exposure. The actual dose rate depends on the type and quantity of radioactive material spread over the area, and contributing factors such as weather and terrain. As an area denial weapon, an RDD can generate significant public fear and economic impact. In some cases, an area may not be habitable for nonmilitary personnel but military operations could continue in the area following appropriate risk management procedures such as strict exposure control guidelines.

(b) A radiological exposure device (RED) is a radioactive source placed to cause injury, illness, or death. An undetected RED may increase the potential dose to the intended target.

(c) Other sources of ionizing radiation include damaged or ruptured nuclear containers (e.g., Chernobyl), spent fuel rods, and medical radiological waste.

1. By far the largest quantities of radioactive waste, in terms of both radioactivity and volume, are generated by the commercial nuclear power and military nuclear weapons production industries, and by nuclear fuel cycle activities to support these industries such as uranium mining and processing.

2. Depleted uranium (DU) presents a residual radiation hazard and appropriate actions must be taken to protect against the hazard. If ingested or inhaled in large amounts, heavy metal properties of DU could have toxic effects on the kidney. This

chemical toxic effect would be detected long before any negative health outcomes that may result from internalization of radiations associated with DU.

Appendix D, "Radiological Hazard Considerations," provides additional information on operational considerations for other dispersed toxic radioactive materials.

(4) **Nuclear Weapons.** A nuclear weapon refers to a complete assembly (i.e., implosion type, gun type, or thermonuclear type), in its intended ultimate configuration which, upon completion of the prescribed arming, fusing, and firing sequence, is capable of producing the **intended nuclear reaction and energy release.** With regard to the risk of proliferation and use by terrorists, the gun-type weapon is a relatively simple design and is a concern, as it does not require as much fine engineering or manufacturing as other methods. With enough highly enriched uranium, nations or groups with relatively low levels of technological sophistication could create an inefficient, though still quite powerful, nuclear weapon. Nuclear weapons effects are qualitatively different from biological or chemical weapons. A nuclear detonation produces its damaging effects through four primary ways: blast, thermal radiation, ionizing radiation, and electromagnetic pulse (EMP). The radiation effects of a nuclear explosion are divided into two categories: initial and residual.

(a) **Initial radiation effects** are those effects generated within the first minute following the detonation and are almost entirely from the nuclear processes occurring at detonation. **These effects** are comprised of:

1. **Initial radiation** (e.g., gamma, neutron, X-ray) generated by the nuclear explosion and dependent upon the yield itself, which may be very harmful to humans and other life forms within a few miles of the explosion.

2. **Thermal radiation**, which will ignite flammable materials and cause significant burns to people in the direct line-of-sight of the burst.

3. **EMP**, which may damage or destroy a variety of electronic equipment up to hundreds of miles away from the nuclear detonation.

(b) **Residual radiation** is that radiation which is emitted later than one minute after detonation. Its effects are caused by radioactive fallout and neutron induced activity; it may encompass large areas, and serve as a persistent hazard to civilian and military personnel for extended periods of time.

Appendix E, "Nuclear Hazard Considerations," provides additional information on nuclear weapons effects.

(5) **Toxic Industrial Material.** TIM is a generic term for toxic chemical, biological, or radioactive substances in solid, liquid, aerosolized, or gaseous form created for industrial, commercial, medical, military (nonweapon), or domestic purposes. Normally, such materials retained within their planned manufacturing, storage, and transport facilities do not pose a significant hazard. However, their intentional or accidental

release may pose a significant hazard to joint forces. It could result in a toxic industrial hazard (i.e., the contamination or irradiation of personnel or the environment, area, or any particular object). Forces may be exposed to TIMs as a consequence of friendly action, adversary action, or accidents. A TIM hazard area refers to an area containing TIMs that have been released or have the potential for release into the environment with consequent impact on the conduct of military operations.

(a) **Toxic Industrial Chemicals (TICs).** Industrial chemicals can pose significant toxic hazards and can damage the human body and equipment. Many industrial chemicals are corrosive, flammable, explosive, or combustible; these hazards may pose greater short-term challenges than the immediate toxic effects. Most TICs will be released as vapor or highly volatile liquid and can have both short-term and long-term health effects. The release of large volumes of hazardous industrial chemicals can also produce environmental damage.

Appendix B, "Chemical Hazard Considerations," describes general chemical agent characteristics and their effects and identifies other potential toxic chemical hazards.

(b) **Toxic Industrial Biologicals (TIBs).** The release of TIB hazards can occur following an incident, an attack, or damage at a facility that handles, produces, stores, and/or recycles biological material. Those facilities include hospitals, medical installations, agricultural facilities, and facilities that recycle biological materials for the medical, pharmaceutical, or agricultural industries.

Appendix C, "Biological Hazard Considerations," provides additional information on the variety of potential agents and their effects.

(c) **Toxic Industrial Radiologicals (TIRs).** Possible sources of TIRs capable of producing radioactive hazards are: civil nuclear production, research, recycling, and storage facilities; nuclear waste containment sites; industrial and medical nuclear sources; nuclear materials and sources in transit; stolen or smuggled nuclear weapons grade material; medical and fossil fuel manufacturing and waste processing, and other industrial sources. The characteristics of radioactive hazards produced will depend on the type of radiation and the nuclide involved. The geographical hazard area can vary dramatically based on the source and manner of release.

Appendix D, "Radiological Hazard Considerations," provides additional information on operational considerations for other dispersed toxic radioactive materials.

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CHAPTER II
CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR DEFENSE FRAMEWORK

> *"Nation-states no longer have a monopoly over the catastrophic use of violence. Today, small teams or even single individuals can weaponize chemical, biological and even crude radiological or nuclear devices and use them to murder hundreds of thousands of people."*
>
> **Quadrennial Defense Review Report**
> **February 6, 2006**

1. General

a. The capability to effectively respond to and defend against CBRN attacks, and sustain operations in CBRN environments, requires properly trained and equipped forces. US forces must be prepared to conduct and sustain operations in CBRN environments with minimal degradation. In order to sustain operations, US forces must assess the environment for CBRN hazards and prepare for CBRN defense when appropriate. **CBRN defense is based on three general principles** that specifically address the hazards created by CBRN incidents: **contamination avoidance** of CBRN hazards; **protection** of individuals, units, and equipment from unavoidable CBRN hazards; and **decontamination** in order to restore operational capability. Application of these principles helps to minimize vulnerabilities, protect friendly forces, and maintain the force's operational tempo in order to achieve operation or campaign objectives.

b. Preparedness — either to sustain readiness, prepare for deployment, or to conduct major combat operations — for conducting operations in a potential CBRN environment is integral to any planning effort. Even when an adversary does not possess CBRN weapons, easy global access to materials such as radiation sources and TICs represents significant potential hazards to be considered during planning. CBRN preparedness helps provide defense against attack and improves the capability to sustain operations in CBRN environments. Effective CBRN preparedness and operational readiness also deters adversary CBRN usage by contributing to the survivability of US forces.

c. All elements in the Armed Forces of the United States are responsible for ensuring that their training for individuals and organizations meets the requirements of the combatant commands for operations in CBRN environments.

2. Principles of Chemical, Biological, Radiological, and Nuclear Defense

a. Before employing passive defense measures, commanders must assess the operational environment. A thorough assessment of the risks associated with the CBRN hazards provides commanders the information necessary to determine the degree to which the three fundamental principles of contamination avoidance, protection, or decontamination are implemented. A CBRN assessment includes, but is not limited to, identifying, quantifying, and determining the properties of the agent or material in the operational area, determining the risks of the CBRN hazards, and their potential impact on operations. This requires the ability to recognize the presence or absence of CBRN hazards in the air, water, on land, and its potential impact on personnel, equipment, and facilities. Intelligence, surveillance, and reconnaissance (ISR) capabilities enable forces to characterize the CBRN hazards. The fusion of these capabilities with information from other sources yields a common operational picture supporting decisions for specific contamination avoidance, protection, and decontamination actions.

b. CBRN environments present major challenges to sustaining military operations in air, land, maritime, and space. Logistic operations and facilities are particularly vulnerable to CBRN attack to the degree that they rely on fixed sites (e.g., ports and airfields) or must remain in particular locations for extended periods of time. **Working in CBRN environments adds to the physical and psychological demands of military members.**

c. A detailed discussion of the operational elements of CBRN defense (shape, sense, shield, and sustain) follows with appropriate integration of the principles of CBRN defense.

3. Operational Elements of Chemical, Biological, Radiological, and Nuclear Defense

a. Commanders at all echelons should initiate CBRN defense planning and integration into all phases of operations as early as possible. The following section outlines operational elements of CBRN defense: sense, shield, sustain, and shape, which serve as a guide in conducting CBRN defensive planning and activities (see Figure II-I).

b. **CBRN Sense.** Early understanding and detection of CBRN hazards is a key to CBRN defense. CBRN sense entails activities that provide CBRN threat and hazard information and intelligence to support the common operational picture. CBRN sense is intended to continually provide critical information about potential or actual CBRN hazards in a timely manner through early detection, identification, and determination of the scope of hazards in all physical states (air, water, land), as well as personnel, equipment, or facilities. CBRN sense is also key to contamination avoidance. Successful contamination avoidance minimizes disruption to operations and organizations by eliminating unnecessary time in the various protective postures and minimizing decontamination requirements. CBRN sense provides decision makers with information useful for establishing requirements for other contamination avoidance measures such as isolating contaminated areas, establishing split-mission-oriented protective posture (MOPP) concepts, sounding alarms, marking hazards, warning forces, restricting movement, and maneuvering away from the downwind hazard area. To support JFC decisions on contamination avoidance, specific tactics, techniques, and procedures (TTP) guide avoidance strategies, such as increased use of covers and shelters during CBRN employment windows, and providing key information for movement before, during, and after CBRN incidents. In planning for contamination avoidance, the JFC must include an assessment of the capabilities of available detection systems. Particular challenges include covert or unanticipated use of chemical, biological, or radiological agents and the capabilities and limitations of current remote and standoff detection systems. Sensing may include:

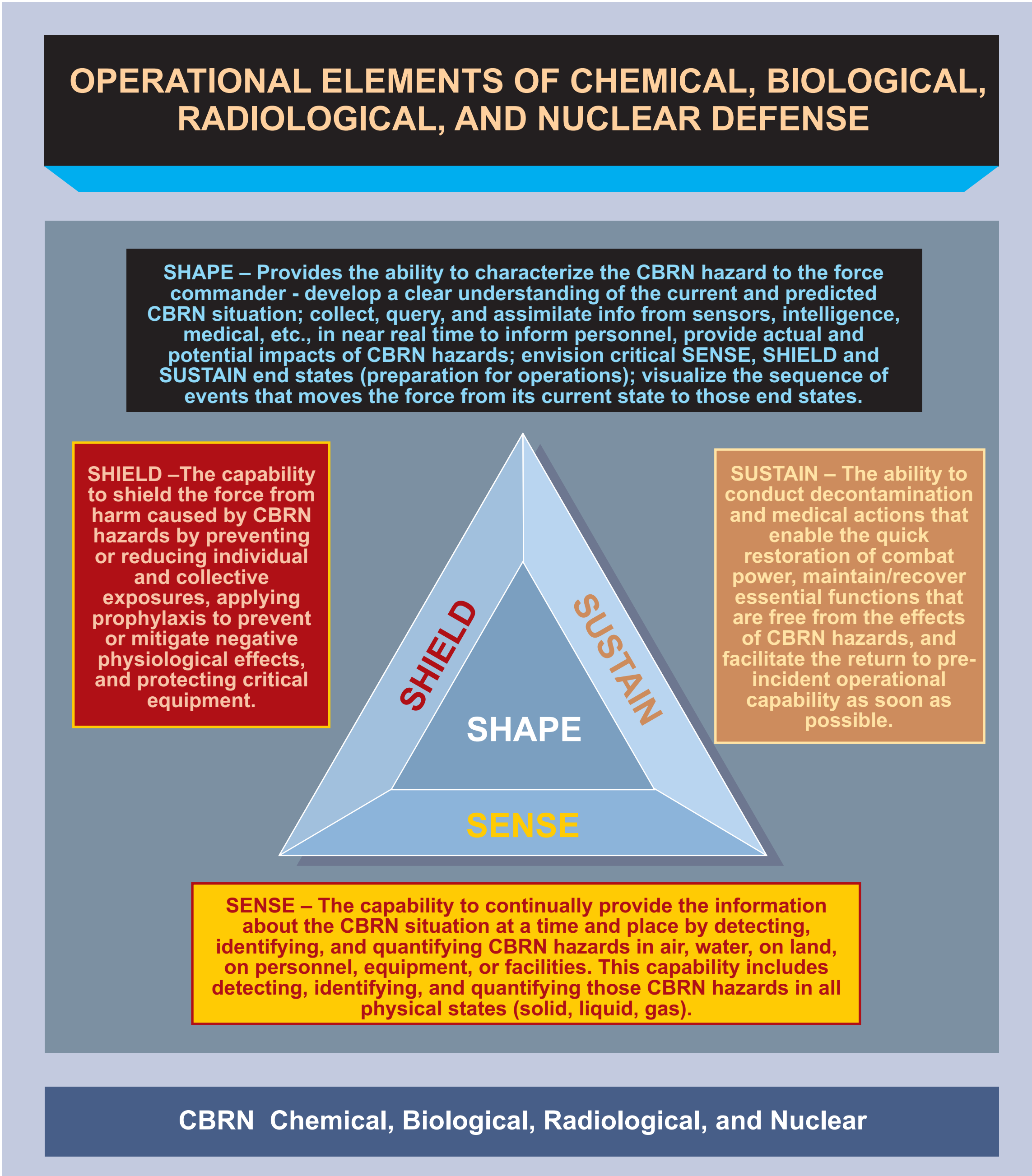

Figure II-1. Operational Elements of Chemical, Biological, Radiological, and Nuclear Defense

(1) Determining the presence of any CBRN hazardous substances in the environment.

(2) Identifying the storage locations of CBRN materials, weapons, or components in the operational area.

(3) Developing environmental and climatology background data.

(4) Identifying CBRN weapons employed in the operational area.

(5) Identifying CBRN hazards as a result of CBRN incidents.

(6) Detecting and identifying CBRN hazards in non-accessible areas. This may require participation from other than US forces and/or resources.

(7) Obtaining samples collected by non-assigned organizations.

(8) Verifying first use by proper sampling and identification of biological, chemical, or radiological agents.

(9) Identifying naturally-occurring diseases endemic to the local area and developing baseline medical surveillance data for those diseases.

For further information, on split-MOPP see Field Manual (FM) 3-11.34/Marine Corps Warfighting Publication (MCWP) 3-37.5/Navy Tactics, Techniques, and Procedures (NTTP) 3-11.23/Air Force Tactics, Techniques, and Procedures (Instruction) (AFTTP(I)) 3-2.33, Multi-Service Tactics, Techniques, and Procedures (MTTP) for Installation CBRN Defense.

c. **CBRN Shield**

(1) CBRN shield consists of individual and collective protection measures essential to mitigating the effects of CBRN hazards. Protecting the force from CBRN hazards may include hardening systems and facilities, preventing or reducing individual and collective exposures, and applying medical prophylaxes. Additional considerations also include designated nonmilitary personnel as defined and designated by strategic and national authorities. Shielding may include:

(a) Supplying or prepositioning protective consumable, expendable, and replacement CBRN equipment.

(b) Employing protective measures to minimize the effects of CBRN incidents.

(c) Integrating allied, coalition, and US protective measures and assets.

(d) Establishing CBRN defense medical protection operations.

(e) Protecting equipment and supplies.

(f) Providing collective protection (COLPRO) for command and control (C2), medical operations, and work force rest and relief.

(g) Implementing effective restriction of movement, to include social distancing, isolation, and quarantine as appropriate, to limit exposure following a CBRN attack or incident.

(2) **Protection.** CBRN protection requires the planning, preparation, training, and execution of medical and physical defenses to negate the effects of CBRN hazards on personnel, materiel, and military working animals. As staffs analyze their mission requirements and conditions, the planning process will yield potential courses of action (COAs) required before, during, and after CBRN incidents. After commanders decide upon a COA, these actions should be clearly communicated and rehearsed from command to individual levels. **CBRN protection conserves the force by providing individual and collective protection postures and capabilities.**

(a) **Individual Protection**

1. MOPP is a flexible system of protection against CBRN contamination. This posture requires personnel to wear only that protective clothing and equipment (MOPP gear) appropriate to the threat level and work rate imposed by the mission, temperature, and humidity. MOPP allows commanders to adjust their force's protective posture (from as low as having individual protective equipment [IPE] readily available to as high as wearing the full personal protective ensemble) based on the threat of imminent attack or the CBRN hazards present, and then prosecute the mission with confidence. Mission performance of personnel will suffer from wearing protective equipment over time. Also, IPE effectiveness degrades over time. Therefore, MOPP analysis is critical for determining what should be worn, by whom, and for how long. MOPP analysis relies on accurate joint intelligence preparation of the operational environment (JIPOE) and CBRN hazard prediction, as well as a clear understanding of the force's ability to quickly increase its CBRN protection. To facilitate adapting to varying mission demands across a combatant commander's (CCDR's) AOR, MOPP decisions should be delegated to the lowest level possible and retained at higher levels only in exceptional cases. The JFC has overall responsibility for providing guidance for levels of protection and ensuring timely warning of CBRN hazards. Commanders of installations are responsible for promulgating JFC guidance to all tenant units and coordinating with those units to maximize force protection (FP) and minimize the degradation of operations. Figure II-2 depicts ship/land CBRN MOPP comparison. Force components may require various MOPP configurations for unique situations, such as "MOPP ready" or "mask only" split-MOPP. Split-MOPP provides greater flexibility for fixed sites to respond to chemical threats in specific areas and continue operations within areas unaffected by the incident or at lower risk from the threat. Service publications address specific TTP for MOPP configurations and they should seek to standardize those configurations where possible. Installation commanders are responsible for ensuring unit plans include applicable MOPP configurations and ensuring all tenant units are prepared to implement and execute those configurations.

2. Dependent upon characteristics such as color and type of material, ordinary clothing can provide extremely limited protection against the thermal effects of a

nuclear detonation and mitigate the percutaneous threat associated with chemical agents in vapor form and aerosolized biological agents. It can also provide some basic protection against ionizing radiation particles (alpha and beta) from a nuclear detonation or a radiological incident. However, ordinary clothing should not be considered adequate protection against CBRN hazards. Additional protective measures are required, especially when exposure to biological, chemical, or radioactive hazards is direct, intensive, or prolonged. These measures include pretreatments, protective masks and clothing, radiation shielding and overgarments, antidotes, immunizations, and other medical treatments. Protective mask filters are designed to prevent ingestion or inhalation of certain aerosols and vapors of chemical and biological agents, and radiological particles. Wearing a correctly sized and maintained protective mask provides protection for the eyes and respiratory tract. IPE or personal protective equipment (PPE) provide protection from a wide range of chemical and biological agents and radiological particles. Additionally, overgarments can protect wearers from the effects of alpha particles and low energy beta particles. Likewise, individual equipment, vehicles, and supplies gain considerable protection from covers. These covers may be as simple as plastic sheathing, which should provide limited protection against large scale use of liquid agents, or CBRN protective covers which provide improved protection. Radiation shielding, such as lead or substantial thicknesses of concrete or certain plastics, is necessary to prevent exposure to high energy radiation including X-rays and gamma rays.

3. The individual protective posture for response units may include DOD-approved commercial off-the-shelf protective ensemble or "nonstandard equipment sets" referred to as PPE. The PPE provides units with additional capabilities, such as the ability to detect a multitude of substances and chemicals that are immediately dangerous to life or health. CBRN consequence management forces utilize PPE which are divided in four categories (Level A, B, C, and D).

For additional information on PPE see FM 3-11.21/Marine Corps Reference Publication (MCRP) 3-37.2C/NTTP 3-11.24/ AFTTP(I) 3-2.37, Multi-Service Tactics, Techniques, and Procedures For Chemical, Biological, Radiological, and Nuclear Consequence Management Operations.

(b) **COLPRO Postures.** Sustaining operations in CBRN environments may require COLPRO equipment, which provides a toxic free area for conducting operations and performing life support functions such as rest, relief, and medical treatment without wearing IPE. IPE and warfighter performance while wearing IPE degrades over time, thus requiring COLPRO equipment.

SHIP/LAND CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR MISSION-ORIENTED PROTECTIVE POSTURE COMPARISON

Ship MOPP		Land MOPP	
Ship MOPP Level	**Description**	**Land MOPP Level**	**Description**
MOPP 0	• Inspect, size, fit, and issue IPE to personnel	MOPP 0	• Carry mask; IPE available (within arms reach)
MOPP 1	• IPE available (within arms reach)	MOPP 1	• Don protective suit
MOPP 2	• Carry mask, IPE available • Activate installed detectors • Post detector paper • Set condition modified ZEBRA (Ship Hatch Closure/Secure Measures)	MOPP 2	• Don protective boots
MOPP 3	• Don protective suit • Don protective boots • Set condition ZEBRA (Ship Hatch Closure/ Secure Measures) • Activate intermittent countermeasure washdown	MOPP 3	• Don protective mask • Secure hood (Joint Service Lightweight Integrated Suit Technology)
MOPP 4	• Don mask • Don protective gloves • Secure hood • Set condition CIRCLE WILLIAM (Ship Hatch Closure/Secure Measures) • Activate continuous countermeasure washdown	MOPP 4	• Secure hood (Battle Dress Overgarment only) • Don protective gloves

IPE	Individual Protective Equipment
MOPP	Mission-Oriented Protective Posture

Figure II-2. Ship/Land Chemical, Biological, Radiological, and Nuclear Mission-Oriented Protective Posture Comparison

1. Besides protecting the joint force (including warfighters, contractors, and US Government civilians), DOD policy and the Geneva Conventions require protection for civilians, host nation (HN) personnel, adversary prisoners of war, and detainees.

2. Contamination transfer into the toxic free area compromises the health and safety of all occupants and jeopardizes their ability to support the mission. Therefore, training must include procedures for toxic free area entry and exit to prevent contamination.

3. In planning for the use of COLPRO, the staffs need to include an assessment of the capabilities of the available COLPRO systems. COLPRO systems should protect against most CBRN hazards; however, they do have limitations. Consult with subject matter experts to understand proper use. Logistic supportability is another challenge for COLPRO systems. Proper planning and coordination will be required to effectively use COLPRO.

4. When COLPRO is not available, plans must be developed, exercised, and evaluated to move personnel to alternative toxic free areas that are well away from the contaminated areas. If evacuation is not possible, building occupants may be able to shelter in place to gain limited protection by closing all windows and doors, turning off ventilation systems, and moving to closed, inner rooms. If there is advance warning, occupants can increase protection by sealing windows, doors, and openings, but must recognize that the building or space may quickly become uninhabitable without cooling or ventilation. That is why, in at risk areas, an inventory of shelters must be conducted and filtering equipment must be in place for the anticipated number of people. Therefore, if possible, planners should include the provision of communication for the occupants of sealed areas to stay in touch with operations C2.

(c) **Threat-based Protection.** When directed by the commander, or as a vulnerability reduction measure at installations or fixed sites, split-MOPP planners should provide the commander with flexible options to respond to threats in specific areas and continue operations within areas unaffected by the incident or at lower risk from the threat.

d. **CBRN Sustain**

(1) CBRN sustain consists of the decontamination and medical activities to restore combat power and continue operations. Mitigation includes planning, initiating, and continuing operations despite threats from CBRN materials through the conduct of contamination control, and medical countermeasures that additionally enable the quick restoration of operational capability; maintaining and recovering essential functions and assets; and facilitating the return to pre-incident operational capability as soon as possible. Sustaining may include:

(a) Integrating CBRN incident restoration operations.

(b) Decontaminating significant areas or facilities.

(c) Coordinating salvage and decontamination of materials.

(d) Providing C2 of restoration operations.

(e) Providing restoration country assistance teams.

(f) Determining the disposition of contaminated equipment, facilities, and human remains.

(g) Establishing reporting procedures for restoration requirements.

(h) Providing operational guidance to contaminated forces.

(i) Assessing the operational impact of restoration activities, to include assessing the linkage of restoration and the operational risk assessment.

(j) Establishing appropriate mortuary processes.

(k) Supporting restoration of special operations forces (SOF) operations.

(l) Establishing contamination control.

(2) **Decontamination**

(a) Decontamination efforts mitigate the effects of CBRN hazards to enhance JFC capabilities. Decontamination also supports the post-attack restoration of forces and operational capability. Decontamination is intended to minimize the time required to return personnel and mission-essential equipment to a mission capable state. Because decontamination may be labor intensive and assets are limited, commanders must prioritize requirements and decontaminate only what is necessary. Commanders may choose to defer decontamination of some items and, depending on agent type and weather conditions, opt to either defer use of equipment or allow natural weathering effects (temperature, wind, and sunlight) to reduce hazards. There are four levels of decontamination: immediate, operational, thorough, and clearance. The type of decontamination depends on the situation, mission, degree of contamination, time available, and decontamination assets available. The principles of decontamination are:

1. Decontaminate as soon as possible.

2. Decontaminate by priority.

3. Decontaminate only what is necessary.

4. Decontaminate as far forward as possible.

(b) **Contamination Control.** Contamination control is a combination of standard force health protection measures, and CBRN contamination avoidance, protection and decontamination measures. This includes procedures for avoiding, reducing, removing, weathering, or neutralizing the hazards resulting from the contamination. Contamination control is applied in any operational environment where CBRN threats and hazards exist to support passive defense measures. Contamination control prevents secondary transfer of disease, chemical or radiological material, and/or agent reaerosolization. In a chemical environment, this involves TTPs that limit the further spread of chemical contamination (e.g., split-MOPP basing, contamination control areas, covering critical ground equipment, sheltering aircraft where possible, and developing an asset protection plan to prioritize ground equipment protection requirements). In a biological environment, this involves TTPs that limit the spread of contagious diseases (e.g., disease containment planning and restriction of movement). In a radiological environment, this involves TTPs that limit the further spread of radiological contamination.

(c) **Levels of Decontamination.** There are four levels of decontamination: immediate, operational, thorough, and clearance. The type of decontamination depends on the situation, mission, degree of contamination, time available, and decontamination assets available. Decontamination also entails special considerations for patients, sensitive equipment, aircraft, ships, fixed sites, and the retrograde of equipment. Service publications provide detailed TTP for the technical aspects of decontamination.

1. **Immediate Decontamination.** Immediate decontamination is a hazard reduction process to minimize casualties, save lives, and help to limit contamination exposure and spread. A contaminated individual carries out immediate decontamination, which may include: removal of contamination from the skin and eyes, personal wipedown (hood if worn, mask, gloves, individual equipment, etc.), and operator removal of surface contamination from frequently touched equipment surfaces.

2. **Operational Decontamination.** Operation decontamination is a hazard reduction process that limits the spread and transfer of contamination, allows temporary relief from MOPP 4, and focuses on mission-essential techniques: MOPP gear exchange for personnel; decontamination of supply routes and operator wash down of mission-essential equipment. By supplementing the weathering process, the need for a thorough decontamination may be eliminated.

3. **Thorough Decontamination.** Thorough decontamination is a hazard reduction process that reduces or eliminates the need for wearing of protective equipment and facilitates the relatively unconstrained use of previously contaminated resources. Thorough decontamination is supported by specialized decontamination units and personnel. There are three thorough decontamination techniques: detailed personnel decontamination, detailed equipment decontamination, and detailed aircraft decontamination.

4. **Clearance Decontamination.** Clearance decontamination provides for the decontamination of equipment and personnel to a level that allows unrestricted transportation, maintenance, employment, and disposal. Reconstitution decontamination

involves those actions required to bring contaminated items into full compliance with national work and occupational hazard standards after termination of conflict. It involves eliminating contamination to restore mission-critical resources to a condition that permits unrestricted use, handling, or operation, and release from military control. Reconstitution decontamination would be conducted after hostile actions have terminated, when the commander determines it is in the unit's best interest, or when directed by higher authority. Clearance decontamination prepares organizations or individual units for return to their home garrisons. Decontamination at this level will probably be conducted at or near a shipyard, advanced base, or other industrial facility. Clearance decontamination involves factors such as suspending normal activities, withdrawing personnel, and having materials and facilities not normally present. During clearance decontamination, resource expenditures are documented.

5. **Additional Decontamination Considerations.** Some situations require unique application of decontamination principles, procedures, and methods. These considerations should take into account command, control, communications, and planning capabilities required for decontamination of strategically significant areas/terrain or facilities, to include standing up/deactivating a task force, selecting and defining joint decontamination operations sites, and establishing the manning allocation of initial headquarters required by decontamination operations missions.

a. **Patient decontamination** reduces the threat of contamination-related injury to health service support (HSS) personnel and patients. Patient decontamination will have to be accomplished as the operation and patient load allows. Under most CBRN circumstances delaying treatment or stabilization of the patient for decontamination should not put the patient at additional risk. Trained and qualified triage personnel should determine priority of treatment and decontamination. Aeromedical evacuation (AE) capabilities for contaminated and contagious casualties are very limited. The JFC should consult with US Transportation Command (USTRANSCOM) to determine whether evacuation or treatment in place is appropriate.

b. **Sensitive equipment decontamination** considers the delicate nature of certain types of equipment (e.g., avionics and/or electrical, electronic, and environmental systems); aircraft and vehicle interiors; associated cargo; and some weapon systems. Due to the corrosive properties of most decontamination solutions, sensitive equipment decontamination options are limited. Employ contamination avoidance measures (to include collective protection and standoff/point detection systems) to prevent or mitigate interior contamination of vehicles, aircraft, and ships.

c. **Aircraft pose unique decontamination challenges.** Clearance decontamination is required to ensure the unrestricted use of air mobility and SOF aircraft for international flight operations. To achieve this level of cleanliness, specialized teams with more sensitive detection equipment may be required to validate that clearance standards have been achieved. Therefore, the JFC should limit the intentional exposure of air mobility aircraft to "critical" mission requirements. JFC plans must take into account these challenges in considering employment of aircraft to airlift contaminated cargo or passengers, or operate in contaminated areas.

d. **Sealift Decontamination.** Clearance decontamination may be required to ensure the unrestricted use of Military Sealift Command (MSC) ships for strategic sealift. To achieve this level of cleanliness, specialized teams with more sensitive detection and decontamination equipment may be required. Therefore, the JFC should strive to limit the intentional CBRN exposure of MSC strategic sealift ships to only those missions considered critical. JFC plans must take into account these challenges in considering employment of MSC ships to transport contaminated cargo or passengers or to operate in contaminated areas.

e. **Fixed site decontamination** techniques focus on fixed facilities and mission support areas, such as communications systems, C2 facilities, intelligence facilities, supply depots, aerial and sea ports, medical facilities, and maintenance sites.

f. **Cargo Decontamination.** Cargo must be packaged safely in accordance with hazardous materials procedures or decontaminated prior to transport. To limit the spread of contamination and minimize risks to personnel, the JFC will limit the retrograde of contaminated or formerly contaminated cargo to "critical" items that are pre-identified in JFC plans unless the cargo has been assessed to be safe or meets clearance standards. Additionally, destination and transit countries may deny overflight and landing clearances to aircraft carrying contaminated cargo. US Presidential approval may be required for these shipments. Postconflict redeployment of contaminated assets may require extensive decontamination measures (to include extended weathering) and the use of specialized teams and highly-sensitive detection and monitoring equipment. In place destruction/disposal of contaminated equipment may be necessary.

g. **Terrain Decontamination.** Absorption of CBRN hazards by terrain surfaces may cause exposure at a later time. The decontamination of terrain allows personnel to increase stay time in an area and provides passage through an area. Large scale terrain decontamination requires extensive resources in terms of equipment, material, and time; and must therefore be limited to areas of critical importance.

e. **CBRN Shape.** CBRN shape is the command and control activity that integrates the sense, shield, and sustain operational elements to characterize CBRN hazards and threats and employ necessary capabilities to counter their effects. This facilitates transformation of CBRN information and capabilities into situational awareness, which is essential for establishing viable active and passive defense measures. This allows the JFC to make informed use of CBRN information and defensive capabilities for future operations: to plan, conduct, and integrate CBRN defense with other defenses; to optimize the capability to operate in the CBRN environment; and, to minimize negative psychological effects. Shaping may include:

(1) Providing CBRN situational awareness.

(2) Establishing cooperative CBRN detection policies, procedures, and networks.

(3) Identifying and coordinating links with operational area active systems with CBRN passive detectors.

(4) Ensuring adequate joint force CBRN defenses.

(5) Providing country assistance teams to support theater engagement plans.

(6) Coordinating CBRN defense information systems and processes.

(7) Providing CBRN defense plans and policies.

(8) Coordinating CBRN defense operations.

(9) Determining the resources required to respond to a CBRN incident.

(10) Coordinating CBRN defense medical surveillance operations.

(11) Collaborating with local medical and emergency response personnel to maximize effectiveness of transportation, triage, sheltering, and decontamination processes and resources.

(12) Contributing to the development and implementation of the JFC's communication strategy.

(13) Providing warning and reporting.

4. Considerations for Preparedness and Readiness

a. Mission-essential functions are the specified or implied tasks required to be performed by, or derived from, statute or executive order, and those organizational activities that must be performed under all circumstances to achieve DOD component missions or responsibilities in a continuity threat or event. Failure to perform or sustain these functions would significantly impact DOD ability to provide vital services, or exercise authority, direction, and control.

b. The fundamental elements needed for maintaining adequate preparedness are a clear understanding of the threats and operational requirements, both overseas and in the United States, as well as unity of effort. To support these requirements, commanders' mission analyses identify specific, mission-essential tasks for individuals and organizations that facilitate operations in CBRN environments. The Armed Forces of the United States are also responsible for appropriate military support within the United States to counter adversary threats and employment of CBRN weapons directly against the United States. Such domestic military activity is subject to constitutional, statutory, and policy restrictions.

See JP 3-27, Homeland Defense*, JP 3-28,* Civil Support*, and JP 3-41,* Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives Consequence Management*, for more information on countering threats to the United States and civil support for CBRN incidents.*

c. Peacetime preparedness for operations in CBRN environments includes measures taken by GCCs in theater operational areas. **All commands must undertake vulnerability assessments and supporting actions**, with appropriate emphasis on aerial and sea ports of embarkation and debarkation, local CBRN facilities and infrastructures, nonmilitary and foreign military support personnel, and deployed US forces and facilities, local, state, and federal support personnel. All commands are responsible for cooperative actions in peacetime with governments, armed forces of allies, and potential multinational partners to facilitate sustainment of operations in CBRN environments. GCCs develop joint mission-essential task lists (JMETLs) in order to support the military strategy for every theater. JMETLs are a major input to planning, executing, and assessing joint training. Essential in these JMETLs is the inclusion of key tasks for establishment of effective defenses and counters to adversary CBRN attacks and other toxic material releases.

d. **US ambassadors and their country teams have primary responsibility for coordination with the host country government(s).** JFCs and component commanders in operational areas must coordinate their actions with the country team to maintain peacetime preparedness and assure effective transition to operations. GCCs also have special responsibilities for US citizens and civilian assets in their AORs. These responsibilities may include noncombatant evacuation operations (NEOs) and other support to US citizens and interests as defined by current US policies. Planners should incorporate CBRN protection and/or decontamination into NEO plans. To assure adequate and timely international transportation support, affected combatant commands and US country teams may need to obtain HN clearances for flights from contaminated areas, continuously coordinating their planning with USTRANSCOM.

CHAPTER III
PLANNING AND OPERATIONS

> *"Our Nation faces an increasing threat from the use of WMD [weapons of mass destruction] by hostile state and nonstate actors. The complexity of this threat also increases with the rapid advance of technologies used to develop and deliver WMD. We must posses the full range of operational capabilities to protect the United States, US military forces, and partners and allies from the threat or actual use of WMD."*
>
> **General Peter Pace**
> **National Military Strategy to Combat Weapons of Mass Destruction, 2006**

1. General

a. **Applicability.** The Armed Forces of the United States must be prepared to conduct prompt, sustained, and decisive military operations in CBRN environments. **An adversary's CBRN capabilities or the existence of significant quantities of TIM in the operational environment can have a profound impact on US and multinational objectives, the concept of operations, and supporting actions, and therefore must be taken into account.** The principles that follow assist the GCC and their subordinate JFCs in planning and executing effective military operations, and providing essential support to civilian authorities charged with mitigating and managing the consequences of an adversary's use of CBRN weapons. Some CBRN considerations for planning are in Figure III-1.

See JP 3-40, Combating Weapons of Mass Destruction*, for more information on CBRN planning.*

b. **Deterrence.** A fundamental premise of US military planning is that adversaries are most likely to be deterred from provocative action when US forces are sufficiently and visibly organized, trained, and equipped to defeat that provocation and fear a credible threat of unacceptable response. **Deterring adversary use of CBRN materials depends to a significant degree on effective preparedness and operational readiness to deny the adversary any meaningful strategic advantage**. Credible plans, visibly effective education, training, and exercising capabilities, and a clearly communicated commitment to hold an adversary and its leadership at risk in response to CBRN use are also important elements of deterrence. The adversary should perceive US capabilities and determination with certainty while remaining uncertain about the precise nature and timing of US actions. Information operations (IO), in conjunction with its supporting and related capabilities, provides the GCC and subordinate JFCs with the principal means to influence a potential or actual adversary with the ultimate strategic objective of deterring them from taking actions that threaten US national interests.

For a more detailed discussion of IO, see JP 3-13, Information Operations.

CONSIDERATIONS FOR COMBATANT COMMAND STRATEGIC PLANNING

- Establish priority intelligence requirements
- Take pre-incident actions to prevent adversary chemical, biological, radiological, and nuclear (CBRN) weapons employment
- Plan offensive and active defense operations to prevent or minimize CBRN attacks
- Plan actions to counter, mitigate, and manage the effects of a CBRN incident, including disease containment strategies
- Emphasize early warning and detection
- Take actions to prepare United States and indigenous military forces
- Protect threatened civilians, infrastructures, and facilities
- Detect and monitor acquisition and development of weapons of mass destruction

Figure III-1. Considerations for Combatant Command Strategic Planning

c. **Enablers for Operating in CBRN Environments.** The principles of joint operations apply to situations in which adversaries possess CBRN capabilities. In considering the challenges to sustained combat operations in such situations, **six areas merit special emphasis**: conducting JIPOE; reducing vulnerability to adversary CBRN use; preventing adversary employment of CBRN capabilities; performing FP; conducting multinational operations; and synchronizing operations. IO core, supporting, and related capabilities are applied across these joint functions and independently.

(1) **Intelligence Support.** The intelligence community and other joint staff members advise the GCC and subordinate JFCs of an adversary's capability to employ CBRN weapons and under what conditions that adversary is most likely to do so. This advice includes an assessment of the adversary's willingness and intent to employ these weapons as a part of JIPOE. JIPOE is a continuous process that identifies confirmed and potential adversary capabilities, plans, and actions. JIPOE should include an analysis of the

capabilities and limitations of adversary CBRN weapons and delivery systems; their command, control, and release procedures; and the indicators of intent to employ CBRN weapons. Further, it should include information from the joint force surgeon, normally prepared as a part of medical intelligence, that identifies medical and disease threats in the operational area. Additionally, the JIPOE process should assess the potential for sabotage of CBRN sources within the AOR, as well as industrial and commercial use TIM sources vulnerable to the adversary. GCCs and subordinate commanders should include treaty, legal, and policy considerations relating to CBRN in their JIPOE process.

See Appendix F, "Treaty, Legal, and Policy Considerations," for additional information.

(2) **Reducing Vulnerability to Adversary CBRN Capabilities.** Vulnerabilities should be examined through continuous comprehensive assessments and integrated with risk management decisions that encompass the full range of potential targets subject to potential adversary CBRN attack. Commanders have multiple means to contain, mitigate, and manage the consequences of identified risks and control hazards in order to preserve combat power and minimize casualties. Such means include **planning for branches and sequels in campaign plans, eliminating unique nodes, and assuring that multiple units are synchronizing operations to counter CBRN attacks**.

(a) When US, HN, or other civilian populations and infrastructures are at risk to CBRN attack, the JFC assists the appropriate military and civil authorities to protect against, mitigate, and manage the consequences of these risks. Of particular concern to the JFC in this regard are CBRN risks to civilian areas that may affect execution of the military campaign.

(b) Assessment and vulnerability reduction must also address the dangers posed by TIMs, including radiological contamination and other environmental contamination from industrial operations within the JFC's operational area. Particular care must be taken in identifying the nature of such hazards, because in many cases standard military CBRN IPE will not provide the necessary protection. **In some instances, avoiding the hazard may be the most effective or only COA.** In all circumstances, the JFC should act to minimize immediate and long-term effects of toxic hazards, including low-level hazards, to health and mission objectives.

See Chapter IV, "Sustainment," for additional HSS information.

(3) **Preventing Adversary CBRN Weapons Employment.** The JFC should not rely solely on efforts to reduce the force's vulnerability to CBRN attacks. **GCC and subordinate JFC plans should include every effort to prevent the adversary from successfully acquiring and delivering CBRN weapons, using the full extent of actions allowed by the rules of engagement (ROE).** Rules on the use of force apply to civil support operations in lieu of ROE. These actions could include interdiction, close air support, strategic attack, offensive operations, counterair operations, WMD elimination, collateral damage planning and assessments, early and sustained operations to disrupt or

destroy CBRN capabilities, and establishment of multi-layered defenses against CBRN weapons delivery.

See JP 3-01, Countering Air and Missile Threats*; JP 3-03,* Joint Interdiction*; JP 3-40,* Combating Weapons of Mass Destruction*; JP 3-09.3,* Close Air Support*; JP 3-0,* Joint Operations*; and* Joint Handbook for WMD Elimination Operations*.*

(4) **Force Protection.** Fundamentally, protecting the force consists of those actions taken to prevent or mitigate hostile actions against personnel, resources, facilities, and critical information. These actions conserve the force's fighting potential so that it can be decisively applied. Offensive and defensive measures are coordinated and synchronized to enable the effective employment of the joint force while degrading opportunities for the adversary. In CBRN environments, the GCC and subordinate JFCs must take into account a number of unique considerations that have a significant effect on FP. These include but are not limited to training and leader development, IO, force health protection, and protective equipment. FP is an integral part of managing the impact of force entry in anti-access and/or denied environments. Forces may be deployed by fixed/rotary-tilt-wing aircraft or by amphibious assault vehicles and landing crafts. CBRN protection must be provided throughout the entire operation: surveillance/reconnaissance through the actual assault; and, then resupply and refit. From the adversary's position, contaminating landing/drop zones and beach landing areas with CBRN hazards is a combat multiplier. Plan and consider a mix of types of protective resources to balance operational requirements with optimal CBRN protection and sustainment.

(a) **Training and Leader Development.** Rigorous and realistic individual and joint unit training across the force ensures effective emergency response, and readiness to fight and win should an adversary employ CBRN weapons. Training and leader development are responsibilities shared by combatant commands, Services, and a number of DOD agencies. **Training, exercises, rehearsals, and professional military education and leader development programs should incorporate the principles for operations in CBRN environments and include realistic consideration of CBRN weapons effects, to include TIM, on peacetime and deployed contingency critical missions and on sustained operations.**

(b) **Information Operations.** IO provides a number of capabilities, which may reduce force vulnerability and deter adversarial use of CBRN weapons. Strategic communications can create international and internal pressures to convince an adversary not to acquire or use CBRN weapons. Computer network exploitation capabilities can make it difficult to employ complex weapons systems and could cause unwanted events on an adversary's home territory. A combination of electronic warfare, computer network operations, psychological operations, military deception, and operations security (OPSEC), in concert with specified supporting and related capabilities, to influence, disrupt, corrupt, or usurp adversarial human and automated decision-making is vital to successful CBRN operations. In affecting an adversary's intelligence and situational awareness, IO, including OPSEC, provide forces with a significant measure of protection by preventing an adversary from acquiring information necessary to successfully target forces and facilities. Deception, dispersion of forces, and effective use of terrain are examples of measures that complement OPSEC.

(c) **Force Health Protection.** Medical protection of the force against CBRN threats involves integrated preventive, surveillance, and clinical programs. The GCC and subordinate JFC's plans should include preventive medicine (i.e., vaccination and prophylaxis), disease containment strategies (i.e., nonpharmaceutical interventions [NPI], restriction of movement), joint medical surveillance, CBRN casualty control (which may include casualty decontamination, mass casualty decontamination, and possibly management of contaminated remains [a logistics function]), medical evacuation, and provisions for readily available treatments and supplies to counter the physical effects of CBRN exposure. These plans should take into account the capabilities and requirements of host countries, multinational partners, governmental and nongovernmental organizations (NGOs), and essential civilian workers supporting US and multinational forces.

(d) **Protective Equipment.** Sufficient equipment should be available to protect not only the uniformed force but also the essential supporting US and civilian work forces. **Individual and unit training for proper sizing, use of, and care for individual equipment is required to take full advantage of its capabilities.** IPE is the personal clothing and equipment provided to all military personnel. Protective equipment that meets civilian certifications as required by the Occupational Safety and Health Administration, National Institute for Occupational Safety and Health, is considered PPE.

(5) **Multinational Operations**

(a) US military operations are routinely conducted with forces of other countries within the structure of an alliance or coalition. **An adversary may employ CBRN weapons against non-US forces, especially those with little or no defense against these weapons, in an effort to weaken, divide, or destroy the multinational effort.** In planning and conducting combat operations, the JFC must consider the capabilities and limitations of all available forces to maximize their contributions and minimize their vulnerabilities. Peacetime activities with multinational partners, particularly multinational and interagency training and planning exercises, provide means of preparing for multinational combat operations in CBRN environments.

(b) Multinational operations in many cases will involve the use of HN sovereign airspace and territory, bases or civilian airports, facilities, and personnel (including other countries' government and contracted civilian workers supporting US and multinational forces). For some contingencies, HN considerations are the subject of significant peacetime planning in which operational, legal, contractual, and personnel issues are addressed. Due to the complex and vital nature of coordinated action with HN authorities to defend against and mitigate the effects of CBRN attacks, advance planning is a high priority for the GCC and subordinate JFCs. **GCCs and subordinate JFCs coordination of HN support activities will involve a number of DOD components as well as the US country team.**

DOD 4500.54-G, Department of Defense Foreign Clearance Guide*, provides guidance on aircraft diplomatic and personnel clearance requirements for Department of State-designated special areas, combatant command AORs, and HNs around the world.*

(6) **Synchronization of Operations.** The objective in synchronizing operations is to maximize the combined effects of all friendly forces while degrading adversary capabilities. **Synchronization entails the interrelated and time-phased execution of all aspects of combat operations**, and is enhanced by situational awareness and adaptability. In CBRN environments, successful synchronization requires proper integration of and sequencing among ISR capabilities; passive defense measures; active defense operations; offensive operations; consequence management; and sustainment. The JFC's operation or campaign plan, C2 arrangements, and TTP should facilitate synchronization across all force functions and components. Installation commanders must also synchronize base-level operations among all tenant units to maintain readiness and continuity of operations in CBRN environments.

2. Planning Considerations

a. Supported and supporting combatant command contingency planning must take into account potential adversary CBRN weapons employment concepts in developing theater campaign plans as well as in planning for plausible but unforeseeable crises (see Figure III-1). In particular, **campaign and supporting plans must include options for generating adequate and timely force capabilities (including FP) in the event of early adversary CBRN employment in the supported combatant command AOR or other supporting areas, including the United States**. Combatant commands must establish priority intelligence requirements (PIRs), take pre-crisis actions to prevent adversary CBRN weapons employment, plan counterforce and active defense operations to prevent or minimize CBRN attacks, and plan actions to counter, mitigate, and manage the effects of a CBRN attack or incident. In conjunction with host countries, particular emphasis should be placed on early warning and detection; actions to prepare US and indigenous military forces; and protection of threatened civilian populations, essential infrastructures, and facilities. To preserve air mobility capability, these plans must emphasize contamination avoidance measures for mobility forces providing deployment, sustainment, and redeployment support to the JFC. Combatant commands should also develop and exercise plans to support host country actions to minimize and manage the effects of a CBRN attack, especially where the effects may constrain US military freedom of action.

b**. Plans and implementing actions to counter potential adversary CBRN developments during peacetime and early in crises are crucial.** These plans and actions require aggressive and integrated joint, multinational, and interagency ISR activities to identify adversary CBRN employment concepts and doctrine, weapons developments, activities at suspected or known CBRN storage and production sites, and deployments of operational CBRN weapon systems.

c. **Public Diplomacy and Information.** JFC planning should consider public diplomacy and information requirements when confronting the threat or use of CBRN weapons. Public interest in CBRN-related developments may be intense and may have an effect on US and multinational authorities' decision-making. Therefore, the JFC must be a source of timely, accurate information, with particular emphasis on the explanation of actions taken in response to CBRN threats or use. Establishing productive relationships with diplomatic channels and media organizations is an inherent element of JFC planning.

d. **Protection**

(1) Protection, including CBRN defense, consists of certain defensive measures that are required throughout each joint operation or campaign phase. Protection focuses on conserving the joint force's fighting potential in **three primary ways** — **active defensive measures** that protect the joint force, its information, its bases, necessary infrastructure, and lines of communications from an adversary's attack; **passive defensive measures** that make friendly forces, systems, and facilities difficult to locate, strike, and destroy; and **emergency management and response** to reduce the loss of personnel and capabilities due to accidents, health threats, and natural disasters. Basic goals for operations and campaigns described in Figure III-2 include prevention of adversarial use of CBRN weapons, rapid and uninterrupted force preparation and deployment, comprehensive FP, and adherence to the law of war.

CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR PROTECTION GOALS

These goals should be reflected in joint operation planning, development of branches in campaign plans, redundant assignments of mission-essential tasks to forces, and visible exercises that assure peacetime preparedness and may thereby deter potential adversaries:

- **Prevention of adversarial use of chemical, biological, radiological, and nuclear agents either in the United States or abroad**
- **Rapid and uninterrupted force preparation and deployment**
- **Comprehensive force protection**
- **Adherence to law of war including prohibitions against illegal weapons and requirements to preserve evidence of war crimes**

Figure III-2. Chemical, Biological, Radiological, and Nuclear Protection Goals

(2) Known threat of use and preparedness is imperative in a CBRN environment. The joint force can survive adversary use of CBRN weapons by anticipating their employment and understanding the potential hazards. Once these hazards are understood, commanders can protect their forces in a variety of ways, including training, OPSEC, using established reporting and notification procedures, dispersion of forces, use of IPE, and proper use of terrain for shielding against blast and radiation effects. Enhancement of CBRN defense capabilities reduces incentives for a first strike by an adversary with CBRN weapons. As directed, the JFC's protection function may also extends beyond FP to encompass protection of US noncombatants; the forces, systems, and civil infrastructure of friendly nations; and other government agencies (OGAs), intergovernmental organizations (IGOs), and NGOs. JFCs should immediately inform HN authorities, OGAs, IGOs, or NGOs in the operational area of adversary intentions to use CBRN weapons. These organizations do not have the same intelligence or decontamination capabilities as military units and need the maximum amount of time available to protect their personnel.

(3) Protection capabilities apply domestically under civil support. The GCC when tasked by the SecDef can apply protection capabilities in support of homeland defense, civil support, and emergency preparedness.

e. **Public Affairs (PA).** Well planned PA support should be incorporated in every phase of operations. PA planning, coordination, and execution within DOD and with OGAs enhances the credibility and coherence of information reaching the worldwide audience. Regardless of the type or scope of military operations, PA will facilitate making accurate and timely information available to the public.

f. **Threat and Capability Assessments**

(1) Joint force intelligence staffs, in addition to assessing the full range of adversary CBRN capabilities, intent, CBRN hazards, and other threats, should also assess concepts of operations for delivery of CBRN weapons. Special attention should be given to identifying missile and covert or clandestine delivery concepts that would stress in-place US defenses — especially prior to a major US force build-up.

(2) Development of integrated operational concepts to counter the CBRN threat must be based on realistic assessments of available passive defense, active defense, and counterforce capabilities. Even with effective offensive and active defense capabilities, some adversary attacks may succeed, forcing reliance on passive defenses in order to survive and operate. If there are more serious shortfalls in counterforce and active defense assets, the burden on passive defenses will be correspondingly greater.

(3) **The primary purpose of CBRN defense planning is to support commanders' decision-making needs.** CBRN defense planning is accomplished by:

(a) Identifying, assessing, and estimating the adversary's CBRN capabilities, intentions, and most likely COAs based on the situation.

(b) Providing recommendations for commanders' guidance to help ensure that forces and facilities are prepared to operate in CBRN environments.

(4) CBRN assessments support several critical facets of joint force planning and decision-making, including mission analysis, COA development, and the analysis and comparison of adversary and friendly COAs. Planning support to decision-making is both dynamic and continuous, thus CBRN vulnerability analyses must be completed early enough to be factored into the commanders' decision-making effort. Unit staff and CBRN personnel work together to ensure that all analyses are fully integrated into contingency and crisis action planning. They accomplish this by wargaming friendly versus adversary COAs and jointly developing products designed to assist the GCC, subordinate JFCs, Service components, and multinational partners in the decision-making processes.

g. **CBRN Defense Planning Considerations.** The basic CBRN defense planning process remains the same across the range of military operations and occurs within and among all levels. Nevertheless, specific CBRN defense planning considerations may vary considerably among strategic-, operational-, and tactical-level operations due to differences in missions, available resources, and the size of the operational areas and areas of interest (AOIs). An adversary's use of CBRN weapons can quickly change the character of an operation or campaign. The use or the threat of use of these weapons can cause large-scale shifts in strategic and operational objectives, phases, and COAs. Planning at all levels should ensure the integration of CBRN considerations into the overall planning and decision-making processes. A key task for all commanders is the establishment of protection against CBRN attacks in the operational area and in other areas providing forces and sustaining capabilities. These goals include prevention of adversarial use of CBRN weapons, rapid and uninterrupted force preparation and deployment, and comprehensive FP. This section will introduce strategic and operational level CBRN planning considerations. Tactical level CBRN planning considerations are covered within multi-Service and Service-specific doctrine. One of the key facets of planning for CBRN, given the large variety of potential agents, material, and weapons, is to limit those agents and weapons under consideration to those most likely to be employed during the time period being addressed.

(1) **Strategic-Level CBRN Defense Planning.** Planning activities at the strategic level establish national and multinational military objectives, develop global plans or theater war plans to achieve these objectives, sequence initiatives, define limits, assess risks for the use of military and other instruments of national security policy, and provide military forces and other capabilities according to strategic plans.

(a) The strategic-level operational environment is analyzed in terms of geographic regions, nations, strategic personality of leadership, and climate rather than local geography and weather. Other factors that impact the command's CBRN planning include treaties; international law, custom, and practice; existing agreements/arrangements with HNs en route to and within the operational area; and the capability of adversary propaganda to influence US public support and world opinion.

(b) Political, psychological, and economic characteristics of the operational environment assume increased importance for deterrence at the strategic level. They may, in fact, be the dominant factors influencing the adversary's COAs. At this level, the analysis of the adversary's strategic capabilities will concentrate on considerations such as psychology of political leadership, national will and morale, ability of the economy to sustain warfare, possible willingness to use CBRN weapons, and possible intervention by third-party countries and non-state actors.

1. On the political scale, if a state has possessed CBRN weapons or been attacked with CBRN weapons during past crises, it becomes important to understand the effect of those weapons upon the region's politics and their effect on the decision to use or withhold such weapons.

2. On the psychological scale, it is vital to understand the adversary's motivations and values in order to be able to estimate the pressure it might feel to use, or withhold, CBRN weapons in a particular situation.

3. On the economic scale, understanding the industrial and technological capabilities and interdependence of a nation or region can help estimate the type of CBRN weapons that may exist.

(c) COA models at the strategic level consider the entire spectrum of resources available to the adversary and identify both military and nonmilitary methods of power projection and influence.

(2) **Operational-Level CBRN Defense Planning.** The size and location of the operational environment at this level depends on the location of the adversary's political and economic support structures, its military support units and force generation capabilities, potential third-nation or third-party involvement, logistics and economic infrastructure, political treaties, press coverage, and adversary propaganda.

(a) At the operational level, analysis of the operational environment should concentrate on capabilities to support the movement of and logistic support to CBRN weapons (i.e., road, rail, air, and sea transportation networks); zones of entry into and through the operational area and AOI; the impact of large geographic features such as mountains, forests, deserts, and archipelagos on military operations; and the impact of seasonal climate on CBRN weapons effects.

(b) When examining the adversary's order of battle, the analysis of the adversary should include doctrine for C2, logistic support, release procedures for the use of CBRN weapons, agent delivery capability, special operations, and paramilitary forces. CBRN planning examines the adversary's COAs in terms of operational objectives, large-scale movements, lines of communications, and the phasing of operations. These estimates form the basis for operational planning by identifying, developing, and comparing friendly COAs and assessing the impact of a CBRN environment on each friendly COA.

(c) CBRN planning by the staff helps to determine:

1. The characteristics and decision-making patterns (i.e., weapons release procedures) of the adversary's strategic leadership and field commanders.

2. The adversary's strategy, intention, or strategic concept of operation for use of CBRN weapons, which should include the adversary's desired end state, perception of friendly vulnerabilities, and intentions regarding those vulnerabilities.

3. The adversary's ability to integrate offensive CBRN operations into the overall concept of operations.

4. The composition, disposition, movement, strength, doctrine, tactics, training, and combat effectiveness of adversary forces with an offensive CBRN capability.

5. The adversary's principal strategic and operational objectives and lines of operations.

6. The adversary's CBRN weapons strategic and operational sustainment capabilities.

7. The adversary's ability to conduct IO.

8. Use or access data from space systems to support its targeting process.

9. The adversary's CBRN weapons and weapons storage location vulnerabilities.

10. The adversary's capability to conduct asymmetric attacks against global critical support nodes.

11. The adversary's ability to conceal or obfuscate initial deployment of, or their responsibility regarding deployment of, CBRN weapons.

12. The adversary's relationship with possible allies and the ability to enlist their support.

13. The adversary's capability to operate advanced warfighting systems (e.g., smart weapons and sensors) in adverse meteorological and oceanographic conditions.

14. Area studies, intelligence estimates, and/or economic studies that may indicate potential TIM hazards in the operational area. Use the JIPOE analysis to assess the existence and status of TIM hazard areas.

15. The adversary's capabilities for FP, civilian and infrastructure protection and, specifically, CBRN operations.

h. **Decontamination Actions.** Established TTP for decontamination of military equipment and personnel will be followed. If decontamination of civilian personnel, equipment, or facilities is required, procedures will be established in coordination with HN authorities and IGO and NGO experts as appropriate.

i. **Retrograde of Contaminated Materiel from the Theater**

(1) In the early stages of post-conflict operations, returning US equipment to the continental United States (CONUS) or other locations will be a major activity as forces are withdrawn from the theater of operations. The GCC will establish the relative priority among the goals shown in Figure III-3 in view of the circumstances at hand, in particular operational timing and extent of contamination. For example, under emergency conditions, the attainment of US and multinational objectives may warrant increased risks and require a more robust protective posture to limit contamination hazards and mitigate their effects. 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.

(2) Essential actions begin at the operator level and continue to the organization ultimately receiving the shipped equipment. **Two key roles are performed by the joint security coordinator (JSC) and the CBRN retrograde support element (RSE).** Consistent with GCC guidance, and in coordination with Commander, USTRANSCOM, the JSC determines if mission requirements warrant the risk of emergency retrograde or if other COAs are acceptable. To assist with requirements for deliberate contaminated materiel retrograde, the JSC may organize a CBRN RSE to accomplish tasks from marking equipment to contamination monitoring. Redeployment planning should address requirements for consolidation points for equipment with residual CBRN contamination. **Post conflict redeployment of military equipment, in most cases, occurs by sea.**

(3) The safety of personnel is of foremost concern during the retrograde of equipment with potential, residual, or low-level CBRN contamination. Based on principles outlined in this paragraph, Services and other responsible military agencies must develop and implement specific, precautionary procedures for handling and transporting their equipment. Any equipment present in the attack or downwind hazard areas may possess residual contamination. Service manuals define CBRN contamination hazard areas. Specialized detectors may be required at specified sites in the joint security area (JSA) to monitor contamination. Given decontamination technology limitations, some equipment may require extensive weathering or, in some cases, destruction to meet safety objectives. Following thorough decontamination, residual contamination risks include potential vapor and contact hazards. These risks increase as contaminated equipment is consolidated and personnel work around this equipment for prolonged periods. Risks may also increase as equipment is disassembled for maintenance functions or containerized for shipment.

Figure III-3. Contaminated Materiel Retrograde Goals

(4) **Methods to mitigate residual radioactive, persistent chemical, and biological hazards are primarily removal of these materials or, in some instances, allowing sufficient time for their decay or degradation.**

(a) The time required for the natural decay of radioactive material is a function of the half-life of the isotope and cannot be altered. If the residual radiation cannot be removed, commanders must employ the principles of time, distance, and shielding. Minimize the time that personnel are exposed to the radiation source; maximize the distance between personnel and the radiation source; and place as much shielding material, such as walls or soil, between personnel and the radiation source as possible. If burying a contaminated source is necessary for personnel protection, ensure that doing so does not create other contamination hazards, such as irradiating ground water.

(b) Biological agents generally decay within hours after dissemination or exposure to ultraviolet light (sunlight). For more robust biological agents, as well as persistent chemical agents, thorough decontamination and preparation of equipment to US Department of Agriculture import standards will eliminate most health threats; even so, continuing precautions, such as individual protection, are warranted. Because of the small particle size of many biological agents, some agent may adhere to internal equipment surfaces, creating a risk, primarily respiratory, to unwarned maintenance personnel touching facial areas after contact with these internal surfaces.

(5) The nonemergency equipment retrograde concept assumes that post-conflict conditions allow time for thorough decontamination and weathering in the operational area before retrograde from the theater. Personnel assisting the JSC with detection, monitoring, and preparation of the equipment will require stringent personal protection and specialized detectors. These preparations may require continuous operations for weeks or months. As suspect equipment is consolidated for monitoring, decontamination, and weathering, security and buffer zones around the consolidation site provide additional contamination control measures to protect US and multinational forces as well as HN personnel.

(6) Air quality control and related legal requirements are additional considerations requiring legal advice and review prior to equipment retrograde. Once in the US, precautionary measures continue throughout the remaining equipment life cycle, including DOD control requirements, pre-maintenance monitoring, and other periodic monitoring.

j. **Mitigation of Residual Hazards**

(1) Identifying, assessing, and mitigating residual hazards in the theater of operations will be an important aspect of transition to conflict termination. **US and multinational forces must be able to detect and evaluate hazardous areas in order to contain and mitigate contamination hazards.** They must be capable of providing immediate lifesaving support and emergency disposal (or containment) of leaking, unstable, or otherwise dangerous toxic materials.

(2) Joint force plans must also provide for the transfer of custody of contaminated materials and sites and associated monitoring tasks to the HN or follow-on forces or organizations.

For further guidance on considerations for termination of operations, refer to JP 5-0, Joint Operation Planning*, and JP 3-0,* Joint Operations*.*

CHAPTER IV
SUSTAINMENT

> *"Sustainment is the provision of logistics and personnel services necessary to maintain and prolong operations until mission accomplishment. Key considerations include employment of logistic forces, facilities, environmental considerations, health service support, host-nation support, contracting, disposal operations, legal support, religious support, and financial management."*
>
> **JP 3-0, *Joint Operations***

1. General

a. The ability to sustain military combat operations with appropriate levels of logistics, personnel services, and HSS is critical to operational success. JFC plans supporting deployment; reception, staging, onward movement, and integration (RSOI); and sustainment must continually be reviewed. Operations in CBRN environments make sustainment planning more complex.

b. The **sustainment function** encompasses a number of tasks including:

(1) Coordinating the resupply of CBRN defense equipment.

(2) Coordinating the supply of food, fuel, arms, munitions, and equipment.

(3) Providing for maintenance of equipment.

(4) Coordinating support for forces, including field services, personnel services support (PSS), HSS, mortuary affairs, religious support, legal services, financial management support, and medical readiness.

(5) Building and maintaining sustainment bases.

(6) Assessing, repairing, and maintaining infrastructure.

(7) Acquiring, managing, and distributing funds.

(8) Providing common-user logistic support.

(9) Establishing and coordinating movement services.

(10) Maintaining force health protection measures.

(11) Decontaminating.

c. Operational tempo, logistic operations, the HSS system, PSS, and reconstitution efforts may be profoundly affected by the introduction of CBRN material. CBRN materials present separate and distinct threats to personnel, units, equipment, and operations. **The ability to assess the potential effects of CBRN hazards on the mission is a critical factor in deciding priorities for CBRN protection and efficiently allocating resources.**

d. Generally, operations will slow as tasks are performed by personnel encumbered by protective equipment or exposed to CBRN effects. Hazards may require abandonment or limited use of contaminated areas, transfer of missions to uncontaminated forces, or avoidance of planned terrain and routes. Additionally, CBRN use or contamination resulting in a major disruption of normal personnel and materiel replacement processes in the theater could severely hamper the component commanders' capabilities for force generation and sustainment. Split-MOPP options could make available many forces that would otherwise have been unavailable due to unnecessary protective level constraints. Force reconstitution requirements may also dramatically increase over initial planning estimates. Even when sufficient protection has been afforded to individuals and units, continued operations in a CBRN environment could overburden reorganization and reconstitution systems, as well as the deployed medical treatment capabilities.

e. Maintaining the physiological and psychological health of military forces is a basic requirement for combat effectiveness. A deliberate or inadvertent CBRN event in an operational area will affect both military and civilian populations. HSS considerations in CBRN environments, therefore, should include civilian public health service matters. **The command surgeon is responsible for ensuring the integration of preventative health services matters (mass prophylaxis and treatment, ensuring a safe environment, restoration of a healthy population, etc.) into the command HSS plans and activities (to include providing medical care) in order to support mission accomplishment.**

2. Logistics

a. **Theater sustainment capabilities must be protected.** CBRN contamination at an essential port of embarkation (POE) or port of debarkation (POD), or other critical logistic facility can significantly affect campaign plans and execution. Measures to prevent and mitigate the effects of CBRN contamination must focus on maintaining support to combat operations and rapidly restoring the degraded capabilities. Preventing and mitigating the effects of CBRN hazards on equipment and supplies includes the use of protective coatings and coverings. Under some circumstances it may be necessary to use alternate facilities.

b. **Protecting forces from the effects of a CBRN environment is logistically taxing.** Resupply requirements for protective clothing, medical supplies (antidotes, antibiotics, and antivirals), and sustainment supplies for quarantine/isolation facilities will be time sensitive. Low density CBRN protective equipment may require movement within the theater. Personnel and equipment decontamination requires great amounts of water, and then creates great amounts of contaminated water. These and other resources needed for recovery from CBRN incidents can severely strain the theater logistic system and have unanticipated effects on combat operations.

c. **Overview and Assumptions**

(1) **Theater Maturity.** US forces may be deployed to theaters that provide a wide range of infrastructure and support activities.

(a) **Mature theaters** have forward-deployed forces with a significant amount of logistic infrastructure already in place. Quantities of pre-positioned supplies and equipment may be stored in environmentally controlled warehouses or covered shelters to reduce their vulnerability to contamination. Host-nation support (HNS) agreements may be in place and routinely exercised.

(b) **Immature theaters** have few, if any, forward-deployed forces and only minimal logistic infrastructure. HNS agreements may not have been negotiated prior to the onset of hostilities. Pre-positioned supplies and equipment, if available, may be stored in the elements, thus the need for overhead cover. Other supplies and equipment may require storage at an intermediate staging base outside the theater until the theater logistic infrastructure matures to accept them.

(2) **Logistic Elements.** Logistic elements operate throughout the operational environment. Logistic elements directly supporting engaged forces may be small, mobile units. Logistic elements providing area support may involve larger, more complex transportation and supply activities conducted at fixed or semi-fixed sites.

(a) Mobile units seek to limit contamination by avoiding exposure to CBRN materials to the maximum extent possible. If contaminated, units identify clean areas, and on order move along pre-designated routes from contaminated areas. Units decontaminate equipment and exchange protective garments during the move to clean sites.

(b) Units located at fixed locations, such as ports, airfields, and supply depots, may be required to continue operations from contaminated sites until they can relocate to clean areas or complete decontamination efforts.

(3) **Workforce Composition.** In most circumstances, the logistic infrastructure in a theater operates with a **substantial complement of nonmilitary personnel**. In a typical theater, sustained logistic operations will rely heavily on military personnel, DOD civilians, HNS personnel, other nation support personnel, and contractor-provided logistic support personnel. During the early phases of deployment, the logistic infrastructure may rely on HNS personnel for port operations and transportation requirements. Workforce degradation due to CBRN contamination can severely hamper continued operations.

d. **Logistic Operations in Contaminated Environments.** Logistic operations are particularly vulnerable to CBRN incidents. When assessing the likely nature and frequency of possible CBRN incidents on logistic facilities, the JFC should consider the number and type of available adversary delivery systems as well as the adversary's ability to deliver an agent in quantities sufficient to significantly disrupt operations. Other factors to consider include:

(1) **Areas of Vulnerability.** The areas of greatest vulnerability are large fixed sites (e.g., PODs), staging and marshalling areas, hubs and bases, assembly areas, and main supply routes (MSRs) adjacent to sites involved in early force build-up activities.

(2) **CBRN Logistic Readiness.** Adequate logistic support, which must be maintained under all conditions, is vital to operations in CBRN environments. **The key considerations are application of the joint logistic principles of sustainability, survivability, responsiveness, and flexibility to ensure adequate CBRN equipment stocks, interoperability, and training.**

(a) **Sustainability.** Sustainability is the measure of the ability to maintain logistic support to all users throughout the theater for the duration of the operation. In CBRN environments, constant, long-term consumption of CBRN defense supplies requires careful planning, monitoring serviceability for items, such as overgarments, that have specific shelf lives (i.e., expiration dates), and anticipation of future requirements.

(b) **Survivability.** Theater logistic sites and units present an adversary with important and often static high value targets for attack with CBRN weapons. Logistic planners must plan for both active and passive measures to minimize the risks of CBRN weapons incidents while satisfying the needs of the joint force for uninterrupted logistic support.

(c) **Responsiveness.** The hazards and potential damage caused by CBRN incidents may require relocation of bases and HSS facilities, major redirection of supply flow, reallocation of transportation and engineering services, and short-notice transfer of replacement personnel or units from one part of the theater to another. Joint force plans should allow for surges in logistic requirements for CBRN defense consumables and equipment items to appropriate units.

(d) **Flexibility.** Work/rest cycles must be activated and implemented to the maximum practical extent allowed. Maintaining logistic flexibility in CBRN environments requires that logistic units be capable of rapid alteration of work schedules. CBRN incidents can cause degradation of logistic operations due to operating in protective clothing and the requirement to handle and decontaminate supplies and equipment. Logistic planners will plan for deliberate and expedient covers and shelters to protect essential items from contamination. Commanders will prioritize and focus efforts on accomplishment of mission-essential tasks.

For a complete discussion of all joint logistic principles see JP 4-0, Joint Logistics*.*

(e) **CBRN Defense Equipment Stocks.** Logistic support for CBRN readiness requires adequate supplies and transportation of chemical and biological defense equipment, as well as sustainment of supporting CBRN defense organizations responsible for carrying out reconnaissance, decontamination, and supporting tasks.

(f) **Interoperability.** In operations outside CONUS, the JFC will be working with HN and other forces. While each member organization of the multinational effort is responsible for its own CBRN defense, the ability to exploit logistic interoperability (e.g., in equipment and supplies) can contribute to the effectiveness of the collective force.

(g) **Training.** Individual and unit survival skills and the ability to perform mission-oriented tasks while in protective clothing are vital to theater logistic activities. Mission-essential tasks will be identified in theater plans and unit standing operating procedures, and regular training will be conducted to establish individual and unit proficiency.

(3) **Communications Systems.** Communications systems are integral to maintaining logistic support in CBRN environments. The JFC will ensure that communications systems supporting logistic operations are sufficiently self-reliant and robust to operate through CBRN incidents. Communications related vulnerability assessments will include: a review of plausible CBRN incidents; the CBRN warning and reporting system; high-altitude electromagnetic pulse (HEMP) protection and other aspects of survivability and endurability; equipment redundancy; availability and proficiency in the use of protective clothing and equipment; proficiency of military and nonmilitary personnel in the performance of individual and unit tasks at various levels of MOPP; and the degree of reliance on, and compatibility of, HN equipment and support (e.g., utilities and transmission facilities).

(4) **CBRN Defense Planning Responsibilities.** Theater-level logistic support is generally furnished from Service operated and other functional fixed sites throughout the JSA. Logistic CBRN defense operations in the JSA are based on Service and site requirements, but will be coordinated with the JSC and base cluster commanders (when designated).

(a) **The JSC is responsible for CBRN defense integration for the joint security area among the component commanders.** Component commanders will incorporate CBRN plans, exercises, equipment considerations, individual decontamination measures, and preventive measures into their area and base cluster defense plans. They will also position CBRN defense personnel and assets to support current mission requirements and facilitate future operations, in accordance with JFC and area commander directives and priorities.

JP 3-10, Joint Security Operations in Theater*, provides additional guidance on JSC and outlines a joint force and component commander's roles and responsibilities.*

(b) The JFC must consider the adequacy of equipment and training of nonmilitary and non-US logistic personnel to survive and operate in CBRN environments. While it is a Service responsibility to train and equip the forces they provide to the joint force, the JFC is responsible for establishing the requirements based on the command's assessment of the CBRN threats. If there are deficiencies in CBRN equipment and training, resources must be requested through Service and joint channels.

e. **Logistic Planning Considerations for Fixed Sites.** Ports, airfields, and related fixed sites are choke points vulnerable to CBRN incidents. Combat forces are vulnerable to CBRN incidents during entry operations and during movement to areas of military operations. Fixed sites may be high-value targets for adversary CBRN incidents. Common fixed site defense measures can reduce their vulnerability.

(1) **Incident Warning and Reporting**

(a) In order for individuals and units to take necessary self-protection measures, timely warning of CBRN incidents is required. **The JFC has the responsibility, in coordination with the HN, to establish an effective and timely warning system and to exercise this system on a recurring basis.** In a CBRN high threat environment, fixed site commanders should monitor CBRN warning systems, to include real-time integrated tactical warning and attack assessment missile warning systems (which include near-real-time notification of nuclear detonations) continuously and should be capable of passing warnings to personnel and units throughout their sites, to units in their downwind hazard areas, and receive warning from units upwind of their fixed site location.

(b) Because of the variety of delivery methods for CBRN weapons and the limitations of detection capabilities, personnel and units may not receive warning before exposure occurs. **Warning architectures should be designed to alert personnel promptly upon initial detection of an attack.** Because personnel may be widely dispersed throughout the area, a site-wide alarm system, capable of being activated immediately upon receipt of warning, must be available, maintained, and exercised regularly.

(2) **Protective Postures**

(a) **Logistic planners must consider the vulnerability of HN and other civilian workers to incidents, and plan accordingly**. The JFC is responsible for ensuring that mission-essential civilian workers receive appropriate equipment and training and are integrated into area CBRN defense plans. This may involve coordinating with HN representatives and the US country team.

(b) Workers must be exercised in CBRN incident scenarios. Upon hearing an alarm, workers must be trained to immediately protect themselves by rapidly donning protective clothing and moving to the nearest overhead cover. Planners must ensure that overhead cover is available at appropriate locations throughout the area.

(c) Typically, even during high volume sustainment operations, much of the materials handling equipment (MHE) at a facility is not in use. Commanders should protect idle MHE from exposure to CBRN hazards in the event of an incident. Housing and covering MHE with plastic, or otherwise protecting it from exposure, can ensure that it will be readily available to resume operations after the attack.

(3) **Post-Attack Reconnaissance.** Understanding the nature of possible contamination by CBRN agents is central to adopting an effective concept of operations that reduces the risk of casualties and cross-contamination and ensures a rapid resumption of operations after an incident. This requires coordinated reconnaissance, detection, and marking. Workers should be trained to conduct self-assessment activities to detect possible contamination in their work areas; however, a military unit trained and equipped to deal with CBRN contamination normally will be necessary to support these surveys.

(4) **Recovery from CBRN Incident.** It may be required, when a base of support becomes contaminated, to decontaminate to continue sustainment operations. Depending upon the nature of the CBRN incident, extensive damage, mass casualties, and contaminated areas could result. During this phase, it is necessary to obtain additional information about the incident, and to develop and carry out a recovery plan. The incident commander or equivalent has primary responsibility to approve all recovery actions and will develop a recovery plan to be approved by the installation commander. Complex systems, made of various materials that absorb contaminates, may not be able to be decontaminated. These same materials may also not be transportable because of their inherent public health risk.

(a) **Conduct Appropriate Level of Area Decontamination.** The following principles should be considered when conducting area decontamination.

1. Begin with the most important items (mission and health essential) first.

2. Decontaminate only what is necessary.

3. Consider the mission, time, and the extent of contamination, protective equipment status, and the decontamination assets available.

4. Do not move contaminated equipment, personnel, or remains away from the operational area if it is possible to bring decontamination assets (organic or supporting units) forward safely. This will keep the equipment on location, speed decontamination, and limit the spread of contamination to other areas.

5. Additional decontamination options include: disposal, isolation, weathering, and neutralization of the hazard.

(b) Restoration of the area is a long-range project, and is nonmilitary.

(c) **Assess and Repair the Installation Infrastructure.** Assessment of the installation's infrastructure and assets after an attack is conducted by all functional areas. This includes all aircraft, facilities, vehicles, and equipment.

1. Chemical and biological agents or covert radiological sources used in an attack usually would not cause much physical damage to the installation, only

contamination. Relocation of such items may be necessary when persistent contamination is still present.

2. Special circumstances are associated with contamination that tends to settle in basements and other low areas, rubble piles, and similar collections of debris, or into porous surfaces. This concentration could extend the lethality period of chemical and biological agents.

3. A device producing a nuclear yield or a radiological dispersion device may also cause structural damage. The damage from a radiological dispersal device would be limited by the size of the conventional explosive while the extent of structural damage from a nuclear yield producing device could extend for miles. In either case, residual radiation may be a contamination hazard. If radioactive residue is found, coordinate disposal efforts with the authorities.

(d) **Assess Immediate and Long-Term Health Impacts.** The type of attack and the means of delivery will determine whether immediate and/or long-term medical assistance is necessary. The ability to quickly and correctly assess the agent and provide appropriate medical care and supplies will have implications regarding the operational effectiveness of the installation, the medical facilities, and the populace after an attack. The impact can be immediate, long-term, or a combination of the two.

1. **Immediate Impact**

a. **Chemical Incidents.** Casualties may appear immediately, or symptoms may be delayed. Medical personnel may encounter an immediate spike in casualties that will overload their capabilities. Depending on the agent, follow-on casualties may not appear immediately. However, if casualties are immediate, then requirements would be immediate and potentially require a large and readily accessible antidote supply. Procedures for obtaining these antidotes must be well established.

b. **Biological Incidents.** If the type of pathogen is not quickly determined or medical treatment is not readily available, the potential for large numbers of casualties is increased. From the time of an incident to the incubation period, zero casualties would report to medical personnel for treatment. Depending on the agent used, a peak in casualties would take place within a few days (for anthrax) or up to two months (for brucellosis) and could quickly overload medical personnel and facilities.

c. **Radiological Incidents.** Casualties are unlikely to appear immediately unless the incident is also associated with an explosion or other conventional casualty producing scenario. Radiation exposure symptoms will most likely be delayed and are dependent on the dose rate and total dose. Follow-on casualties may not have an immediate impact on operations. However, casualties with psychological effects may overwhelm medical facilities.

d. **Nuclear Incidents**. Casualties will appear immediately. There will be a combination of thermal, overpressure, traditional trauma, and radiation casualties requiring evacuation and treatment. Casualty estimation and planning for a nuclear scenario is available from North Atlantic Treaty Organization (NATO) Standardization Agreement (STANAG) 2475-Allied Medical Publication (AMedP)-8, the Defense Threat Reduction Agency (DTRA), or the United States Army Nuclear and Combating Weapons of Mass Destruction Agency (USANCA).

2. **Long-Term Impact**

a. **Biological Incidents.** Some biological agents (i.e., toxins) will be evident immediately after exposure, while the symptoms of other agents (i.e., anthrax) will take a while to present. Some biological agents have effective preventative medications, others respond to treatment after exposure, and still others do not respond to medical intervention, leaving only the option of supportive care. Commanders should be made aware of any medical intent to move biological casualties. Medical personnel should be aware that commanders must obtain approval for the movement of casualties with internationally quarantinable diseases through the appropriate coordinating agency (Department of Health and Human Services).

b. **Radiological and Nuclear Incidents.** Radiation exposure can have delayed effects. Depending on the total dose, the effects may not manifest themselves for an extended period of time. Long term monitoring may be required for casualties not showing immediate symptoms or biological effects.

(e) **Conduct Follow Up Analysis**

1. Work with investigation teams. Appropriate officials will investigate and identify the cause of the CBRN incident/attack and report findings.

2. Compile inputs from all participating units.

3. Periodically review the recovery plan and follow up on open action items.

(5) **Contamination Control**

(a) A CBRN incident may contaminate essential operating areas. Local commanders, accordingly, must have available the capability to control the contamination, including the capability to **decontaminate operating surfaces, MHE, aircraft, and exposed military cargo to the extent required to sustain operations.** Large fixed sites (e.g., ports, airfields) with throughput capacity higher than required may allow split-MOPP processes and procedures implementation which would provide the flexibility to shift operations to uncontaminated locations on the installation. At smaller facilities operating at 100% capacity, however, an incident could reduce throughput to a level below the JFC requirements.

(b) Controlling contamination of equipment and operating surfaces at fixed sites is required to restore full operational capacity. The operational tempo and mission will determine the level of decontamination required.

(6) **Considerations for POEs and En Route Facilities**

(a) POEs and en route fixed sites may be targeted in order to disrupt or inhibit US military deployments. Because these sites may be located in the US and other regions outside the threatened theater, **they are subject to clandestine (including terrorist) attack**. Commanders of POEs must take action to protect their facilities (including supporting staging areas as well as rail and road networks) against, and mitigate the effects of, CBRN incidents.

(b) Intermediate logistic bases and infrastructure are also vulnerable to CBRN attack. For some large-scale operations, the en route structure is limited and may be a particularly **valuable target.** Commanders must protect and be prepared to deal with incidents at these facilities.

(7) **Considerations for Aerial Ports of Debarkation (APODs)**

(a) While each APOD is unique, a few general considerations are important. When considering CBRN threats, the installation's overall size with respect to the mission, and its operational capacity and flexibility will affect the commander's **options for decontamination and avoidance.** However, conducting successful attacks against APODs presents significant challenges to the adversary. If installation leadership and personnel are properly prepared to survive the attack and sustain operations, CBRN attacks may not cause significant long-term degradation of throughput capacity, unless the attack is nuclear, or involves a biological agent that remains undetected until it has spread through a significant portion of critical personnel and/or equipment. This is especially true at large APODs where critical assets and much of the storage areas and MHE could easily escape contamination. Operations in these cases may be limited more by the effects of the attacks on the local workforce and nearby civilian population. In most cases, it will be possible to continue operations at a contaminated APOD. While CBRN incidents may result in contamination of some operating surfaces, the size of the hazard area may be small compared to the size of the installation. The capability to shift operations to those areas and facilities on the installation that escaped contamination is key to sustaining throughput operations. This is the essence of split-MOPP. Proper preparation, response, recovery, and mitigation activities can significantly reduce the impact of CBRN incidents. Because it is unlikely that all of the operational areas of an APOD will be contaminated at any one time, it is particularly important that the commander know the location of hazard areas, requirements for working and parking areas, and the availability of runways and taxiways. APOD plans should include expedited offload procedures (e.g., engines running, no crew changes or refueling) within the CBRN threat area to minimize the number of aircraft and personnel exposed at any one time during ground operations.

(b) If necessary, contaminated aircraft must be decontaminated to the level required by GCC and HN before returning to the air mobility flow. The GCC is responsible for establishing control of contaminated aircraft in the AOR and at designated decontamination sites, and for procedures to address overflight requirements and destination base/country landing rights for previously contaminated aircraft.

(c) In CBRN environments, there are limitations on the employment of aircraft. Some aircraft will not be able to land at or depart from contaminated areas regardless of an aerial port's CBRN preparedness. Of particular importance are the Civil Reserve Air Fleet, civilian, and other aircraft under contract to support military operations. Combatant command plans must provide for replacing these aircraft with other airlift assets or conducting transload operations from bases outside the immediate threat area. These replacement aircraft would have to operate from transload airbases to shuttle the affected cargo and passengers to the theater. If that is not feasible, alternate means (e.g., sea, rail, or wheeled transport) must be made available.

(d) The availability of alternative aerial ports to accomplish the transload of personnel and materiel from intertheater to intratheater airlift can minimize potential deployment interruptions by adversary CBRN use. The supported CCDR, in coordination with the Commander, USTRANSCOM is responsible for designating transload aerial ports. All means of active and passive contamination avoidance measures will minimize the level of contamination and will prevent further cross contamination during operations.

(8) **Considerations for Seaports of Embarkation.** JFC plans must take into account MSC ships exposed to contamination. Contaminated ships will require decontamination support and certification acceptable to civil authorities in order to load additional cargo at uncontaminated US or foreign commercial port facilities.

(9) **Considerations for Seaports of Debarkation (SPODs)**

(a) In large-scale operations, US equipment and materiel normally enter the theater on strategic sealift ships and offload at SPODs. **The vital importance of these seaports to US power projection capability makes them an attractive target for CBRN incidents.** However, conducting successful attacks against SPODs presents significant challenges to the adversary. If port managers and operators are properly prepared to survive the attack and sustain operations, CBRN attacks may not cause significant long-term degradation of military logistic throughput capacity. This is especially true at large ports where many piers, storage areas, and much of the MHE may escape contamination. Operations in these cases may be limited more by the effects of the attacks on the local workforce and nearby civilian population.

(b) Though similarities concerning the impact of CBRN attack on SPOD and APOD operations exist, there are substantial differences. For example, assignment of overall responsibility for decontamination efforts is more complex.

(c) Each port provides unique capabilities and has different vulnerabilities in CBRN environments, but contamination avoidance is an essential element of sustaining throughput operations. In normal circumstances, a port is but one node of a complex, theater-wide logistic network. Plans should include options for redirecting incoming ships when possible from contaminated ports to those that are uncontaminated. However, when alternate ports with adequate capacity and berths to handle large cargo ships are not available, it may be necessary to continue operations at contaminated ports. In considering alternate ports, planners must take into account the requirements for unit equipment to arrive in proximity to the marshalling areas for unit personnel, ammunition, and sustainment supplies in order to ensure a coherent RSOI for affected units.

(d) In some cases, it will be possible to **continue operations at a contaminated port.** While CBRN incidents may result in contamination of some operating surfaces, the size of the contaminated area may be small compared to the size of the port. The capability to shift operations to those areas and facilities within the port that escaped contamination is key to sustaining throughput operations. Proper preparation can significantly reduce the impact of CBRN incidents on an SPOD.

f. **Logistic Planning Considerations for Joint Reception, Staging, Onward Movement, and Integration.** The permanency of sites for RSOI of arriving forces can vary widely between theaters. Theaters with large forward-deployed forces rely on fixed sites for a wide variety of activities, such as pre-positioned stock maintenance and control, supply and maintenance, materiel and transportation management, and logistic communication systems. Theaters with limited forward presence normally rely more heavily on temporarily fixed sites (e.g., facilities that are transportable or mobile but, due to ongoing operational constraints, may not be rapidly moved). The CCDR will ensure that adequate detection, personnel protection, and decontamination assets are available to meet the threat and that alternative sites, along with rehearsed activation plans, are identified and prepared. Consideration of RSOI in CBRN environments encompasses a number of specific functional areas.

(1) **Reception Areas.** APODs and SPODs may be attractive targets for CBRN attack. Logistic planners must assess the relative value of the convenience provided by establishing large centralized facilities, which are more easily targeted, and the enhanced security that results from a larger number of smaller, dispersed facilities that are more difficult to command and control but less vulnerable to CBRN attack.

(2) While the anticipated threat will influence the staging area selection process, adequate facility and area space availability may be the determining considerations. Planning must consider **equipment marshalling areas and rail yards** (which may not be in close proximity of APOD and SPOD facility complexes); **theater logistic hubs and bases** (which may be fixed facilities in theaters with large forward-deployed forces); and **assembly areas** (where deploying units complete deployment recovery, equipment receipt, and processing, and prepare for movement to tactical assembly areas).

(3) **Onward Movement.** CBRN attack during the movement of forces and sustainment to tactical assembly areas or other operating areas must be considered by planners. Plans must consider the impact of delays in the arrival of forces, equipment, and sustainment or the vulnerability of MSRs to CBRN incidents that may vary widely among theaters. In theaters that rely on a few major MSRs and have limited alternative routes and off-road capability, CBRN attacks may have a greater impact on operations than in theaters with more extensive supply routes and where obstacles can more easily be traversed.

(4) **Integration.** Consideration must be given to possible disruption to the integration of forces or the transfer of mission-ready forces and capabilities into the CCDR's force caused by a CBRN attack.

g. **External Support for US Military Operations**

(1) In many operations, US military forces will receive significant logistic support from US and foreign nonmilitary personnel. In some theaters, foreign military sources will also augment nonmilitary support. These support personnel fall into the following categories: US Government civilians (to include non-DOD personnel), HN government civilians, HN military personnel (in direct support of US forces), third country nationals, other multinational partner military personnel, and contractors. Support and services that depend heavily on nonmilitary and foreign military personnel include, but are not limited to: transportation; stevedore and port operations; general engineering; personnel marshalling area operations (including supply of basic necessities); rail workers; emergency utility operations; selected maintenance activities; administrative activities (e.g., contracting specialists and local communications experts); and MSR security and control. **Theater logistic support is provided through a wide array of Service, multinational, contract, and acquisition and cross-servicing agreements and will vary from theater to theater.**

(2) **The three basic categories of external support for US military operations are wartime HNS, contingency contracts, and current contract agreements.** These usually exist in conjunction with one another and collectively provide to the theater its full logistic capability. Contracts or agreements will clearly specify services to be provided during periods of crisis or war.

(3) Logistic and area commanders should not expect unprotected or untrained individuals to continue to provide essential logistic services under the threat of CBRN incidents or during operations in CBRN environments. Massive worker absenteeism is possible, and a lack of adequate protective clothing and equipment could result in significant casualties should an incident occur. The area commander is responsible for ensuring that mission-essential personnel receive appropriate equipment and training, working in coordination with HN authorities and the US country team. CBRN protection includes individual and collective survival skills as well as operational training. **Survival skills** refer to the capability to take required, immediate action upon CBRN incident, to include masking, proper wear and care of protective clothing and equipment, personal decontamination, and buddy aid. **Operational training** refers to the ability to continue to perform essential functions under MOPP conditions and resume normal operations after an

incident. Essential functions and tasks include convoy driving, supply and equipment loading, refueling operations, and materiel decontamination.

h. **Handling of Contaminated Materiel and Equipment and Human Remains**

(1) **Materiel and Equipment**

(a) The GCC is responsible for ensuring that all materiel and equipment exposed to CBRN contamination is decontaminated, if necessary, before it is returned to stock or retrograded from the theater. Joint doctrine and Service TTP are required to protect individuals against low-level CBRN hazard exposure, conserve valuable assets, identify requirements for the return of equipment and personnel to the United States, and maintain DOD life cycle control of previously contaminated equipment. In view of the limitations of decontamination technology in meeting all safety and health standards, some equipment may require extensive weathering to meet safety objectives. **In some cases, equipment may be so grossly contaminated that reuse or repair is not practical and in-theater destruction will be required.**

(b) The length of time that nuclear and biological contaminants pose a health hazard is determined by the nuclear and biological decay rates. The time required for the natural decay of radioactive material is a function of the half-life of the isotope and cannot be accelerated. If the residual radiation cannot be removed, commanders must employ the principles of time, distance, and shielding. Minimize the time that personnel are exposed to the radiation source; maximize the distance between personnel and the radiation source; and place as much shielding material, such as walls or soil, between personnel and the radiation source as possible. Biological agents generally decay to acceptable levels within hours after dissemination due to exposure to ultraviolet light (sunlight), relative humidity, wind speed, and temperature gradient. However, encapsulation or genetic engineering may protect agents from natural decay and increase their persistency. For more robust biological agents, thorough decontamination and preparation of equipment to US Department of Agriculture import standards will eliminate most health threats.

(c) As a rule, contaminated materiel and equipment will be marked, segregated, and disposed of or decontaminated after the cessation of hostilities. Theater campaign plans and orders will provide guidance and procedures for retrograde of contaminated materiel and prioritize selected items that, due to their essential nature and short supply, require immediate retrograde, repair, and subsequent return to the theater.

(d) Equipment retrograde and redeployment requires valuable lift assets that must be protected for future force flow/time-phased force and deployment data use. Therefore, only "critical" retrograde cargo is moved from a contaminated to an uncontaminated airbase. Critical requirements are predesignated in theater war plans. The intent to retrograde residually contaminated equipment must be communicated through the CJCS due to potential foreign and domestic risks, and political/environmental sensitivities. GCCs are responsible for cargo processing to include packaging, technical escort, reception and staging, foreign and domestic interagency coordination and must comply with US laws;

applicable international laws, treaties, conventions, and agreements to which the United States is a party; and DOD and Service regulations and policies with consequence management the responsibility of the GCCs.

More detailed treatment of retrograde of equipment and personnel is in Chapter III, "Planning and Operations."

(2) **Human Remains**

(a) A GCC has the responsibility to search, recover, tentatively identify, and evacuate US human remains from the AOR. To complete this task, **the JFC establishes a mortuary affairs decontamination collection point (MADCP)**. The MADCP is an operational element under the oversight of the joint mortuary affairs office (JMAO), and is manned by specialized mortuary affairs and CBRN defense personnel.

(b) In some circumstances (such as large scale CBRN casualties), the JFC may need to authorize alternative procedures for the disposition of human remains. If human remains cannot be decontaminated to a "safe" level, decontamination capabilities are not available, or for public health and safety, contaminated human remains may have to be temporarily interred or stored in a manner that contains the CBRN hazard and is properly marked to facilitate contamination avoidance. In instances of mass fatalities, the JFC, on advice of the JMAO, may authorize temporary interment. The JMAO will direct and control subsequent disinterments. Temporary interments will require dedicated transportation assets to avoid the spread of contamination, engineer support to prepare the site, and security personnel to prevent unauthorized personnel from entering the interment area.

(c) In accordance with DOD policy, USTRANSCOM transports human remains that have been properly decontaminated and rendered safe for transport in accordance with the procedures established in JP 4-06, *Mortuary Affairs in Joint Operations*. However, contaminated human remains should remain in place and not be transported until such time as the methods for returning contaminated human remains safely have been established by the SecDef.

For joint doctrine for handling contaminated human remains, see JP 4-06, Mortuary Affairs in Joint Operations.

3. Personnel Services

PSS requirements are coordinated and integrated throughout the operation, subject to the GCC approved guidance issued by the manpower and personnel directorate of a joint staff, with each Service retaining its own distinct culture, traditions, and requirements. Providing PSS to assigned forces is a Service responsibility; however, the GCC may determine that centralizing some support functions (postal; religious; legal; morale, welfare, and recreation; or other appropriate services) within the AOR would be beneficial and may designate a single Service component to provide or coordinate the support. These PSS functions may be impacted in an area experiencing a CBRN incident. Some services may be curtailed or stopped due to mission degradation while others may require augmentation due to an increased workload. Support includes the following:

a. Human resources functions (personnel management, casualty operations, casualty management, personnel accountability, and strength reporting).

b. Postal operations and support.

c. Religious support, in the form of religious support teams, provides for the spiritual care of military and authorized civilian casualties, as well as military first responders in a CBRN incident, by providing for religious worship, rites, sacraments, ordinances, ministrations, and visitation. Religious support teams also advise commanders on civil factors such as localized customs and humanitarian organizations.

d. Financial management.

e. Legal support.

f. Quality of life issues (member and family well being).

g. Morale, welfare, and recreation infrastructure and access.

For additional information, see JP 1-0, Personnel Support to Joint Operations*, JP 1-04,* Legal Support to Military Operations*, JP 1-05,* Religious Support in Joint Operations*, and JP 1-06,* Financial Management Support in Joint Operations.

4. Health Service Support

a. **To provide adequate HSS, definitive planning and coordination are required.** The GCC must consider and plan for all aspects of HSS requirements, including the possibility of a CBRN incident. Failure to plan for preventive medicine (PVNTMED) support as part of the early entry force can cause mission failures due to disease and nonbattle injuries. Planning for and maintaining a sound medical surveillance program for all operations can maximize force effectiveness by eliminating or reducing the effects of medical threats, such as the existence of indigenous diseases and their effect on the physiological and psychological health of military forces. Sound preparation and thorough disease containment planning will ensure the greatest range of options is available to respond to CBRN events while balancing mission requirements with the risk to personnel.

b. HSS supports all phases of operations, taking into account the unique characteristics and effects of the range of CBRN materials. While US policy and doctrine acknowledge that HSS is primarily a Service responsibility, **the senior ranking medical person** (command surgeon, surgeon general, or public health emergency officer) **is responsible for guiding and integrating all HSS capabilities available to the command to support the mission**. HSS planning for post-CBRN incidents must include efforts to conserve available

HSS personnel for medical treatment. Although most definitive care is rendered outside the area of immediate combat (contaminated area) in a non-tactical environment in a mature theater, triage, patient decontamination, and initial resuscitative care may be necessary in the combat area (or contaminated area). HSS planners must ensure that units can locate clean areas in which to operate a medical treatment facility (MTF) or, if available, employ COLPRO shelter systems to provide life and limb care in combat areas. Commanders and medical leaders must also plan to prevent or reduce the numbers of stress-related cases in this environment. Pre-incident education and training programs will help reduce the stress of CBRN incidents and can be used to educate personnel on appropriate response actions (e.g., self-monitoring procedures, ROM, IPE wear).

c. The GCC establishes the theater's HSS requirements and uses directive authority to ensure the proper coordination of all HSS capabilities in the force (to include general HSS services, shelter, food, water, environmental and occupational health, medical surveillance, medical prophylaxis, medical pretreatments, immunizations, post-exposure therapeutics, antidotes, and fluids).

Doctrine for HSS is in JP 4-02, Health Service Support*.*

d. **CBRN Weapons Employment.** Adversary use of CBRN weapons can cause large numbers of military and civilian casualties. Commanders and HSS planners must ensure that a process is in place to cope with and treat CBRN casualties. Additionally, the potential for accompanying widespread disruption and destruction will require special patient handling and challenge HSS capabilities and resources. Consequently, pre-deployment and employment intelligence collection, reporting, analyses, and risk assessments must be timely and accurate for PVNTMED protocols to be effectively implemented to support operations, while protecting the forces' health. Timely and complete intelligence and risk assessments assist commanders to prevent casualties and prepare forces for immediate or long-term treatments, if required, prior to deployment and employment.

e. **Medical Intelligence**

(1) Operations in CBRN environments place particular HSS demands on intelligence. Especially important are a clear and commonly shared assessment of adversary CBRN capabilities, CBRN use effects, and US, multinational, and HN HSS capabilities and limitations in countering adversary CBRN use. The Armed Forces Medical Intelligence Center (AFMIC) is responsible for intelligence products to support HSS aspects of JFC intelligence requirements. AFMIC can assist by producing epidemiological and environmental threat assessments associated with specific geographical locations. **Threat assessments should include the identification of industrial sites in the theater that can produce toxic hazards.** TIM could become a health hazard to deployed forces if these sites are accidentally or intentionally destroyed or damaged. Furthermore, TIM could be a source of environmental hazards to deployed forces even when the sites are not disturbed.

(2) In the theater, HSS activities supporting the continuous JIPOE process include investigations of disease and injury resulting from known or suspected chemical, biological, or radiological agents, and integration of HSS information from medical and nonmedical units. Effective preventive and curative HSS for the forces requires production of complete, timely, and accurate HSS intelligence products and their integration into overall theater intelligence assessments and estimates. Since an affect from a biological agent may first occur in the local population, it is important for HSS to maintain an awareness of local civilian disease trends and unique cases in order to quickly identify potential biological agent casualties.

f. **Other Information Resources.** In addition to AFMIC, other specialized organizations provide expert information on medical aspects of CBRN threats, casualty prevention, CBRN agent sample and specimen collection, and medical care and management of casualties. These include DTRA, the Armed Forces Radiobiology Research Institute, the Naval Medical Research Center, the US Army Medical Research Institute of Infectious Diseases (USAMRIID), the US Army Medical Research Institute of Chemical Defense, US Army Center for Health Promotion and Preventive Medicine, USANCA, United States Air Force School of Aerospace Medicine, Air Force Institute for Operational Health, the Navy and Marine Corps Public Health Command, as well as the US Centers for Disease Control and Prevention.

g. **Medical Treatment Facilities. The success of MTFs in treating arriving casualties in CBRN environments depends on prior planning and adaptability.** The GCC is responsible for directing and guiding planning and exercises to ensure adequate HSS, including the operations of MTFs.

(1) CBRN materials are capable of producing mass casualties. In the hours immediately following a CBRN incident, MTFs can be overwhelmed with casualties that exceed their capacity. The GCC, supported by the command surgeon, establishes HSS priorities for treatment of mass casualties. MTF commanders are responsible for planning and training to cope with this situation in line with joint force plans and priorities.

(2) Whenever possible, an MTF should be located such that it is maximally protected from a CBRN incident. No matter where the MTF is located, treatment providers must still have adequate IPE, particularly for certain chemical agents. Facilities must be prepared to track casualty flow and decontaminate as soon as possible once casualties are stabilized.

(3) To facilitate operations in CBRN environments, MTFs employ COLPRO. COLPRO enables the MTF to continue operations in a contaminated environment, ensuring that contamination-free areas are available to treat decontaminated casualties. In a contaminated situation, casualties and staff are relocated to a contaminated free area as soon as possible, generally within 72 hours. MTFs are not usually moved into areas that are known to be contaminated.

(4) HSS operations at MTFs should avoid diversion of medical specialists to nonmedical tasks. Whenever possible, in line with joint force priorities and assets, augmentation will be made available to perform tasks such as decontamination, physical security, and maintenance of contamination-free areas and collective protective shelters.

(5) The CCDR is responsible for providing MTFs with adequate logistic support in theater, including damage control, relocation, and resupply, in line with joint force priorities and assets.

h. **Preventive Medicine Principles**

(1) **Demand for PVNTMED services increases commensurate with the CBRN threat.** PVNTMED personnel and the command surgeon assist the JFC in determining the health risks associated with CBRN hazards; the safety of drinking water and food supplies; the appropriate time for using pretreatments, prophylaxis, and immunizations; and other PVNTMED measures.

(2) PVNTMED personnel must remain aware of the potential medical threats in the local environment. They must establish and maintain a medical surveillance program that provides a database on actual medical threats in their command's area; names and units of personnel exposed to the medical threats; and treatments provided to exposed personnel. The medical surveillance program must be established before the first personnel enter the theater, whenever possible, and be maintained and continued after the personnel depart. When possible, medical surveillance should be extended to include the local civilian population in order to quickly identify potential biological warfare (BW) casualties in the event that the civilian population is affected before the military population.

(3) The damage caused by CBRN incidents will vary according to geographic and climatic conditions. Nevertheless, **adherence to both the principles of PVNTMED and public health standards can mitigate the effects of CBRN incidents**, particularly if these are implemented before an outbreak.

(4) In the aftermath of a CBRN incident, HSS and public health service facilities may be strained beyond their capacities. Demands for medical support to both military and civilian populations could be intense. PVNTMED specialists must assist the JFC in establishing priorities and effectively using available HSS and public health service resources. To assure adequate support to the joint force, JFC directives concerning treatment of civilian populations must be clear and adhered to by the joint force HSS personnel and facilities.

(5) Carelessness in emergency situations regarding food and water sanitation, general hygiene, and other common disease control measures can significantly contribute to secondary spread of disease. **Enforcing satisfactory personal hygiene and field sanitation is a leadership responsibility.** Washing with soap and water is the most effective, and often simplest, personal hygiene measure for controlling communicable diseases. All personnel must apply standard, individual hygiene and sanitation measures.

Strict procedures are required for waste treatment and sewage, including water surveillance and sanitation control measures. Generally, the best method of sanitizing water is purification or boiling. However, if the water will be used for human consumption and hygiene purposes, these are not effective against certain biological agents such as viruses, spores, toxins, or radioactive particles. The reverse osmosis water purification unit and the tactical water purification system can remove most CBRN agents, and provide a safe water supply for these uses. In all cases, the designated medical authorities must approve all water supplies before distribution and consumption.

(6) Maintaining safe food and water supplies is vital in CBRN environments. Following an incident, all food except canned or similarly protected items should be thoroughly inspected for contamination. If the situation demands that suspect items be consumed, they should be decontaminated. Foods determined to be safe must be protected against secondary contamination. Protective measures must be practiced by those who transport, store, prepare, and serve food as well as by those who consume the food. In addition, commanders must consider applying control measures to prevent contamination of foodstuffs by insects, rodents, and other vectors.

i. **Preventive Measures.** Effective HSS includes a combination of preventive and curative measures. Commanders must ensure that all the command's personnel train to survive and accomplish their missions in CBRN environments. **The command's HSS activities must be able to effectively care for CBRN casualties while providing all other required health services.** Commanders must ensure that personnel keep immunizations current (including full use of the Military Immunizations Tracking System), use available prophylaxis and pretreatments against suspect agents, and apply contamination avoidance procedures. Preventive measures in HSS planning for CBRN environments include, but are not limited to the following.

(1) Development of the body's natural defenses through individual and unit health and fitness programs.

(2) Integration of military PVNTMED and civilian public health service preventive capabilities, including hygiene and vaccination programs and disease containment strategies (i.e., restriction of movement, isolation, or quarantine), to the extent feasible and permissible by mission requirements.

(3) Integration of HSS considerations into ISR activities to detect CBRN and other toxic agents and materials; provide early warning to maximize the effectiveness of PVNTMED and curative HSS.

(4) Protection of medical supplies and equipment by using available overhead cover, chemical agent resistant coatings, or protective coverings.

(5) Frequent testing of all food and water sources and supplies for CBRN contamination.

(6) Establishment and maintenance of a medical surveillance system to identify populations at risk, including eligible civilians, to anticipate, recognize, and assess hazardous exposures, to monitor health outcomes, and to employ new countermeasures.

(7) FP measures extended to HSS organizations and facilities based on JFC priorities to ensure HSS availability in the event of CBRN incidents.

(8) Integration of HSS units and facilities into joint force plans and activities to limit CBRN exposure and contamination following a CBRN incident, through application of CBRN defense principles.

j. **Casualty Decontamination and Triage**

(1) Decontamination of casualties protects them from the detrimental effects of additional exposure and protects those who evacuate and treat them. The control and treatment of contaminated casualties will vary with the tactical situation and the specific contaminants. Although the primary responsibility for decontamination of casualties prior to transportation to MTFs rests with the unit, a medical unit must be prepared to receive contaminated casualties. Within the theater, decentralization of casualty decontamination is necessary. Casualties must not be forced to wait at central points for decontamination. All medical units should have readily available, and be proficient in the use of, the necessary decontamination equipment for self and patient decontamination. MTFs supporting operations in potential CBRN environments must establish appropriate procedures for casualty decontamination and triage.

(2) Triage of contaminated casualties takes place with due regard to the type of CBRN agent that is known or likely to have caused the contamination. The triage officer takes account of the significant differences between and among CBRN hazards. When casualties arrive at the MTF, the triage officer will determine decontamination priorities based on the urgency of patient treatment needs. Patients with life- or limb-threatening conditions will receive emergency medical treatment before decontamination.

k. **Care and Management of CBRN Casualties**

(1) Effective care and management by HSS organizations of casualties caused by CBRN materials requires planning to treat large numbers of individuals exposed to biological agents, toxins, chemical agents, and blast, heat, and radiation from nuclear weapons and/or radiological dispersal devices. Each element of the patient movement and treatment process requires careful evaluation to assure it best conserves and restores the command's combat capability. Consideration of multinational partner and HN requirements and capabilities that affect the JFC mission and the ability of US HSS units to function effectively is especially important.

(a) To conserve, restore, or maintain combat effectiveness, commanders and HSS personnel within the evacuation and treatment processes must continually evaluate capabilities based on situational changes and make adjustments to conform to the GCC's and subordinate JFC priorities.

(b) All patients must be checked for CBRN contamination and decontaminated, if required, prior to being admitted to MTFs to reduce the hazard to medical personnel and other patients and to prevent contamination of the MTF.

(c) Treatment of life- or limb-threatening conditions must be accomplished in the patient decontamination area prior to and during decontamination. Medical personnel must support this mission, either by providing the actual patient decontamination function, or assisting with the patient decontamination process.

(2) Units have primary responsibility for decontaminating their casualties as soon as possible and prior to moving them to MTFs. However, operational circumstances may prevent them from doing so. This has a serious impact on the command's ability to maintain uncontaminated medical facilities. **Decontamination and collective protection following CBRN incidents are essential if MTFs are in a contaminated area.** The GCC, with advice from the command surgeon, must consider MTF needs when establishing priorities for allocating decontamination assets.

(3) Demands for military medical support to neighboring civilian populations following a CBRN incident may be substantial, especially in areas with a concentration of very young, very old, and other individuals already suffering from underlying disease or other forms of weakening stress. In consultation with the command surgeon, the GCC must establish, at the beginning of the operation, the scope of care to be rendered to civilian populations.

(4) In accordance with their missions, medical organizations assist with providing adequate shelter, establishing safe food and water sources, and ensuring that preventive measures and curative treatments are available. Adversary action and the potential need to deal with panic among the civilian population require physical security measures at facilities that permit uninterrupted medical treatment. The JFC may decide to assign the physical security mission to nonmedical units, if operational requirements and priorities permit.

(5) Although the source and means of exposure to CBRN hazards affect incidence and the severity of injuries, basic principles of prevention and treatment do not change. For instance, in the event of a biological incident, rapid detection and accurate identification of the agent are important factors in providing operationally relevant information to the JFC and HSS units. This allows the command to mitigate effects on the force, facilitate adequate casualty management, and provide effective medical treatment. **The first indication of a biological incident or covert radiological source may be the appearance of numerous casualties in which medical specialists are challenged to differentiate endemic disease occurrence from adversary attack.**

(6) In the case of a biological incident, casualties may not occur as they would during large-scale conventional bombardment or attack with most chemical agents against unprotected personnel. Moreover, the degree of agent exposure and personal resistance (natural or acquired) may delay illness. HSS units must anticipate increasing casualty loads beginning with relatively few initial casualties and escalating to a peak over successive hours or days. Since some biological agents are transmissible among humans, the prevention of disease transmission after the initial attack will be essential for military PVNTMED and civilian public health services organizations.

(7) In the case of a contagious biological agent (e.g., plague) the installation's public health emergency officer (PHEO) in coordination with the medical commander, may recommend to the installation commander to institute a prophylaxis regimen and administer controls to isolate (isolation, quarantine, other emergency actions) categories of infected individuals in order to limit further spread of disease. When local capabilities are anticipated to be insufficient (e.g., deployed clinics, expeditionary medical support, combat support hospital), the combatant command surgeon recommends the redeployment of available in-theater assets to augment the local effort.

(8) In the case of some chemical or radiological incidents, agent or radioactive material disseminated by explosion may not produce symptoms in casualties not injured by the blast effects until hours later. This is particularly true with mustard. A high index of suspicion for chemical (and radiological) material dissemination must be maintained by HSS facilities after a conventional attack.

l. **Patient Movement**

(1) Externally contaminated patients and those infected with biological agents will not be transported without first being decontaminated or cleared for transport. Additionally, since AE provides transportation after initial casualty stabilization/treatment, patients should be decontaminated prior to entering the AE system. In the event patients cannot be decontaminated, the GCC, in conjunction with USTRANSCOM, will identify the requirement to move contaminated/contagious patients. The Commander, USTRANSCOM responsibilities include providing global patient movement, in coordination with geographic combatant commands, for the DOD through the Defense Transportation System.

(2) Commanders operating in CBRN threat environments must consider the commitment of evacuation assets to contaminated areas. In planning for evacuation, the JFC considers the nature of the actual contamination hazard. **Radiological contamination and radioactive fallout impose different operating conditions than persistent or nonpersistent chemical agents or lethal or nonlethal biological agents.** When evacuation personnel are sent into a radiologically contaminated area, an operational exposure guide (OEG) must be established. Prolonged wearing of IPE under MOPP conditions, climate, workload, and fatigue combine to limit personnel effectiveness and consequently hamper casualty evacuation. Based on factors such as missions, priorities, and OEG, commanders decide which evacuation assets will be sent into the contaminated

area. As a general principle, to limit contamination of evacuation assets, if patients are stable enough, patients should be decontaminated before evacuation.

m. **Countermeasures and Response to CBRN Health Effects.** Countermeasures and responses to the health effects of CBRN agents include immunizations, medical prophylaxis, medical treatments, antidotes, and disease containment measures such as ROM. These actions occur before exposure to high-risk, CBRN conditions (e.g., pretreatments and immunizations) as well as after exposure to CBRN agents (e.g., treatments and fluids). The timeliness and accuracy of intelligence including any warning can directly enhance the success of medical countermeasures and response.

(1) **Pre-Exposure.** Commanders must ensure that all their personnel have up-to-date immunizations, begin required pretreatments and prophylaxis, and/or use designated medical barrier materials as ordered before entering a potential CBRN hazardous area.

(2) **Post-Exposure.** HSS personnel will assist commanders by ensuring that all exposed personnel continue prophylaxis, pretreatments, and the use of medical barrier materials, and to administer antidotes as required. Exposed personnel should seek medical assistance as soon as possible. HSS personnel will also advise commanders on the implementation and sustainment of ROM.

(3) **Psychological Impact.** CBRN incidents will generate confusion, panic, and hysteria. Therefore, the use of combat and operational stress control teams is essential in preparing for and responding to CBRN incidents. Additionally, commanders should coordinate with PA in order to quickly and effectively communicate agent risk and response information to personnel in order to avoid confusion and hysteria.

For information on domestic or foreign consequence management, see JP 3-41, Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives Consequence Management.

For information on installation response to CBRN incident, see DODI 2000.18, Department of Defense Installation Chemical, Biological, Radiological, Nuclear, and High-Yield Explosive Emergency Response Guidelines.

APPENDIX A
THREAT CONSIDERATIONS

1. General

a. This appendix identifies some of the factors required to assess the threat posed to friendly forces and operations by an adversary's use of CBRN weapons and other toxic materials. The factors are generic in nature and should be replaced by current validated intelligence products as friendly plans are developed. An adversary's ability and willingness to employ CBRN weapons can significantly influence friendly operations and every effort must be made to determine if an adversary possesses and can employ these weapons capabilities.

b. Dealing with a CBRN threat requires detailed planning based on very specific intelligence about the adversary's capabilities, opportunities, and intentions. When the possibility of a CBRN threat exists, commanders should establish CBRN specific PIRs. In developing these PIRs, there are a number of questions that need to be answered to produce an accurate CBRN threat assessment. These questions form the basis for a CBRN threat assessment and are summarized in Figure A-1.

c. Adversaries have a wide range of potential CBRN options to employ against friendly forces and operations. What option an adversary is likely to employ depends on the adversary's objectives and capabilities. There are basically three types of adversaries currently confronting US forces who possess, or can develop, a CBRN capability:

(1) Emerging global adversaries.

(2) Regional adversaries.

(3) Non-state adversaries.

d. There are a number of broad objectives that these adversaries may have in confronting US interests. Identifying and understanding these objectives will assist commanders in developing appropriate responses to deter potential employment. These adversary objectives include:

(1) Defeating friendly forces.

(2) Preventing defeat by friendly forces.

(3) Disrupting friendly forces' operations.

(4) Deterring intervention.

(5) Exerting regional leverage or intimidating other regional powers.

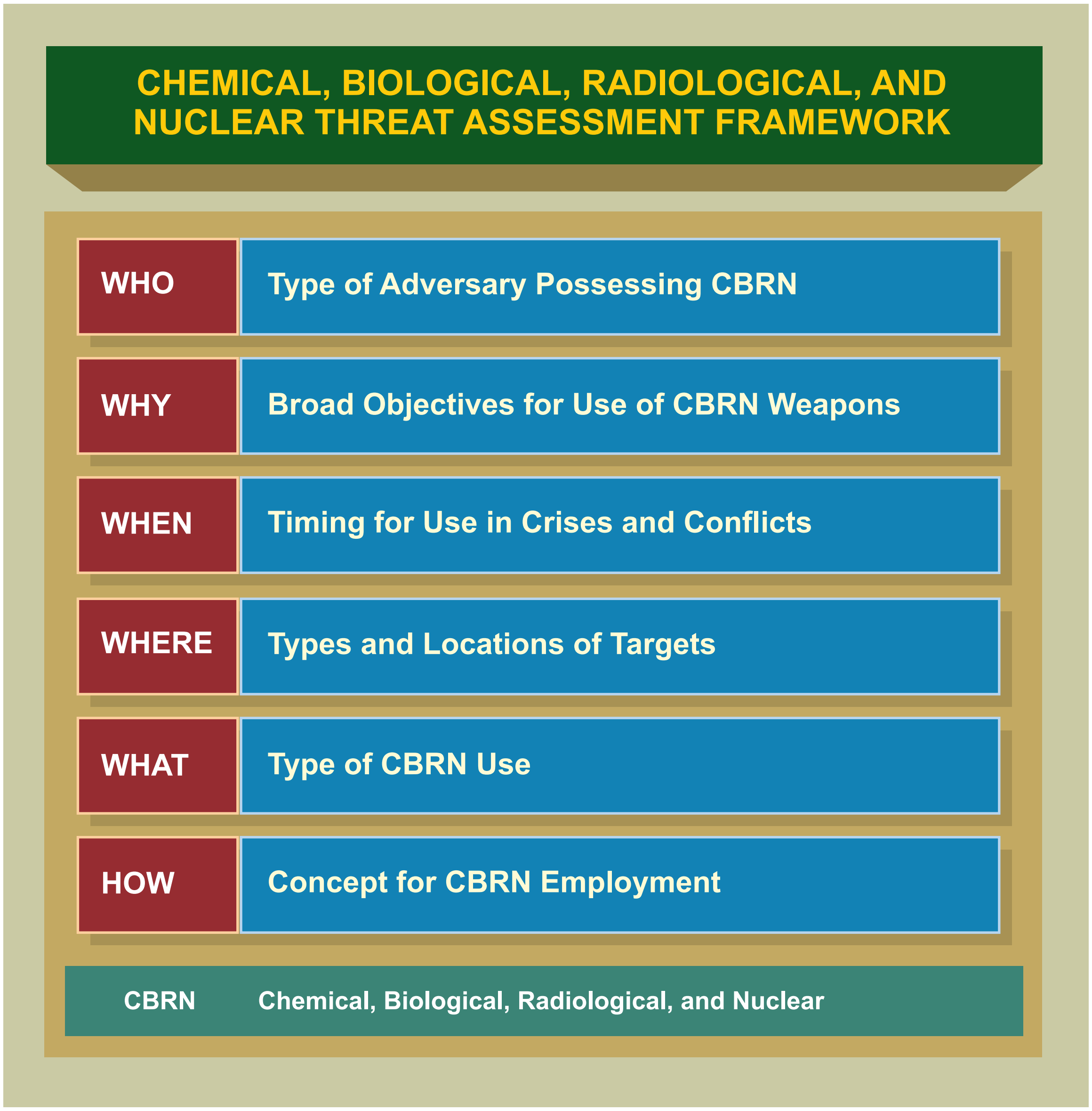

Figure A-1. Chemical, Biological, Radiological, and Nuclear Threat Assessment Framework

(6) Survival and revenge.

e. Adversaries are not constrained in their array of potential targets which can include military and civilian populations and infrastructure. As a result, in a potential CBRN environment, commanders must be prepared to deal with the impacts of the adversary's use of those weapons on civilian targets.

f. **CBRN Vulnerability Assessments.** CBRN vulnerability assessments are essential to FP planning (see Figure A-2). They provide the commander with a tool to determine the potential vulnerability of an installation, unit, activity, port, ship, residence, facility, or other site against CBRN threats and hazards. A CBRN vulnerability assessment identifies

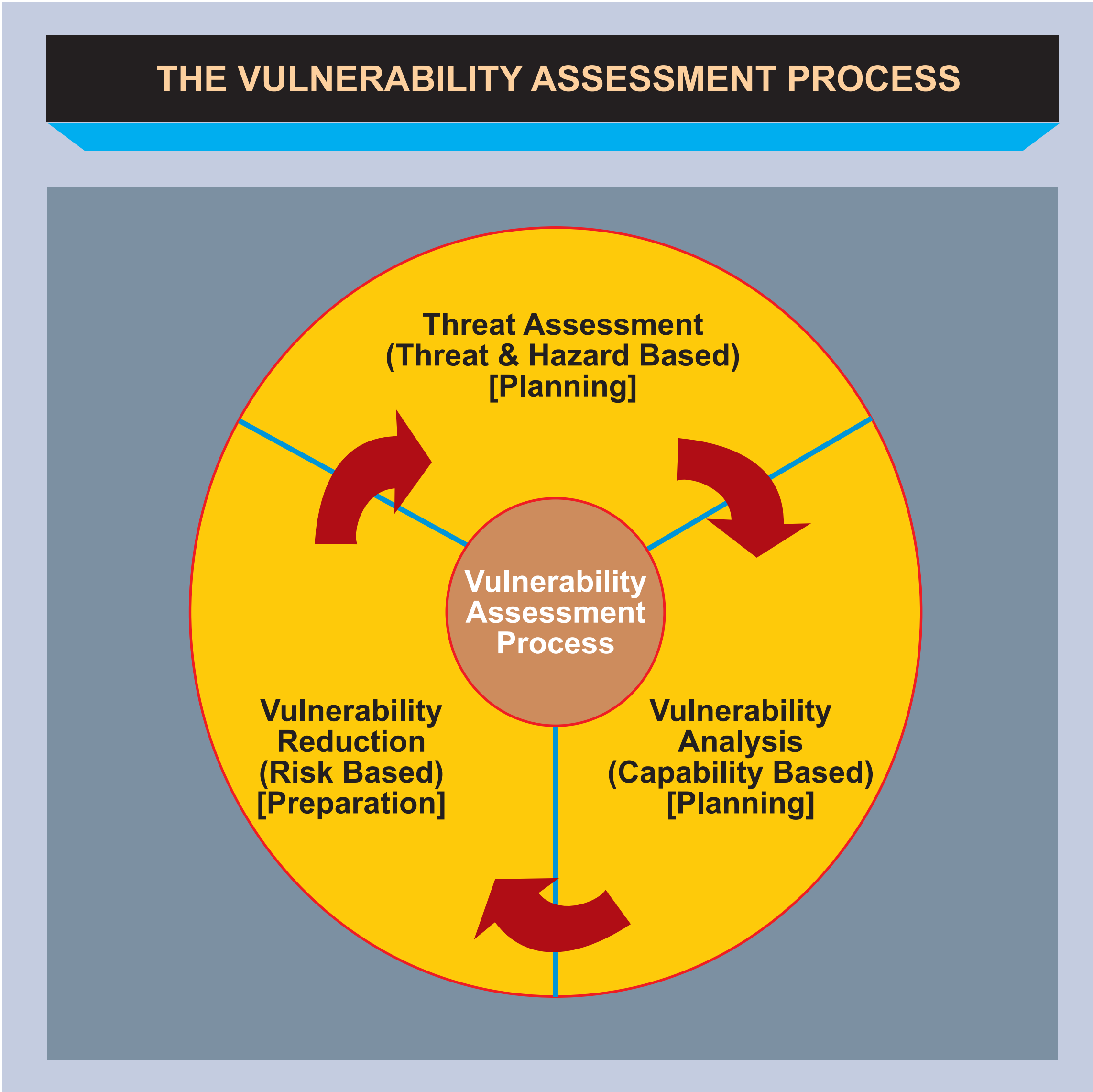

Figure A-2. The Vulnerability Assessment Process

functions or activities vulnerable to threats and requiring attention from C2 authorities to address improvement required to withstand, mitigate against, or deter the threat.

(1) The CBRN vulnerability assessment will:

(a) Indicate what the vulnerabilities are.

(b) Determine the likelihood that CBRN threats or hazards will exploit a given vulnerability based on knowledge, technologies, resources, probability of detection, and the payoff.

(c) Predict the potential impact to the operational area if the vulnerability is exploited.

(2) CBRN vulnerability assessments require comparison of the threat with a unit's vulnerabilities to determine the efforts necessary to safely meet incident requirements. Vulnerability assessment also includes integration of commander's guidance through a risk management process in order to prioritize vulnerability reduction measure implementation.

(3) Given all the factors in the risk equation and the cost of implementing countermeasures, a determination may be made that the risk potential of a given vulnerability is not worth the cost of correcting or implementing a CBRN defensive countermeasure.

FM 3-11.14/MCRP 3-37.1A/NTTP 3-11.28/AFTTP (I) 3-2.54, Multi-Service Tactics, Techniques, and Procedures for Nuclear, Chemical, and Biological Vulnerability Assessment *discusses CBRN vulnerability assessments in more detail.*

2. Assessment Framework

a. The framework for assessing the threat posed by an adversary possessing, or suspected of possessing, CBRN weapons contains six elements: who, why, when, where, what, and how. These elements are summarized in Figure A-1.

b. This framework supports the CBRN threat assessment process and forms the basis for a tabular description of the threat profiles that follow. The framework provides an analytic tool for assessing the vulnerability of targets in general and in areas of interest to specific commands.

3. Broad Objectives for Adversary Employment of Chemical, Biological, Radiological, and Nuclear Weapons

a. Figure A-3 summarizes the broad objectives that the three types of adversaries may entertain for employment of CBRN weapons against US forces operating unilaterally or in multinational coalitions. It also identifies the types of CBRN weapons that may be most appropriate for those broad objectives. While an adversary may use any weapon available in a conflict involving the United States, Figures A-4 through A-6 focus on the weapons that an adversary could consider most effective for achieving the stated objective.

b. Adversaries may also develop and employ radiological weapons whose effects are achieved by dispersing toxic radioactive materials against desired targets. Moreover, other TIMs may be used deliberately or spread accidentally in ways that threaten US forces and interests. Adversary employment of radiological and other toxic materials may be most appropriate in seeking to disrupt US and coalition forces, deterring US intervention, or achieving regional leverage or intimidation. The variety of these toxic materials makes their detailed treatment in this appendix impractical.

BROAD OBJECTIVES OF ADVERSARIES FOR ACQUISITION AND EMPLOYMENT OF CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR WEAPONS

WHO \ WHY	Defeat US, Revenge, Survival	Prevent Defeat by the US	Disrupt US Multinational Force	Deter US Intervention	Regional Leverage, Intimidation
Emerging Global Adversary	• Nuclear • Biological	• Nuclear • Biological • Chemical	• Biological • Chemical	• Biological • Chemical	• Biological • Chemical
Regional Adversary	• Nuclear • Biological • Chemical	• Nuclear • Biological • Chemical	• Biological • Chemical	• Biological • Chemical	• Nuclear • Biological • Chemical
Non-State Adversary	• Nuclear • Biological • Chemical		• Biological • Chemical	• Biological • Chemical	• Biological • Chemical

Figure A-3. Broad Objectives of Adversaries for Acquisition and Employment of Chemical, Biological, Radiological, and Nuclear Weapons

c. Global and regional adversaries may have the means and motivation to develop and employ nuclear and nonnuclear weapons for the purpose of generating an EMP. In some cases, EMP weapons could be detonated at high altitudes.

4. Emerging Global Adversaries

An emerging global adversary could have a CBRN employment profile that seeks broad objectives as indicated in Figure A-4, and seeks to exploit US and coalition vulnerabilities.

5. Regional Adversaries

A regional adversary could have a CBRN employment profile that seeks broad objectives as indicated in Figure A-5, and seeks to exploit US and coalition vulnerabilities.

EMERGING GLOBAL ADVERSARY CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR EMPLOYMENT PROFILE

WHY Broad Objective	WHEN Timing	WHERE Targets	WHAT Type CBRN Use	HOW Employment Means
Regional Leverage, Intimidation	• Early	• Regional Civilian Infrastructure • Population	• Nonlethal Biological • Nonpersistent Chemical	• Aircraft • Ballistic and Cruise Missiles • SOF
Deter US Intervention	• Early	• Regional Civilian Infrastructure • Logistics	• Nonlethal Biological • Nonpersistent Chemical	• Aircraft • Ballistic and Cruise Missiles • SOF
Disrupt US Multinational Force	• Early	• Regional Combat Units • C2 • Logistics	• Nuclear EMP • Biological • Chemical	• Aircraft • Ballistic and Cruise Missiles • SOF
Prevent Defeat by the US	• Mid-War	• US and Regional Combat Units • C2 • Logistics	• Nuclear EMP • Biological • Chemical	• Ballistic and Cruise Missiles • SOF
Defeat US, Revenge, Survival	• Mid-War; Fearing Defeat • Late; Defeat Imminent	• US and Regional Civilian Infrastructure and Population	• Nuclear • Biological	• Ballistic and Cruise Missiles • SOF

C2 Command and Control
EMP Electromagnetic Pulse
CBRN Chemical, Biological, Radiological, and Nuclear
SOF Special Operations Forces

Figure A-4. Emerging Global Adversary Chemical, Biological, Radiological, and Nuclear Employment Profile

REGIONAL ADVERSARY CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR EMPLOYMENT PROFILE

WHY Broad Objective	WHEN Timing	WHERE Targets	WHAT Type CBRN Use	HOW Employment Means
Regional Leverage, Intimidation	• Early	• Regional Civilian Infrastructure • Population	• Nonlethal Biological • Nonpersistent Chemical	• Aircraft • Ballistic and Cruise Missiles • SOF
Deter US Intervention	• Early	• Regional Civilian Infrastructure • Logistics	• Biological • Chemical	• Aircraft • Ballistic and Cruise Missiles • SOF
Disrupt US Multinational Force	• Early	• Regional Combat Units • C2 • Logistics	• Biological • Chemical	• Aircraft • Ballistic and Cruise Missiles • SOF
Prevent Defeat by the US	• Mid-War	• US and Regional Combat Units • C2 • Logistics	• Nuclear • Biological • Chemical	• Artillery • Aircraft • Ballistic and Cruise Missiles • SOF
Defeat US, Revenge, Survival	• Late; Fearing Defeat • Post-Conflict; for Revenge	• US and Regional Military and Civilian Infrastructure and Population	• Nuclear • Biological • Chemical	• Artillery • Aircraft • Ballistic and Cruise Missiles • SOF

C2 Command and Control
CBRN Chemical, Biological, Radiological, and Nuclear
SOF Special Operations Forces

Figure A-5. Regional Adversary Chemical, Biological, Radiological, and Nuclear Employment Profile

6. Non-state Adversaries

A non-state adversary could have a CBRN employment profile that seeks broad objectives as indicated in Figure A-6, and seeks to exploit US and coalition vulnerabilities.

NON-STATE ADVERSARY CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR EMPLOYMENT PROFILE

WHY Broad Objective	WHEN Timing	WHERE Targets	WHAT Type CBRN Use	HOW Employment Means
Regional Leverage, Intimidation	• Early	• Civilian Infrastructure • Population	• Nonlethal Biological • Nonpersistent Chemical	• Aircraft • Cruise Missiles • SOF
Deter US Intervention	• Early	• Civilian and Military Infrastructure • Population	• Biological • Chemical	• Aircraft • Cruise Missiles • SOF
Disrupt US Multinational Force	• Early • Mid-War	• Civilian and Military Infrastructure • C2 • Logistics	• Biological • Chemical	• Aircraft • Cruise Missiles • SOF
Defeat US, Revenge, Survival	• Late • Post-Conflict	• Civilian Infrastructure • Population	• Nuclear • Biological • Chemical	• Aircraft • Cruise Missiles • SOF

C2 Command and Control
CBRN Chemical, Biological, Radiological, and Nuclear
SOF Special Operations Forces

Figure A-6. Non-State Adversary Chemical, Biological, Radiological, and Nuclear Employment Profile

APPENDIX B
CHEMICAL HAZARD CONSIDERATIONS

1. General

Exposure to toxic chemicals can significantly influence the operational tempo and sustainment of forces. This appendix presents a brief overview of chemical agents and TICs and their effects. The following definitions are important to understand this overview.

a. **Chemical Hazard.** Any chemical manufactured, used, transported, or stored, which can cause death or other harm through toxic properties of those materials. This includes chemical agents and chemical weapons (prohibited under the Chemical Weapons Convention [CWC]) as well as TICs.

b. **Chemical Agent.** Any toxic chemical intended for use in military operations.

c. **Chemical Weapon.** Together or separately:

(1) A toxic chemical and its precursors, except when intended for a purpose not prohibited under the CWC.

(2) A munition or device, specifically designed to cause death or other harm through toxic properties of those chemicals described in (1), above, which would be released as a result of the employment of such munition or device.

(3) Any equipment specifically designed for use directly in connection with the employment of munitions or devices described in (2), above.

d. **Toxic Industrial Chemical.** Any chemical manufactured, used, transported, or stored by industrial, medical, or commercial processes. For example: pesticides, petrochemicals, fertilizers, corrosives, poisons, etc.

2. Chemical Agents

a. Chemical agents are classified according to physical state (solid, liquid, gas), physiological action (nerve, blood, blister, choking), and tactical use (immediate or delayed acting casualty agent). The terms “persistent” and “nonpersistent” describe the time an agent stays in an area. Persistent chemical agents affect the contaminated area for more than 24 hours to several days or weeks. Conversely, a nonpersistent agent normally dissipates and/or loses its ability to cause casualties after considerably less time, but is usually a more lethal agent. The effects on personnel exposed to these hazards may be immediate or delayed. For units forced into high levels of protection, missions will take longer to perform. A summary of effects for persistent and nonpersistent chemical agents is shown in Figure B-1.

CHEMICAL AGENT EFFECTS

PERSISTENCY	Target of Choice	Target Effect
Nonpersistent • Nerve • Blood • Choking	• Personnel	• Immediate • Lethal
Persistent • Nerve • Blister	• Terrain • Materiel • Logistics • Command and Control Facilities	• Reduced Operations Tempo or Mission Degradation • Lethal or Casualty-Producing

Figure B-1. Chemical Agent Effects

b. Figure B-2 indicates individual symptoms and effects, rate of action, and how chemical agents are normally disseminated.

c. Adversaries will seek to employ chemical agents under favorable weather conditions, if possible, to increase their effectiveness. Weather factors considered are wind, air stability, temperature, humidity, and precipitation. For example, the best weather for direct placement of an agent, especially a nonpersistent agent, on an occupied area is calm winds with a strong, stable temperature gradient. Low winds and stable or neutral conditions are most favorable for spreading an agent cloud evenly over a larger target area. **Note: Non-state actors or terrorists may not need to wait for favorable weather conditions to employ chemical agents in order to create their desired effects (fear, terror, panic, etc.).**

d. Enemies may choose to deliver agents upwind of targets; in which case, stable or neutral conditions with low to medium winds of 5-13 kilometers per hour (kph) are the most favorable conditions. Marked turbulence, winds above 13 kph, moderate to heavy rain, or an air stability category of "unstable" result in unfavorable conditions for chemical clouds. However, the adversary may be able to leverage these factors to effectively employ a persistent agent to contaminate water supplies, deny terrain, material, etc.

e. Most weather conditions do not affect the quantity of munitions needed for effective, initial liquid contamination.

TYPES OF CHEMICAL AGENTS

Types	Symptoms	Effects	Rate of Action	Release Form
Nerve	• Difficulty Breathing • Sweating • Drooling • Nausea • Vomiting • Convulsions • Dimming of Vision • Headache (Symptoms Usually Develop Quickly)	• Incapacitates at Low Concentrations • Death at High Concentrations	• Very Rapid by Inhalation or through the Eyes • Slower through the Skin	• Aerosol • Vapor • Liquid
Blood and Choking	• Difficulty Breathing • Coma	Interference with Respiration at Cellular Level or by Interfereing with Oxygen Transport	Rapid	• Aerosol • Vapor
Blister	• Symptoms Range from Immediate to Delayed (Agent Dependent) • Searing of Eyes • Stinging of Skin • Powerful Irritation of Eyes, Nose, and Skin	• Blisters Skin and Respiratory Tract • Can Cause Temporary Blindness • Some Sting and Form Welts on the Skin	• Blisters from Mustard May Appear Several Hours After Exposure • Lewisite Causes Blisters within Minutes of Exposure • Phosgene Oxime Causes Immediate, Intense Pain	• Liquid • Particulate

Figure B-2. Types of Chemical Agents

3. Toxic Industrial Chemicals

a. US forces frequently operate in environments in which TICs are present. A number of these chemicals could interfere in a significant manner across the range of military operations. Most TICs of immediate concern are released as vapors. These vapors exhibit the same dissemination characteristics as chemical agents noted above. The vapors tend to remain concentrated in natural low-lying areas such as valleys, ravines, or man-made underground structures downwind from the release point. High concentrations may remain in buildings, woods, or any area with low air circulation. Explosions may spread liquid hazards and vapors may condense to liquids in cold air.

b. Figure B-3 identifies recommended isolation and protective action distances associated with accidental releases of some selected TICs. Isolation and protective action distances listed in the *Emergency Response Guidebook* do not apply to a terrorist or insurgent release of TICs. However, these distances may be multiplied by a factor of two to determine recommended isolation and protective action distances for a terrorist or insurgent

INDUSTRIAL CHEMICAL SITE MINIMUM DOWNWIND HAZARD (SAMPLE)

	SMALL RELEASE (< 55 Gallon Drum)			LARGE RELEASE (> 55 Gallons or Multiple Small Releases)		
CHEMICAL*	ISOLATE All Directions (Meters)	Protect Downwind (Kilometers) DAY	Protect Downwind (Kilometers) NIGHT	ISOLATE All Directions (Meters)	Protect Downwind (Kilometers) DAY	Protect Downwind (Kilometers) NIGHT
Ammonia	60	0.2	0.2	120	1.2	4.4
Chlorine	60	0.4	2.4	480	2.4	7.4
Nitric Acid	60	0.2	0.2	120	1.2	2.4
Phosgene	180	1.8	8.2	1600	6.6	21+
Sulfuric Acid	120	0.8	2.0	660	5	13
Hydrochloric Acid	As an immediate precautionary measure, isolate release in all directions for at least 50 meters for liquids and at least 25 meters for solids					
Petrochemicals						
Phosphoric Acid						

* - Samples only. See ERG2004 for additional information and chemicals

Figure B-3. Industrial Chemical Site Minimum Downwind Hazard (Sample)

TIC release. Release of TICs is most dangerous at night. The downwind hazard from a nighttime release is much longer than that for a daytime release.

Note: Distances in Figure B-3 are worst case scenarios involving the instantaneous release of the entire contents of a package (e.g., as a result of terrorism, sabotage, or catastrophic accident). Figure B-3 distances were obtained by multiplying US Department of Transportation *Emergency Response Guidebook* by a factor of two.

c. The most important action in case of an industrial chemical release is **immediate evacuation from the hazard's path**. The greatest risk from a large-scale toxic chemical release occurs when personnel are unable to escape the immediate area and are overcome by vapors or blast effects. **Military respirators and protective clothing may provide only limited protection against TICs** but can/should be used for immediate evacuation from the hazard area if more appropriate protective gear is not available**.**

d. In planning for operations in areas that might include TICs, commanders at all levels should include consideration of these potential hazards as part of the JIPOE process. These hazards could occur from deliberate or accidental release from industrial sites as well as storage and transport containers. It is possible that enemies could use an improvised explosive device to disperse TICs. Particular emphasis should be placed on those TICs that produce acute effects when inhaled or that produce large amounts of toxic vapor when spilled in water.

For detailed information on these and other TIC hazards, see National Institute for Occupational Safety and Health's, Pocket Guide to Chemical Hazards*, and US Department of Transportation's,* Emergency Response Guidebook.

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APPENDIX C
BIOLOGICAL HAZARD CONSIDERATIONS

1. General

Militarily significant characteristics for biological aspects of operations include: a normally vulnerable target population; infectious or toxic agents with highly lethal or incapacitating properties; agent availability or adaptability for scaled-up production; agent stability; and agent suitability for mass dispersion. Limiting factors include biological properties (e.g., virulence), environmental factors (e.g., ultraviolet light causing rapid decay), and dissemination methods (e.g., wet versus dry aerosol).

2. Technical Aspects

a. Biological agents are categorized as either pathogens or toxins. **Pathogens** are microorganisms (*bacteria and viruses*) that directly attack human tissue and biological processes. Pathogens are further divided into noncontagious or contagious. When biological threats are contagious, planning needs to account for possible quarantines and evacuations. **Toxins** are nonliving poisonous substances that are produced naturally by living organisms (e.g., plants, animals, insects, bacteria, fungi) but may also be synthetically manufactured. A **biological hazard** is any pathogen or toxin that poses a threat to human or animal health. These hazards can originate from sources such as medical waste and biological samples. Advances in biotechnology, genetic engineering, and natural mutation may facilitate the development or emergence of potentially more deadly BW agents. Figure C-1 provides a synopsis of several potential biological agents and their range of effects.

(1) The ability to modify microbial agents at a molecular level has existed since the 1960s, when new genetic engineering techniques were introduced, but the enterprise tended to be slow and unpredictable. With today's techniques, infectious organisms can be modified to become more infectious, to evade current prophylaxis and treatment options, or to exhibit novel disease characteristics. The current level of sophistication for many biological agents is low, but there is enormous potential — based on advances in modern molecular biology and drug delivery technology — for making more sophisticated weapons. BW agents may emerge in two likely categories: man-made manipulations of classic BW agents and newly discovered or emerging infectious diseases. An example of a recent new pathogen (though not necessarily an ideal BW agent) is streptococcus pneumonia S23F, a naturally-occurring strain of pneumonia resistant to at least six of the more commonly used antibiotics.

(2) The potential types of modified biological agents that could be produced through genetic engineering methodologies are listed below. Each of these techniques seeks to capitalize on the extreme lethality, virulence, or infectivity of BW agents and exploit this potential by developing methods to deliver agents more efficiently and to gain control of the agent on the battlefield.

PATHOGENS, VIRUSES, AND TOXINS OF MILITARY SIGNIFICANCE

DISEASE	ROUTES OF INFECTION	UNTREATED MORTALITY (%)	INCUBATION PERIOD	VACCINE	TRANSMISSIBILITY (Human to Human)
BACTERIA AND RICKETTSIA					
Anthrax (*Bacillus anthracis*)	S, R	S: 5-20 R: 80-90	1-4 Days	Yes	No
Plague (*Yersinia pestis*)	V, R	60	2-3 Days	No	High
Q Fever (*Cociella burnetti*)	V, R	< 1	2-10 Days	IND	No
Tularemia (*Francisella tularensis*)	D, V, R	30-60	2-10 Days	IND	No
VIRUSES					
Smallpox (*Variola major*)	R	30	10-12 Days	Available (Controlled US Stock)	High
Viral equine encephalitis (e.g., Western, Eastern, Venezuelan)	R, V	< 1	2-6 Days	IND	Low
Viral hemorrhagic fevers (Ebola, Marburg, Lassa, Rift Valley, Dengue, etc.)	DC, R, V	Up to 90 (Virus Dependent)	3-21 Days	No	Moderate
TOXINS					
Botulism (*Botulinum neurotoxins*)	D, R	60	1-4 Days	IND: (Available Only Under FDA-Approved Protocol)	No
Ricin (*Ricinus communis*)	D, R	30	Hours to Days	No	No
Staphylococcal Enterotoxin B	D, R	< 1	Hours to Days	No	No
Trichothecene Mycotoxins (T2)	D, R, S	10-60	—	No	Yes (from skin contact)

D Digestive System
R Respiratory System
S Skin
DC Direct Contact
V Vector
IND Investigational New Drug
FDA Food and Drug Administration

Figure C-1. Pathogens, Viruses, and Toxins of Military Significance

(a) Benign microorganisms genetically altered to produce a toxin or bioregulator (naturally occurring organic compounds that regulate diverse cellular processes in multiple organ systems, such as heart rate).

(b) Microorganisms resistant to antibiotics, standard vaccines, antivirals, and therapeutics.

(c) Microorganisms with enhanced aerosol and environmental stability.

(d) Immunologically altered microorganisms able to defeat standard identification, detection, and diagnostic methods.

(e) Combinations of the above four types with improved delivery systems.

b. **TIBs.** TIBs include infectious agents, as well as other biological hazards, and the risk can be direct through infection or indirect through damage to the environment. TIBs are often generated as infectious waste, such as sharps (e.g., needles, syringes, and lancets) or material contaminated by bodily fluids, and as biological samples (e.g., biopsies, diseases for research).

3. Operational Considerations

a. **Dissemination.** Biological agents may be dispersed or deposited as aerosols, liquid droplets, or dry powders. In general, agents dispersed as dry powder are more viable than those dispersed as wet aerosols. Biological agents can also be transmitted directly by arthropod vectors or by an infected individual. Infected arthropod vectors are useful for penetrating the skin.

b. **Persistency.** The longevity of biological agents is greatly dependent on their viability (ability to cause disease). Examples of viability are shown in Figure C-2.

c. **Environmental Conditions.** Environmental conditions may also affect the viability of biological material (see Figure C-3). These conditions include: solar (ultraviolet) radiation, relative humidity, wind speed, and temperature gradient. Ultraviolet light decreases the viability of most aerosol disseminated biological agents. However, encapsulation through man-made processes, natural sporulation, or arthropod vectors, may protect biological agents from the impacts of the environment and increase agent viability.

d. **Trigger Events.** With current technology, it is possible that a BW attack will be completed before local commanders are aware that it has taken place. Commanders, through their PHEOs, must attempt to distinguish between an epidemic of natural origin, a BW attack, or the release of/exposure to TIBs. Trigger events can assist commanders and PHEOs by providing an indication that a BW event is likely to occur, may have occurred, or has occurred, and will prompt commanders to initiate response measures. There are four possible triggers signaling a biological event: intelligence triggers generally occur prior to

EXAMPLES OF BIOLOGICAL MATERIAL VIABILITY

DISEASE	LIKELY DISSEMINATION METHOD	INFECTIVITY	LETHALITY	VIABILITY
BACTERIA AND RICKETTSIA				
Anthrax (*Bacillus anthracis*)	Spores in Aerosol	Moderate	High	Spores Are Highly Stable
Plague (*Yersinia pestis*)	• Aerosol • Vectors	High	Very High	Less Important Because of High Transmissibility
Q Fever (*Cociella burnetti*)	• Aerosol • Sabotage (Food)	High	Very Low	Stable
Tularemia (*Francisella tularensis*)		High	Moderate	Not Very Stable
VIRUSES				
Smallpox (Variola Major)	Aerosol	High	High	Stable
Viral equine encephalitis (e.g., Western, Eastern, Venezuelan)	Aerosol	High	Low	Relatively Unstable
Viral hemorrhagic fevers (Ebola, Marburg, Lassa, Rift Valley, Dengue, etc.)	Aerosol	High	High - Low (Virus Dependent)	Relatively Stable
TOXINS				
Botulism (*Botulinum neurotoxins*)	• Aerosol • Sabotage	N/A	High	Stable
Ricin (*Ricinus communis*)	Aerosol	N/A	Moderate	Stable
Staphylococcal Enterotoxin B	• Aerosol • Sabotage	N/A	Low	Stable

Figure C-2. Examples of Biological Material Viability

an event; weapons and detector triggers indicate agent release and/or disease infection start times; and a sentinel casualty trigger identifies the onset of symptoms.

(1) Intelligence warning trigger events occur when a commander receives convincing information (unanalyzed) or intelligence (analyzed information) indicating that a biological event (naturally occurring or intentional) is imminent. Information and intelligence from multiple sources (e.g., the general public, military intelligence, national

WEATHER EFFECTS ON BIOLOGICAL AGENT DISSEMINATION

	WEATHER CONDITION	BIOLOGICAL WARFARE AGENT CLOUD PERFORMANCE	OPERATIONAL CONSIDERATIONS
FAVORABLE	Stable or Inversion Conditions	Agent clouds travel downwind for long distances before they spread laterally. High humidity and light rains generally favor wet agent dissemination.	Agent clouds tend to dissipate uniformly and remain cohesive as they travel downwind. Clouds lie low to the ground and may not rise high enough to cover the tops of buildings and/or other tall objects.
MARGINAL	Neutral Conditions	Agent clouds tend to dissipate quickly.	More agent required for the same results as under stable conditions. Desired results may not be achieved.
UNFAVORABLE	Unstable or Lapse Conditions	Agent clouds rise rapidly and do not travel downwind any appreciable distance. Cold temperatures affect wet agent dissemination.	Agent clouds tend to break up and become diffused. Little operational benefit from off-target dissemination.

Figure C-3. Weather Effects on Biological Agent Dissemination

intelligence institutions in the host country) can provide advance warning of a biological event.

(2) Weapons event trigger events refer to attacks by a weapon system(s), such as theater ballistic missile(s), artillery, or observed attacks employing other delivery means such as an aerosol sprayer device. Where intelligence has assessed a biological weapon capability, it is reasonable to initially react to weapons events as if they could contain biological agents.

(3) Detector alarm trigger events refer to the discovery of a biological event via a positive result from a detection device, laboratory report from environmental samples, or a positive food/water sample indicating that a biological agent is present in the environment.

Detectors are not a foolproof method of indicating the presence of biological agents due to the sensitivity limitations of the devices and the possibility of false negatives/positives. Positive results via detector may permit discovery of a biological event prior to the onset of symptoms.

(4) A sentinel casualty trigger event refers to the medical community's detection of a biological agent or infectious disease event by assessing trends in medical symptoms among personnel or diagnosis of an index case. Response actions based on a sentinel casualty may begin well into the disease progression cycle.

e. **Additional Attack Indicators.** In addition to the Trigger Events listed above, the surrounding environment can also provide indication of a BW attack. Particular attention should be given to the following:

(1) Increased numbers of sick or dead animals, often of different species. Some BW agents are capable of infecting/intoxicating a wide range of hosts.

(2) Unusual entomological parameters.

4. Biological Defense

The protection of operational personnel under BW threat is a multifaceted discipline. In striking contrast to protection against chemical, radiological, and nuclear weapons there exists the potential to minimize the effects of biological agents. The combined use of medical surveillance, identification, medical countermeasures, physical protection, and restriction of movement provides the basis of biological defense.

a. **Medical Surveillance.** Human beings are a sensitive, and, in some cases, the only biodetector. Early clinical findings may be nonspecific or atypical of the natural disease. Medical personnel may be unable to differentiate natural disease from BW attacks. Considerable time may elapse following a BW attack before the extent of the exposure is known. To enable identification of a BW attack, ongoing, systematic collection and analysis of health data is essential. Following a BW attack, the disease pattern may have characteristics that differ from those of a naturally occurring epidemic:

(1) In contrast to naturally-occurring epidemics (excluding food-borne outbreaks) in which disease incidence increases over a period of weeks or months, the epidemic curve for most large, artificially-induced outbreaks is compressed, peaking within a few hours or days.

(2) In contrast to the peaks and troughs evident in most natural disease outbreaks, a steady and increasing stream of patients may be seen (comparable to that during a accidental food poisoning outbreak).

(3) An understanding of disease ecology and epidemiology can be extremely useful in distinguishing natural outbreaks from those induced by BW attack. For example,

diseases that are naturally vector-borne will have environmental parameters that predispose to naturally occurring outbreaks. Appearance of disease in the absence of these parameters would be highly suggestive of a BW attack.

(4) The medical services must maintain routine disease surveillance; emergence of an atypical pattern mandates immediate notification of higher authority. The simultaneous appearance of outbreaks in different geographical locations should alert to the possibility of a BW attack. In addition, multiple biological agents may be used simultaneously in a BW attack, or chemical and biological agents may be combined in a single attack to complicate diagnosis.

(5) A large number of casualties within a period of 48-72 hours (suggesting an attack with a microorganism), or within hours (suggesting an attack with a toxin). The epidemiology would be that of a massive single source.

(6) A large number of clinical cases among exposed individuals.

(7) An illness type highly unusual for the geographic area (e.g., Venezuelan equine encephalitis (VEE) in Europe).

(8) An illness occurring in an unnatural epidemiological setting, where environmental parameters are not conducive to natural transmission (e.g., VEE in the absence of antecedent disease in horses or in the absence of vector mosquitoes).

(9) An unusually high prevalence of respiratory involvement in diseases that when acquired in nature, generally cause a non-pulmonary syndrome — the signature of aerosol exposure (e.g., inhalational anthrax).

(10) Casualty distribution aligned with recent wind direction.

(11) Lower attack rates among those working indoors, especially in areas with filtered air or closed ventilation systems, than in those exposed outdoors. The reverse is true when the attack is made by using ventilation systems in order to disseminate BW agents indoors.

(12) Large numbers of rapidly fatal cases, with few recognizable signs and symptoms, resulting from exposure to multiple lethal doses near the dissemination source.

b. **Identification.** Identification of BW agents is essential to determine appropriate operational and medical countermeasure responses that may be taken by the JFC and public health officials.

(1) Presumptive or preliminary identification of the category of the BW agent, using laboratories in the operational area, will influence initial responses. The three BW agent categories can generally be described as:

(a) Communicable diseases, such as pneumonic plague, smallpox, influenza, and many others, that are able to be transmitted from person to person.

(b) Noncommunicable diseases, such as anthrax, that can contaminate an area and infect personnel but are not able to be transmitted form person to person.

(c) Noncommunicable BW agents, such as toxins and many other bacterial pathogens, that primarily only cause effects in directly exposed personnel.

(2) Confirmatory identification through molecular diagnosis, using specialized laboratories, is necessary to confirm or alter initial operational and medical countermeasure responses. Procedures should be developed to obtain and transport environmental and human samples to these specialized laboratories.

c. **Medical Countermeasures**

(1) **Immunoprophylaxis**

(a) **Active Immunoprophylaxis.** Vaccination is an important practical means of providing continuous protection against BW threats prior to, as well as during, hostile actions. Vaccines against a number of potential BW agents are available. Many of these vaccines were developed for the protection of laboratory workers or individuals working where the target diseases are endemic.

1. In a biological agent attack the number of infectious or toxin units to which an individual is exposed may be greater than in the case of natural exposure. Exposure by inhalation may represent an unnatural route of infection with many biological agent. The efficiency of protection afforded by most vaccines is based on natural inoculum size and exposure. Vaccines, which are generally considered to be effective under natural circumstances, may not provide a similar degree of protection to individuals exposed to biological agent attack.

2. An appropriate immunization policy is essential. Vaccines are biological agent specific and do not provide immediate protection. Not all vaccines can be administered simultaneously; therefore to prevent the logistic problems caused by in-theater vaccination, prior immunization is essential.

3. If an in-theater vaccination program is required, the possibility of adverse reactions from vaccination and the concomitant degradation of operational efficiency must be taken into account.

(b) **Passive Immunoprophylaxis.** For some biological agents, the only available medical countermeasures might be specific antiserum. Under certain conditions, passive immunoprophylaxis with immunoglobulin products might be considered. Use may be limited by lack of adequate sources and quantities of material, limited duration of protection, and the risk of serum sickness associated with antisera of animal origin.

However, recent scientific advances in products for immunoprophylaxis (for example, human monoclonal antibodies, "despeciated" equine or ovine antisera) are making this option technically more attractive.

(2) **Chemoprophylaxis**

(a) Chemoprophylaxis using appropriate drugs (e.g., antibiotics, antivirals) may offer additional protection in the event of a BW incident. If an attack is felt to be imminent (i.e., intelligence trigger), or is known to have occurred (i.e., weapon event or a sentinel casualty), command-directed chemoprophylaxis would be appropriate for all personnel in the area. However, it is impractical and wasteful to place everyone located in a potential target area on prolonged, routine antimicrobial prophylaxis in the absence of such a threat condition.

(b) For bacterial agents, antibiotics should be administered as soon as possible following exposure. Initiation of chemoprophylaxis during the incubation period is always worthwhile; however, the earlier the antibiotic is given the greater is the chance of preventing disease. In some cases (e.g., inhalational anthrax), post-exposure vaccination must be given in addition to antibiotics to personnel previously unvaccinated in order to prevent late onset of disease when antibiotics are withdrawn.

(c) Consideration should be given to the possibility of the interaction between drugs in multi-drug regimens that address the multiple elements of force health protection. Medical personnel must ensure consistent observation of personnel receiving chemoprophylaxis in order to identify and treat harmful interactions or side effects.

d. **Physical Protection**

(1) **Individual Protective Equipment**

(a) **Respiratory Protection.** Respiratory protection is essential in the presence of any BW inhalation hazard. Currently fielded respirators equipped with standard filter canisters will provide a high degree of protection against particles greater than 0.3 micrometers in size. Other forms of protection (e.g., self-contained breathing apparatus) are available and may be fielded to meet particular conditions. Low-grade masks (e.g., surgical masks) are not sufficient to protect against aerosol attacks. However, they may have some application for controlling the spread of contagious disease.

(b) **Dermal Protection.** Intact skin provides an excellent barrier against biological agents however, any skin abrasions or exudative inflammation must be covered. In some instances it may be necessary to protect the mucous membranes of the eye. IPE clothing employed against CBRN agents will protect against skin contamination with biological agents, although standard uniform clothing affords a certain degree of protection against dermal exposure to the surfaces covered.

(c) **Casualties.** Casualties unable to continue wearing IPE in a biological agent contaminated area should be held and/or transported using containment measures to protect the patient against biological agent exposure. Contagious patients should be held and/or transported using a barrier system to prevent disease transmission.

(2) **Collective Protection**

(a) A dedicated hardened or unhardened shelter equipped with an air filtration unit providing overpressure provides some protection from biological hazards, but does not provide 100% protection from all biological hazards.

(b) COLPRO is the most effective method for protecting infected patients and the medical facility during the BW attack. However, following a BW attack, the environment within COLPRO may lead to cross-infection between casualties and staff. Therefore, it may be appropriate to care for patients whose illness is thought to be the result of a BW attack or those suspected of carrying a transmissible disease outside of the COLPRO facility. At a minimum, these patients will be cared for using barrier nursing techniques.

e. **Restriction of Movement.** Restriction of movement involves limiting the movement of people to prevent or reduce person-to-person transmission of contagious diseases. Restriction of movement may include social distancing, quarantine, or isolation.

(1) **Social distancing** is a community-based strategy to increase the physical space between people to prevent person-to-person contamination (e.g., physical separation, cancellation of public events, closure of school and daycare facilities, and minimum manning policies).

(2) **Quarantine** includes voluntary and mandatory restriction of movement placed upon individuals or groups reasonably believed to have been exposed to a CBRN agent.

(3) **Isolation** is the separation of symptomatic individuals or groups from other personnel in order to prevent additional contamination.

APPENDIX D
RADIOLOGICAL HAZARD CONSIDERATIONS

1. General

a. Background radiation is always present. It varies considerably throughout the world and can even vary within a small locality. It can complicate detection and quantification of man-made radiation, and hence the interpretation of radiation measurements for identifying and marking a potential hazard area.

b. The potential for radiological hazards may also come from terrorist use of radiological materials. Radiological threats differ from chemical and biological threats in that radiation cannot be "neutralized" or "sterilized" and many radiological materials have half-lives measured in years. Radiation sickness is not contagious, but cross- contamination is possible. Respiratory protection will protect against the inhalation of airborne radiological contaminants. IPE reduces the amount of contaminants that can enter the lungs and the potential for skin burns from alpha and beta particles.

c. The Services are responsible for enforcing precautions and establishing TTP for handling their conventional munitions that employ radioactive materials, such as DU, including enforcing exposure standards, that protect their personnel against external and inhalation and ingestion hazards.

d. In the operational environment, many highly technical items of equipment have high-energy or radiological sources that may accidentally or deliberately become radiation hazards. For example, communications and surveillance sites may have known hazard areas around their equipment that result from high-energy transmissions. These transmissions can injure personnel, damage equipment, and cause electronics and avionics malfunctions. Additionally, medical treatment and diagnostic modalities use radiation sources which require precautions to avoid accidental or deliberate exposure. Lastly, dangerous levels of radiation can result from damaged industrial radiation hazard areas. Due to the downwind hazards such damage can produce, avoidance is the most effective individual and unit protective measure against industrial radiation hazards.

e. Further, adversaries could disperse radioactive material using low-level radiation sources in a number of ways. Such dispersal could range from arming the warhead of a conventional missile with active material from a nuclear reactor, releasing low-level radioactive material intended for use in industry or medicine, disseminating material from a research or power-generating nuclear reactor, or depositing a radioactive source in a water supply. Dispersal of radioactive materials is an inexpensive threat that requires limited resources and technical knowledge for employment.

f. Radiation exposure may result from dispersed radioactive material (in solid, liquid, gaseous, or vapor form) or it may result from discrete sources, such as a radioactive source concealed in a high traffic area. Any alpha, beta, gamma, and neutron source may present a potential radiation hazard.

g. Radiation can cause both deterministic and nondeterministic health effects. Large doses in a short time period may cause a combination of deterministic effects termed "acute radiation syndrome." The higher the dose, the faster these effects occur, and the more severe the syndrome will be. All doses of radiation also have the *potential* to cause an increase in an individual's risk of cancer. Since this is only a potential effect from the exposure, it is considered nondeterministic. Occupational radiation protection programs and regulations are concerned with both deterministic and nondeterministic effects. Figure D-1 summarizes the overall effects of radiation exposure as a function of dose for healthy, young adults with no other injuries. The threshold for effects will be lower for personnel with combined injuries.

2. General Principles

a. The commander's decision to expose personnel to ionizing radiation should be balanced between mission requirements and the overall risks. In combat, individuals may exceed safe levels of radiation exposure because of action by the enemy. The strategy is to be aware of the risks to the greatest extent possible and try to minimize them. To the extent that the demands of combat require exposure to radiation, the risk should be divided among combatants to keep exposure to the absolute minimum.

b. Three basic principles of ionizing radiation protection form the foundation of managing the risks associated with ionizing radiation exposure: justification, optimization, and limitation.

(1) Justification. No unnecessary exposure should be undertaken.

(2) Optimization. The level of individual doses, the numbers of people exposed, and the likelihood of incurring exposures, should be kept as low as reasonably achievable.

(3) Limitation. The dose to an individual shall be limited according to appropriate regulations.

c. Possible radiation sources are:

(1) Civil Nuclear Facilities. These facilities include those for power generation, research, nuclear fuel fabrication, and for the processing, storage, and disposal of nuclear waste.

(2) Industrial and Medical. Wide-scale use of radioactive sources includes the testing of industrial products, medical treatment, calibration equipment, and the sterilization of food and equipment.

(3) Radiological Weapons. Any device, including weapon or equipment other than a nuclear explosive device, specifically designed to employ radioactive material by disseminating it to cause destruction, damage, or injury by means of the radiation produced by the decay of such material. These weapons are sometimes also referred to as radiation weapons, RDDs, or REDs.

(a) Radiological Dispersal Device. A device, other than a nuclear explosive device, designed to disseminate radioactive material in order to cause destruction, damage, or injury.

EFFECTS OF RADIATION EXPOSURE

Acute Dose centi-Gray (cGy) Free-in-Air	Threshold Effects Within 1 Day (See Notes 1, 2)	Probability of Death Within 30 Days	Probability of Nausea/ Vomiting Within 6 Hours	Percent Expected to Require Hospitalizations	Probability of Death from Excess Cancer (40 Years After Exposure) (See Note 3)
	None Expected	< 1%			< 1%
	Mild -- Nausea -- Vomiting -- Headache	< 1%	< 10%	< 1%	1-2%
	• Lymphocyte Count Drop		< 25%		2-4%
410	• Moderate Vomiting • Diarrhea • Fatigue	≥ 50%	75%		10-15%
1000	Performance Degraded	≥ 99%	10%	100%	n/a
3000	Combat Ineffective	100%	100%	100%	n/a
8000	• Disorientation • Death				

1 rad = 1 cGy
100 rad = 1 Gy

NOTES:

1. The probability of death is without medical treatment and for healthy adults.
2. Burns and/or trauma in combination with radiation injury increases mortality. Personnel with such injuries combined with radiation doses exceeding 100 cGy will likely require prompt medical evaluation. Personnel with combined injuries with doses in excess of 600 cGy are unlikely to survive regardless of medical intervention.
3. US citizens have approximately 41% chance of getting cancer over lifetime, averaging between 37% and 41% based upon race and ethnicity.

Figure D-1. Effects of Radiation Exposure

(b) Radiological Exposure Device. A radioactive source placed to cause injury or death, the placement of which may be covert in order to increase the potential dose.

(4) Military Commodities. Military equipment may contain radioactive sources which, if breached, could present a radiation hazard.

(5) Depleted Uranium. DU is a metal made from uranium hexafluoride, a byproduct of the uranium enrichment process. Although not a likely or significant hazard, DU is a low level radiation source and can be detected with military radiation, detection, indication, and computation (commonly called RADIAC) equipment. Extensive information and guidance on DU is available from the DU Library (http://fhp.osd.mil/du/index.jsp), the US Army Center for Health Promotion and Preventive Medicine (http://chppm-www.apgea.army.mil/), USANCA, the Surgeons General and the Force Health Protection office under the Assistant Secretary of Defense for Health Affairs (http://www.deploymentlink.osd.mil/).

3. Operational Considerations

It is DOD policy to reduce exposures to ionizing radiation associated with DOD operations to a level as low as reasonably achievable (ALARA) consistent with operational risk management. Commanders should consider the risks of ionizing radiation exposure while balancing the requirements of completing military missions. Complying with the principle of ALARA should not introduce other (nonradioactive) risks above those associated with the risks from ionizing radiation exposure.

a. The severity of the effect increases with dose for threshold effects and only happens at relatively high doses. However, the severity of the random effect, normally cancer, is not affected by the dose. For random effects, only the probability of the occurrence is associated directly with dose. There is currently no known threshold below which random effects do not occur; nor on the other hand, is there certainty that a random effect will occur even for higher doses.

b. As part of the risk management process, applying radiation safety principles should not introduce a higher level or more severe risk to the unit or the mission. The highest risk of significant casualties will usually occur from the conventional weapons threat. Increasing conventional risk to achieve the goal of ALARA may result in an increased total risk with higher probability of mission failure. Complete risk management requires the following:

(1) Information. The risk assessment begins with accurate information on the nature of all hazards present in the operational area, to include measurements, visual observations, and modeling.

(2) Justification. During operational decision-making, commanders should consider both threshold and random health consequences of radiation exposure, in addition to other health risks. Unnecessary risks to health should not be accepted.

(3) Optimization. After a mission has been justified, the commander should optimize the plan to minimize the potential effects of all risks that are involved. Optimization can involve reducing the time in a radiation area, maintaining the maximum distance possible from radiation sources, and using shields between exposed personnel and radiation sources to keep radiation exposures as low as reasonably achievable. Optimization also balances the reduction in operational effectiveness and increased time spent in contaminated regions with the protection from varying levels of MOPP or PPE.

c. Commanders should ensure their personnel are informed of the potential health effects of radiation exposure and how to best protect themselves against the threshold and random effects of radiation.

d. The dose contributed by ingestion or inhalation of radioactive material (known as internal dose), by partial body irradiations from gamma-rays, and by skin irradiations from beta-particles cannot be accurately measured in the field. However, such individual doses can be estimated for operational purposes. Depending upon the type of radioactive material and its dispersed form, the combined internal and external dose equivalent may be much larger than the external exposure recorded on a dosimeter. Consequently, respiratory and skin protection must be considered whenever the hazard analysis establishes a potential risk in which the internal exposure, or skin exposure, will cause the commander's OEG to be exceeded. Implementation of respiratory and skin protection controls will be subject to common sense tests of being reasonably achievable and practical for the situation.

4. Responsibilities

a. Operational Commanders

(1) Set the OEG.

(2) Establish guidance for the use of radioprotectants.

b. Staffs

(1) Conduct radiological risk management.

(2) Provide risk and mitigation recommendations to the commander.

(3) Implement medical surveillance program.

(4) Recommend guidance when to use radiotherapeutics.

(5) Collect/archive cumulative dose information, this includes keeping and maintaining radiation exposure status (RES) records. RES is an estimate, indicated by the

categorization symbols R0 – R3 or RES-0 - RES-3 (see Figure D-2), which may be applied to a unit, subunit, or exceptionally, to an individual. It is based on total cumulative dose received from exposure to penetrating radiation. The total cumulative dose is determined by using a tactical dosimeter. If a dosimeter is not used, then the dose can be estimated based on radiation monitoring data and total exposure time. Special advisors should be consulted for acceptable, alternative methods of assessing these exposures. All individuals of the unit or sub-unit are assigned the same dose. If personnel are reassigned, the unit RES is determined by the average dose of the individuals assigned. All personnel who have received radiation exposure during operations should be evaluated by medical personnel, and appropriate entries documented in their individual medical record in accordance with multi-Service TTP and NATO STANAG 2473, *Commanders Guide on Low Level Radiation (LLR) Exposure in Military Operations*. Figure D-2 defines the RES categories as a function of dose receive by the unit and describes the precautions required for units in each of the RES categories.

5. Operational Exposure Guidance

a. The RES provides a convenient method of enabling exchange of information regarding radiation doses. Since RES is directly related to effects of tactical interest, it can be used for estimating the effectiveness of groups (or, in exceptional cases, of individuals) and is considered when planning missions to select units or individuals with appropriate capabilities or skills to ensure mission accomplishment that results in the lowest RES after the mission is completed.

b. Assessing Radiation Hazards

(1) Determining if hazards can be controlled depends on whether the radiological hazards are sufficiently characterized and appropriate controls are in place or can be in place, and sufficient resources exist to protect personnel to a level of risk comparable to occupational standards. Under such conditions commanders should apply the same standards of ionizing radiation protection as would apply to any routine practice involving ionizing radiation exposure and radioactive material as specified in DODI 6055.8, *Occupational Radiation Protection Program.* Military operations may require that dose limits specified in DODI 6055.8 be exceeded in emergency situations and during combat or wartime military operations.

(2) A sufficiently characterized radiological hazard will normally include an evaluation of the environment by a radiation subject matter expert (SME) such as a health physicist or radiation specialist. Characterization normally includes identifying the radionuclide(s) (or ionizing radiation type and half-life of the source), quantifying the dose rate, and determining how the dose rate will change over time. Commanders should consult with available expertise and use available resources to characterize the environment to the best of their ability. Reachback and staff augmentation is available from several sources within each Service and the DTRA, Joint Task Force - Civil Support, and the Armed Forces Radiobiology Research Institute.

RADIATION EXPOSURE STATUS CATEGORIES

Total Cumulative Dose (See Notes 1 & 2)	Radiation Exposure Status (RES) Category	Recommended Actions (Continue Actions from the Previous RES Categories as RES Increases)
0 – 0.05 cGy	R0	• Routine monitoring for early warning of hazard
0.05 – 0.5 cGy	R1A	• Record individual/unit dose readings • Initiate specific mission protocols or goals
0.5 – 5 cGy	R1B	• Initiate radiation survey and continue monitoring
5 – 10 cGy	R1C	• Update survey and continue monitoring • Continue dose control measures • Execute PRIORITY tasks only (see note 3)
10 – 25 cGy	R1D	• Execute CRITICAL tasks only (see note 4) • Medical evaluation recommended upon normally scheduled return to home station
25 – 75 cGy (see note 5)	R1E	• Monitor for acute radiation syndrome symptoms
75 – 125 cGy (see note 5)	R2	• Any further exposure exceeds moderate operational risk
> 125 cGy (see note 5)	R3	• All further exposure will exceed the emergency operational risk

1 rad = 1 cGy

NOTES:

1. Radiation measurement in either centisievert (cSv) or millisievert (mSv) is preferred in all cases. However, due to the fact that the military may only have the capability to measure centigray (cGy) or milligray (mGy), the radiation guidance tables are presented in units of cGy for convenience. For whole body gamma irradiation, 10 mGy = 1 cGy = 1 cSv = 10 mSv.
2. All doses should be kept as low as reasonably achievable. This will reduce individual soldier risk as well as retain maximum operational flexibility for future employment of exposed soldiers.
3. Examples of priority tasks are those that contain the hazard, avert danger to persons or allow the mission to continue without major revisions in the operational plan.
4. Examples of critical tasks are those that save lives or allow continued support that is deemed essential by the operational commander to conduct the mission.
5. Although an upper bound for RES 1E is provided in the table, it is conceivable that doses to personnel could exceed this amount. A low incidence of acute radiation sickness can be expected as whole body doses start to exceed 75 cGy. Personnel exceeding the RES 1E limit should be considered for medical evaluation and evacuation upon any signs or symptoms related to acute radiation sickness (e.g., nausea, vomiting, anorexia, fatigue).

Figure D-2. Radiation Exposure Status Categories

(3) In contrast, environments are uncontrolled when they are uncharacterized, and/or limited resources exist to reduce personnel exposure to ionizing radiation. Under such circumstances, commanders should apply operational risk management to protect personnel to the greatest extent possible. Requirements under these conditions include

ensuring exposures are both justified and ALARA, as well as applying OEGs instead of dose limits.

c. Determine the Radiological Hazard Risk

(1) The first step in assessing the risk in a radiological environment is to determine the potential dose and dose rate from radiological sources that may be encountered during the mission. This will determine the severity of the radiological threat. Next, determine the likelihood to encounter this radiological threat. This will determine the probability. Figures D-3 and D-4 provide severity and probability definitions.

(2) Once the severity and the probability of the hazard are determined, Figure D-5 correlates the two to determine the level of risk associated with the hazard.

d. Setting an OEG

(1) The OEG is set for each platoon or equivalent unit and for each mission. The OEG should be based on the importance of the mission and the acceptable tolerance to ionizing radiation effects in comparison to other risks associated with the mission. During the risk management process a starting point could be to set the OEG at the "low end." As an example, use Figure D-6 to determine OEG and assess the impact to the mission. If there is no foreseeable impact on the mission, then the low end OEG should be appropriate. If not, raise the guidance to the moderate level or high OEG and repeat the process.

(2) The recommended levels for the exposure guidance given in Figure D-6 are low enough that the primary risk is limited to long-term health effects except for a critical mission with an "Extremely High" acceptable risk. This table is intended to guide commanders and their staffs in determining an appropriate OEG. However, based on the mission, operational commanders have the discretion to set any OEG determined to be appropriate (even an OEG greater than 125 centi-Gray per mission).

(3) **Critical** missions are those missions that are essential to the overall success of a higher headquarters' operation, emergency lifesaving missions, or like missions.

(4) **Priority** missions are those missions that avert danger to persons, prevent damage from spreading, or support the organization's mission-essential task list.

(5) **Routine** missions are all other missions that are not designated as priority or critical missions.

(6) In all cases, if following the OEG introduces additional risks and/or hazards otherwise avoidable, a reassessment of the OEG is warranted. It is not reasonable to set the OEG so low that it introduces other more severe and/or unnecessary risks. For example, if the OEG is set so that a route is not usable because of fear of exceeding the OEG and other routes introduce the potential for unnecessary adversary engagement or other significant danger, then reassess the risks, the importance of the mission, and/or increase the OEG.

SEVERITY OF RADIOLOGICAL THREAT

LEVEL OF SEVERITY	MISSION IMPACT	ASSOCIATED POTENTIAL DOSE AND DOSE RATE
CATASTROPHIC	• Expected loss of ability to accomplish mission	• Total dose > 450 cGY • Encounter source/environment with dose rate > 200 cGy/hr
CRITICAL	• Expected significant degradation of mission capabilities in terms of the required mission standard • Inability to accomplish all parts of the mission • Inability to accomplish the mission to standard if hazards occur during the mission	• Total dose > 200 cGy • Encounter source/environment with dose rate > 10 cGy/hr
MARGINAL	• Expected degraded mission capabilities in terms of the required mission standard; Mission capability will be reduced if hazards occur during the mission	• Total dose > 75 cGy • Encounter source/environment with dose rate > 0.5 cGy/hr
NEGLIGIBLE	• Expected effect will have little or no impact on accomplishing the mission	• Total dose > 20 cGy • Encounter source/environment with dose rate > 0.01 cGy/hr

1 rad = 1 cGy

cGy centi-Gray   cGy/hr centi-Gray per hour

Figure D-3. Severity of Radiological Threat

e. Commanders should establish an OEG for the following situations:

(1) All missions with the potential for ionizing radiation exposure.

(2) Units conducting radiological decontamination for personnel or equipment.

(3) Units conducting immediate or operational decontamination.

(a) Unlike chemical or biological agents, radiation will not be neutralized by decontamination. Decontamination will only move the hazard from one surface (bodies,

PROBABILITY OF RADIOLOGICAL THREAT

PROBABILITY OF EVENT	IMPACT ON PERSONNEL
Frequent – 1 in 500	• Expected to occur several times or continuously over the duration of a specific mission
Likely – 1 in 1000	• Expected to occur during a specific mission or at a high rate but intermittently
Occasional – 1 in 10,000	• May occur as often as not during a specific mission • Occurs sporadically
Seldom – 1 in 100,000	• Not expected to occur during a mission • Occurs rarely as isolated incidents
Unlikely	• Occurrence not impossible but can assume will not occur during a mission • Occurs very rarely

Figure D-4. Probability of Radiological Threat

vehicles, etc.) to another (the ground). Removed contaminated clothing and waste water may themselves, under certain conditions, become radiation hazards. Waste water must be controlled to prevent further contamination.

(b) Contaminated clothing and waste water should be treated as radioactive hazards. An appropriate OEG should be set for units conducting thorough decontamination operations (i.e., consider the decontamination operation a separate mission with its own OEG).

(4) Radiological risk management applies to patient movement missions and healthcare providers; however, medical treatment or lifesaving measures take precedence over decontamination efforts.

(a) Mission OEG should be established for medical missions; however, do not deny evacuation or treatment for a contaminated individual to avoid exceeding the OEG for evacuation crews and/or healthcare personnel. It is highly unlikely that a contaminated patient will create a significant radiation hazard for healthcare providers. In most cases, removing the outer layer of clothing will eliminate most of the radioactive contamination.

LEVEL OF RADIOLOGICAL RISK

SEVERITY \ PROBABILITY	FREQUENT	LIKELY	OCCASIONAL	SELDOM	UNLIKELY
Catastrophic	Extremely High	Extremely High	High	High	Moderate
Critical	Extremely High	High	High	Moderate	Low
Marginal	High	Moderate	Moderate	Low	Low
Negligible	Moderate	Low	Low	Low	Low

Figure D-5. Level of Radiological Risk

(b) Treatment of radioactively contaminated casualties triaged as "immediate" should not be delayed for decontamination beyond removal of the outer layer of clothing.

(5) Radiological risk management applies to all ground, air, and sea transportation missions. Risk to the transportation personnel, crew, and the mission requirements are factored into the decision process when setting the OEG. If transporting radioactive material, both the cargo and any other potential ionizing radiation exposure should be evaluated in the risk management process. For radioactively contaminated cargo, the decontamination requirement should be evaluated as part of the risk management process. Depending on the cargo and the mission, the OEG for the crew and transportation personnel may make decontamination unnecessary. Planning for intertheater transportation missions must consider the radiological control requirements at the destination. An intermediate intratheater stop may be required to conform to HN and international transportation requirements.

f. Determining Decontamination Requirements

(1) Immediate or operational decontamination should be completed so that the residual contamination will not result in exceeding the OEG. Once the mission is completed or before beginning a new mission, thorough decontamination may be necessary

RECOMMENDED OPERATIONAL EXPOSURE GUIDE LEVELS

ACCEPTABLE RISK LEVEL / MISSION IMPORTANCE	CRITICAL	PRIORITY	ROUTINE
Extremely High	125	75	25
High	75	25	5
Moderate	25	5	0.5
Low	5	0.5	0.5

NOTE: All doses in cGy [rad]

Figure D-6. Recommended Operational Exposure Guide Levels

to avoid additional exposure and/or exceeding any new OEG and to keep exposure ALARA.

(2) Title 49 Code of Federal Regulations parts 172 and 173, and Nuclear Regulatory Commission Reg. Guide 1.86 provides guidance during peacetime environments for movement, disposal, and release of radiologically contaminated equipment and buildings for unrestricted use.

(3) Up to ten times background (2 microgray/hour) is considered an acceptable operating environment.

6. Other Exposure Guidance

a. Internal Dose:

(1) Can be assessed for likelihood from nasal swabs (if done within one hour post exposure for certain isotopes).

(2) Should be assessed via bioassay as soon as possible.

b. Priority should be given to determining if there is an alpha or beta contamination issue.

(1) Affects internal dose management.

(2) Determines long term MOPP level guidance.

c. Protection of Noncombatants and Dependents.

(1) General criteria for implementing protective actions:

(a) Threshold (i.e., acute) health effects should be avoided.

(b) The risk of delayed effects should not exceed a level that is judged to be adequately protective of health in emergency situations.

(c) Any reduction of risk to public health achievable at acceptable risk should be accomplished.

(d) The risk from a protective action should not exceed the risk associated with the dose that is to be avoided.

(2) Local commanders need to coordinate with local authorities, in accordance with status-of-forces agreements and locally published guidance to establish appropriate guidance for the protection of dependents and noncombatants.

(3) For additional information on intervention levels for the protection of the public in domestic and foreign situations see:

(a) The *National Response Framework* for domestic response guidance and information.

(b) NATO STANAGs and International Atomic Energy Agency safety series documents for foreign operations.

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APPENDIX E
NUCLEAR HAZARD CONSIDERATIONS

1. General

The international security environment encompasses threats from potential adversaries armed with nuclear weapons. This appendix summarizes common effects produced by nuclear weapons, high-energy radiation, and radiological materials to assist combatant and subordinate commanders to plan for and conduct operations in nuclear environments. The effects of radiation exposure described in Appendix D, "Radiological Hazard Considerations," also apply to the residual radiation including fallout from a nuclear explosion.

2. Characteristics of Nuclear Weapons

a. The nature and intensity of the effects of a nuclear detonation depend upon the characteristics of both the weapon and the target and the means of employment, especially the height of burst. The most significant characteristics of a nuclear weapon are its type and yield.

b. **Types of Nuclear Weapons.** Nuclear weapons release enormous amounts of energy liberated from the fission or fusion of atomic nuclei. Fission-based weapons utilize specific isotopes of massive elements, such as uranium or plutonium, as the fuel for the fission reactions. Fission-based weapons are often referred to as gun-type weapons. Because these weapons require a relatively lower level of technological sophistication, they are more likely to be developed or used by under developed nations or terrorist groups. Fusion-based weapons exploit the energy released when the nuclei of light elements, such as isotopes of hydrogen, combine to form more massive nuclei and are often referred to as hydrogen bombs or H-bombs. Fusion-based weapons require very high temperatures to enable fusion reactions and may also be referred to as thermonuclear weapons. Since fusion-based weapons require much greater technological sophistication and are more efficient, more technologically mature nations are likely to adopt this weapon type.

c. **Yield.** The term yield is used to describe the amount of explosive energy released when a nuclear weapon is detonated. A nuclear weapon's yield is measured in units of tons of TNT (trinitrotoluene) that would produce an equivalent explosion. Fission-based weapons are capable of producing yields up to a few hundred kilotons (kTs). Thermonuclear weapons can produce yields in excess of 25 megatons.

3. Nuclear Weapons Effects

a. The effects of a nuclear weapon are largely determined by the medium in which it is detonated. A nuclear weapon may be detonated in space, in the air at high or low altitude, on the surface, below the surface, or under water. Data in this appendix focuses on air bursts.

b. When detonated, a typical nuclear weapon will release its energy as blast, thermal radiation (including X-rays), nuclear radiation (alpha and beta particles, gamma rays, and neurons), and electromagnetic pulse. (Figure E-1 depicts the relative proportions of the radiation products of a air burst nuclear explosion.) When the detonation occurs in the atmosphere, the primary radiation products interact with the surrounding air molecules and are absorbed by matter and scattered as they radiate from the point of detonation. The secondary radiation products, referred to as residual radiation or fallout, produce the preponderance of the radiation hazard and casualties beyond the immediate point of detonation. All of these interactions lead to the five significant effects of a nuclear weapon detonated in the air: blast, thermal radiation, ionizing radiation, EMP, and fallout.

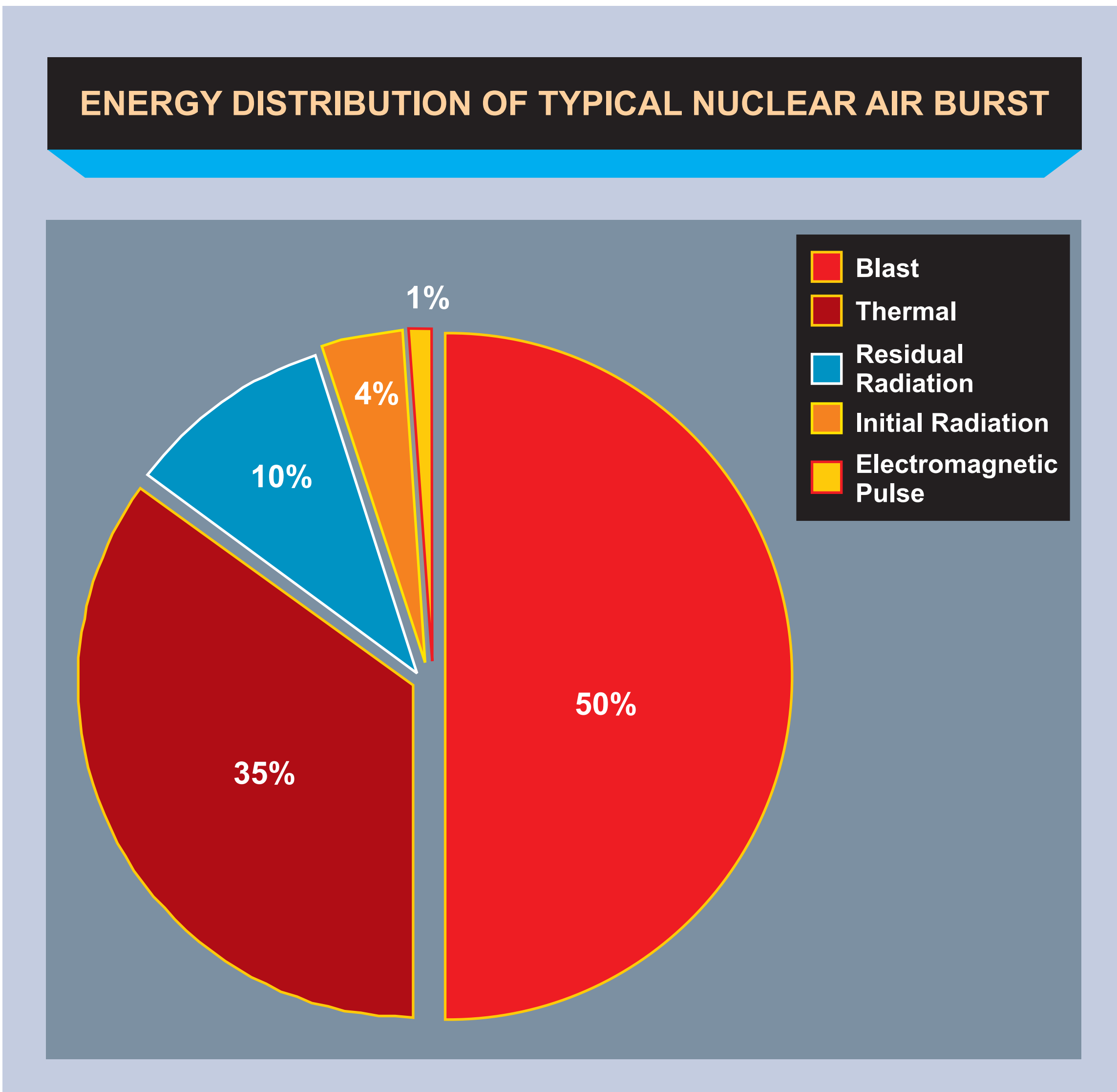

Figure E-1. Energy Distribution of Typical Nuclear Air Burst

For additional technical data, including nuclear weapon employment effects data, contact the USANCA.

c. **Blast.** A low altitude nuclear air burst generates blast waves, high overpressures, and severe winds. These blast effects produce casualties and damage through crushing, bending, tumbling, and breaking. Many of the casualties will be injured from flying debris such as broken glass and rubble. Depending upon a weapon's yield and detonation location, the blast from a nuclear weapon is capable of destroying most of the infrastructure of a major city, including rendering roads impassable; disrupting water, sewer, gas, and phone lines; and destroying medical facilities. Commanders must anticipate these challenges when operating in a nuclear environment.

d. **Thermal Radiation.** The effect of the enormous amount of heat and light released by a nuclear detonation, in certain circumstances, may be more damaging than the blast. The thermal radiation from a multi-megaton weapon can ignite wood, paper, rubber, plastics, and other materials many kilometers away from the detonation point. Because thermal radiation travels at the speed of light, flammable objects within the thermal range and line-of-sight of the blast will ignite immediately. These fires, simultaneously ignited over an area that may exceed 100 square kilometers, could create a firestorm that engulfs the entire area. Even a 10 kT weapon is capable of igniting flammable objects within several hundred meters of its detonation point. Additionally, thermal radiation will cause burns of various degrees to people in the line-of-sight of the explosion. Severe burn victims generally require intensive and sophisticated medical treatment, which may quickly overwhelm available medical support. Leaders must be aware of thermal radiation effects in order to operate in a nuclear environment.

e. **Ionizing Radiation.** Initial radiation produced by a nuclear detonation (x-rays, gamma rays, and neutrons) ionizes material and therefore becomes a significant hazard to personnel and materiel. Acute radiation doses from initial or residual radiation can destroy human cells and lead to severe illness or death. Additionally, intense ionizing radiation can damage objects, including optical, mechanical, and electronic components by altering their physical properties. Gamma rays and neutrons have a long range in the air and are highly penetrating. Consequently, even people inside of buildings and behind opaque objects will receive some radiation dose.

f. **Potassium iodide** may be used to protect the thyroid from radioactive iodine in the event of an accident or attack at a nuclear power plant, or other nuclear attack, especially where volatile radionuclides, which contain significant amounts of Iodine 131, are released into the environment. Radioiodine is a dangerous radionuclide because the body concentrates it in the thyroid gland. Potassium iodide cannot protect against other causes of radiation poisoning, nor provide protection against a *dirty bomb* unless it contains radioactive iodine.

g. **Electromagnetic Pulse.** The interaction of gamma radiation with the atmosphere can cause a short pulse of electric and magnetic fields that may damage and interfere with the operation of electrical and electronic equipment and can cause widespread disruption.

The effects of EMP can extend to hundreds of kilometers depending on the height and yield of the nuclear burst. HEMP can generate significant disruptive field strengths over a continental-size area. The portion of the frequency spectrum most affected by EMP and HEMP is the communications band.

h. **Fallout.** Fallout is the residual radiation product distributed into the atmosphere by a nuclear detonation. High-altitude bursts produce essentially no local fallout. For many weapon designs, low-altitude bursts in which the fireball does not touch the ground will very often produce little, in some cases negligible, amounts of fallout. All nuclear detonations close enough to the surface for the fireball to touch the ground produce very large amounts of radioactive debris that will be drawn up into the atmosphere and be deposited locally and dispersed downwind. Although the localized fallout will typically only be hazardous to human occupation for several weeks, some areas could remain hazardous for years. Radiological surveys will be needed to identify and characterize such areas. Localized fallout may severely limit military operations within a contaminated area. Civilian and military facilities and resources will most likely be overwhelmed by the requirements for fallout casualty decontamination, processing, and treatment. Additionally, decontamination, identification, and interment of remains are formidable challenges for commanders to overcome.

4. Protective Actions

a. Protective actions taken before an attack are most effective for individual survivability and unit effectiveness and may include clothing (one or two layers of loose, light colored clothing can reduce burns), terrain selection (use of reverse slopes), dispersion, and sheltering (use of depressions, culverts, caves, bunkers, and obstructions). Education and training of leaders, staffs, and individuals on nuclear weapons effects and the principles of operations in CBRN environments can significantly enhance operational effectiveness in the event of nuclear attack.

b. Commanders operating in radiological and nuclear environments must minimize and control the exposure of their personnel to radiation. As described in Appendix D, "Radiological Hazard Considerations," an OEG must be established for all military operations.

See Appendix D, "Radiological Hazard Considerations," for further information on setting the OEG, RES categories, military radiation exposure states, and risk criteria.

APPENDIX F
TREATY, LEGAL, AND POLICY CONSIDERATIONS

1. General

This appendix contains brief descriptions of treaty, legal, and policy strictures on proliferation, testing, possession, and employment of CBRN weapons. While the United States adheres to these strictures, a number of potential adversaries may not. Combatant and subordinate commanders will plan appropriate CBRN PIRs and include treaty, legal, and policy considerations relating to CBRN in their JIPOE process. Additionally, they will make periodic assessments of potential adversary CBRN capabilities including potential violations of international agreements to which the adversary may be party.

2. Nuclear Weapons

a. The employment of nuclear weapons by the United States is governed by the current *Nuclear Weapons Employment Policy*. The United States is party to treaties and international agreements that limit proliferation, testing, and possession of nuclear weapons. The affected commander must consult the Department of State's compilation titled *Treaties in Force* to confirm the signature, ratification, and entry into force of these instruments. The following paragraphs contain a brief description of some of the major treaties governing nuclear weapons. The list is not exhaustive and may not include additional protocols, amendments, implementing agreements, or policies related thereto. Affected commanders should consult with appropriate DOD SMEs for relevant interagency coordination and for the latest updates to applicable policies and agreements.

b. The *Treaty on the Non-Proliferation of Nuclear Weapons* entered into force on 5 March 1970. It binds states/parties to prevent the spread of nuclear weapons. The parties to the treaty agree not to transfer, assist, or encourage the manufacture of nuclear weapons or nuclear weapons technology. The United States ratified this treaty on 24 November 1969. On 4 June 1990, the United States and the Soviet Union issued the *Joint Statement on Non-Proliferation*, in which both reaffirmed their commitment to nonproliferation and, specifically, to the *Treaty on the Non-Proliferation of Nuclear Weapons*.

c. The *Strategic Arms Reduction Treaty between the United States and Russia* establishes limits on the number and type of strategic offensive forces.

d. The *Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water* (Limited Test Ban Treaty) entered into force on 10 October 1963. It limits states parties' testing of nuclear devices. The United States ratified this treaty on 7 October 1963.

e. The *Treaty between the United States of America and the Russian Federation on Strategic Offensive Reductions* establishes limits on operationally-deployed strategic nuclear warheads.

f. The *Comprehensive Nuclear Test-Ban Treaty*, which would preclude any nuclear weapon test explosion or any other nuclear explosion, has not entered into force. While the United States signed this treaty on 24 September 1996, the Senate voted against ratification on 13 October 1999. The United States voluntarily observes a moratorium on nuclear weapon test explosions.

g. There are several treaties seeking to prohibit the presence or use of nuclear weapons in defined geographic regions. Except for the *Antarctic Treaty*, which among its provisions prohibits any nuclear explosions or disposal of radioactive waste in Antarctica, the United States is not a party to any of them. The United States ratified the *Antarctica Treaty* on 18 August 1960 and the treaty entered into force on 23 June 1961. With respect to these other treaties, while the United States is not a party to the treaties, the United States has signed and in one case ratified certain of their protocols. For instance, the United States has signed and ratified, subject to understandings and declarations, Additional Protocols I and II to the *Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean* (Treaty of Tlatelolco). The United States has signed but not ratified Protocols I and II to the *African Nuclear-Weapons-Free Zone Treaty*, and the three protocols to the *South Pacific Nuclear Free Zone Treaty* (Treaty of Rarotonga).

h. The *Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Sea-Bed and the Ocean Floor or in the Subsoil Thereof* (Sea-Bed Treaty) entered into force on 18 May 1972. It precludes the placement of nuclear weapons and other weapons as well as structures, launching installations or any other facilities specifically designed for storing, testing, or using such weapons, on the seabed. The United States ratified this treaty on 26 April 1972.

i. The *Convention on the Physical Protection of Nuclear Materials* entered into force on 8 February 1987. It provides for certain levels of physical protection during international transport of nuclear materials and provides a framework for cooperation in the protection, recovery, and return of stolen nuclear material. The United States ratified the treaty on 4 September 1981.

3. Biological and Chemical Weapons

a. **General.** The Office of the Under Secretary of Defense (Policy) and the Under Secretary of Defense for Acquisition, Technology, and Logistics are principally responsible for implementing DOD policy and conducting appropriate interagency coordination for biological and chemical weapons matters. Affected commanders should continuously consult with applicable DOD biological and chemical weapons SMEs for updated policy guidance.

b. **Biological Weapons.** Under the terms of the *Convention on the Prohibition of Bacteriological and Toxic Weapons* (also know as the Biological Weapons Convention [BWC]), (ratified by the US on 29 March 1975), parties undertake not to develop, produce, or acquire biological agents or toxins "of types and in quantities that have no justification for prophylactic, protective, and other peaceful purposes," as well as weapons and means of delivery. The BWC does not establish a specific verification regime. Prior to the BWC, restrictions on the use of biological and chemical weapons were established in the aftermath of World War I.

(1) The *Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous, or other Gases and Bacteriological Methods of Warfare*, also known as the Geneva Protocol of 1925, prohibits chemical and bacteriological methods of warfare. Most parties interpret the protocol as a prohibition only of the first use of these agents in war. It did not ban the development, production, and stockpiling of these weapons.

(a) In 1974, the US Senate gave advice and consent to ratification of this protocol subject to the reservation that the United States would not be bound by the provisions with respect to an adversary state or its allies who fail to respect the prohibitions of the protocol.

(b) On 22 January 1975, the United States ratified the protocol subject to this reservation. The protocol entered into force for the United States on 10 April 1975.

(c) The relevance of the Geneva Protocol is largely superseded by the more restrictive *Convention on the Prohibition of the Development, Production, Stockpiling, and Use of Chemical Weapons and their Destruction* (also known as the Chemical Weapons Convention [CWC]), summarized below.

(2) The *Presidential Statement on Chemical and Biological Weapons*, 25 November 1969, renounced the use by the United States of lethal biological agents and weapons and confined biological research to defensive measures such as immunization and safety. It also reaffirmed the renunciation of first use of chemical weapons and extended the renunciation to first use of incapacitating chemicals.

c. **Chemical Weapons**

(1) The CWC, which entered into force on 26 April 1997, bans the acquisition, development, production, transfer, and use of chemical weapons. It prohibits the use of RCAs as a method of warfare. It provides for the destruction of all chemical weapons stocks and production facilities within 10 years after entry into force. It contains a vigorous challenge regime to ensure compliance. The United States ratified the CWC on 25 April 1997.

See Chemical Weapons Convention Implementation Act of 1998*, codified as Title 22, United States Code, Section 6701 and Executive Order 13128 of June 25, 1999.*

(2) Executive Order No. 11850, 8 April 1975, *Renunciation of Certain Uses in War of Chemical Herbicides and Riot Control Agents*, renounced first use of herbicides in war (except for specified defensive uses) and first use of RCAs in war except for defensive military modes to save lives.

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APPENDIX G
REFERENCES

The development of JP 3-11 is based upon the following primary references:

1. Strategic Guidance and Policy

a. National Security Presidential Directive (NSPD)-17/Homeland Security Presidential Directive (HSPD)-4, *National Strategy to Combat Weapons of Mass Destruction.*

b. NSPD-33/HSPD-10, *Biodefense for the 21st Century*.

c. HSPD-5, *Management of Domestic Incidents.*

d. HSPD-8, *National Preparedness.*

e. HSPD-18, *Medical Countermeasures Against Weapons of Mass Destruction.*

f. NSPD-46, *National Policy for Combating Terrorism*.

g. *National Response Framework*.

h. *National Strategy for Homeland Security.*

i. *National Security Strategy.*

j. *National Defense Strategy of the USA*.

k. *National Military Strategy.*

l. *National Military Strategy to Combat Weapons of Mass Destruction.*

m. Presidential Decision Directive/National Security Council 60, *Nuclear Weapons Employment Policy Guidance.*

n. *Strategy for Homeland Defense and Civil Support.*

2. Department of Defense Publications

a. DOD Directive (DODD) 2000.12, *DOD Antiterrorism Program*.

b. DODD 3025.1, *Military Support to Civil Authorities.*

c. DODD 3025.15, *Military Assistance to Civil Authorities.*

d. DODD 3150.8, *DOD Response to Radiological Accidents.*

e. DOD 4500.54-G*, Department of Defense Foreign Clearance Guide*.

f. DODD 5100.46, *Foreign Disaster Relief.*

g. DODI 2000.18, *Department of Defense Installation Chemical, Biological, Radiological, Nuclear, and High-Yield Explosive Emergency Response Guidelines*.

h. DODI 2000.21, *Foreign Consequence Management (FCM).*

i. DODI 6055.1, *DOD Safety and Occupational Health (SOH) Program.*

j. DODI 6055.8, *Occupational Radiation Protection Program.*

k. DODI 6490.03, *Deployment Health.*

l. Armed Forces Radiobiology Research Institute, *Medical Management of Radiological Casualties*.

3. Chairman of the Joint Chiefs of Staff Publications

a. CJCS Concept Plan 0500, *Military Assistance to Domestic Consequence Management Operations in Response to a Chemical, Biological, Radiological, Nuclear, or High-Yield Explosives Situation.*

b. CJCS Instruction (CJCSI) 2030.01B, *Chemical Weapons Convention Compliance Policy Guidance.*

c. CJCSI 2700.01B, *International Military Agreements for Rationalization, Standardization, and Interoperability Between the United States, Its Allies, and Other Friendly Nations*.

d. CJCSI 3110.16A, *Military Capabilities, Assets, and Units for Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives Consequence Management Operations*.

e. CJCSI 3125.01A, *Military Assistance to Domestic Consequence Management Operations in Response to a Chemical, Biological, Radiological, Nuclear, or High-Yield Explosive Situation*.

f. CJCSI 3214.01C, *Military Support to Foreign Consequence Management Operations for Chemical, Biological, Radiological, and Nuclear Incidents*.

g. CJCSI 3431.01B*, Joint Nuclear Accident and Incident Response Team*.

h. CJCSI 5120.02A, *Joint Doctrine Development System.*

i. CJCS Manual (CJCSM) 3122.01A, *Joint Operation Planning and Execution System (JOPES) Volume I: (Planning Policies and Procedures)*.

j. CJCSM 3122.03, *Joint Operation Planning and Execution System (JOPES), Volume II, Planning Formats.*

4. Joint Publications

a. JP 1, *Doctrine for the Armed Forces of the United States.*

b. JP 1-0, *Personnel Support to Joint Operations.*

c. JP 1-02, *Department of Defense Dictionary of Military and Associated Terms.*

d. JP 1-05, *Religious Support in Joint Operations.*

e. JP 2-0, *Joint Intelligence.*

f. JP 2-01.3 *Joint Intelligence Preparation of the Operational Environment.*

g. JP 3-0, *Joint Operations.*

h. JP 3-08, *Interagency, Intergovernmental Organization, and Nongovernmental Organization Coordination During Joint Operations*.

i. JP 3-10, *Joint Security Operations in Theater.*

j. JP 3-13, *Information Operations.*

k. JP 3-27, *Homeland Defense.*

l. JP 3-28*, Civil Support.*

m. JP 3-29, *Foreign Humanitarian Assistance*.

n. JP 3-33, *Joint Task Force Headquarters.*

o. JP 3-35, *Deployment and Redeployment Operations.*

p. JP 3-40, *Combating Weapons of Mass Destruction.*

q. JP 3-41, *Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives Consequence Management*.

r. JP 4-0, *Joint Logistics*.

s. JP 4-02, *Health Service Support*.

t. JP 4-06, *Mortuary Affairs in Joint Operations*.

u. JP 5-0, *Joint Operation Planning*.

v. JP 6-0, *Joint Communications System.*

5. Multi-Service Publications

a. FM 3-05.105/NTTP 3-11.30/AFTTP(I) 3-2.35, *Multi-Service Tactics, Techniques, and Procedures (MTTP) for Special Operations Forces in Nuclear, Biological, and Chemical Environments*, (FOUO).

b. FM 3-11/MCWP 3-37.1/Naval Warfare Publication (NWP) 3-11/AFTTP(I) 3-2.42, *MTTP for Nuclear, Biological, and Chemical Defense Operations.*

c. FM 3-11.3/MCRP 3-37.2A/NTTP 3-11.25/AFTTP(I) 3-2.56, *MTTP for CBRN Contamination Avoidance.*

d. FM 3-11.4/MCWP 3-37.2/NWP 3-11.27/AFTTP(I) 3-2.46, *MTTP for NBC Protection*.

e. FM 3-11.5/MCWP 3-37.3/NWP 3-11.26/AFTTP(I) 3-2.60, *MTTP for CBRN Decontamination*.

f. FM 3-11.9/MCRP 3-37.1B/Navy Tactical Reference Publication (NTRP) 3-11.32/AFTTP (I) 3-2.55, *Potential Military Chemical/Biological Agents and Compounds.*

g. FM 3-11.14/MCRP 3-37.1A/NTTP 3-11.28/AFTTP 3-2.54, *MTTP for NBC Vulnerability Assessment.*

h. FM 3-11.19/MCWP 3-37.4/NTTP 3-11.29/AFTTP(I) 3-2.44, *MTTP for NBC Reconnaissance.*

i. FM 3-11.21/MCRP 3-37.2C/NTTP 3-11.24/AFTTP(I) 3-2.27, *MTTP for CBRN Consequence Management Operations.*

j. FM 3-11.34/MCWP 3-37.5/NTTP 3-11.23/AFTTP(I) 3-2.33, *MTTP for Intallation CBRN Defense.*

k. FM 3-11.86/MCRP 3-37.1C/NTTP 3-11.31/AFTTP(I) 3-2.52, *Multi-Service Tactics, Techniques, and Procedures for Biological Surveillance*.

l. FM 4-02.283/MCRP 4-11.1B/NTRP 4-02.21/Air Force Manual (AFMAN) 44-161(I), *Treatment of Nuclear and Radiological Casualties*.

m. FM 8-284/MCRP 4-11.1C/NTRP 4-02.23/AFMAN (I) 44-156, *Treatment of Biological Warfare Agent Casualties*.

n. FM 4-02.285/MCRP 4-11.1A/NTRP 4-02.22/AFTTP(I) 3-2.69, *Multi-Service Tactics, Techniques, and Procedures for Treatment of Chemical Agent Casualties and Conventional Military Chemical Injuries.*

6. Army Publications

a. US Army Center for Health Promotion and Preventive Medicine Tech Guide 244, *The Medical NBC Battlebook*.

b. USAMRIID, *Medical Management of Biological Casualties Handbook.*

c. US Army Medical Research Institute of Chemical Defense, *Medical Management of Chemical Casualties Handbook.*

d. FM 3-11.22, *Weapons of Mass Destruction Civil Support Team Tactics, Techniques, and Procedures*.

e. FM 3-90.15, *Sensitive Site Exploitation*.

f. FM 4-02.7, *Health Service Support in a Nuclear, Biological, and Chemical Environment Tactics, Techniques, and Procedures*.

7. US Air Force Publications

a. Air Force Doctrine Document 2-1.8, *Counter-Chemical, Biological, Radiological, and Nuclear Operations.*

b. Air Force Instruction (AFI) 10-2501, *Air Force Emergency Management (Em) Program Planning And Operations.*

c. AFI 10-2603, *Emergency Health Powers On Air Force Installation.*

d. AFI 10-2604, *Disease Containment Planning Guidance.*

e. AFMAN 10-100, *Airman's Manual.*

f. AFMAN 10-2502, Volume 1, *AF Emergency Management Program Standards and Procedures*; AFMAN 10-2502, Volume 2, *Major Accident, Hazardous Material, and Natural Disaster Standards and Procedures*; AFMAN 10-2502, Volume 3, *Contingency/ Wartime Enemy Attack with Chemical, Biological, Radiological, Nuclear, and High-Yield*

Explosive (CBRNE) Weapons and Terrorist Use of CBRNE Materials Standards and Procedures.

8. US Navy and Marine Corps Publications

a. Naval Air 00-80T-121, *Chemical and Biological Naval Air Training and Operating Procedures Standardization (NATOPS).*

b. NTTP 3-20.21, *Surface Ship Survivability.*

c. NTTP 3-20.31.470, *Shipboard Biological Warfare/Chemical Warfare Defense and Countermeasures.*

d. MCWP 3-37, *Marine Air-Ground Task Force (MAGTF) NBC Defense Operations.*

9. Multinational Documents and Publications

a. *Emergency Response Guidebook 2008*.

b. NATO STANAG 2909, *Commander's Guidance on Defensive Measures Against Toxic Industrial Chemicals (TIC).*

c. NATO AMedP-6(C) Volume 1, *NATO Handbook on the Medical Aspects of NBC Defensive Operations (Nuclear).*

d. NATO AMedP-6(C) Volume 2, *NATO Handbook on the Medical Aspects of NBC Defensive Operations (Biological).*

e. NATO AMedP-6(C) Volume 3, *NATO Handbook on the Medical Aspects of NBC Defensive Operations (Chemical).*

f. Allied Engineering Publication-7, *Chemical, Biological, Radiological, and Nuclear (CBRN) Defense Factors in the Design, Testing, and Acceptance of Military Equipment,* (Edition 5).

APPENDIX H
ADMINISTRATIVE INSTRUCTIONS

1. User Comments

Users in the field are highly encouraged to submit comments on this publication to: Commander, United States Joint Forces Command, Joint Warfighting Center, ATTN: Joint Doctrine Group, 116 Lake View Parkway, Suffolk, VA 23435-2697. These comments should address content (accuracy, usefulness, consistency, and organization), writing, and appearance.

2. Authorship

The lead agent for this publication is the US Army. The Joint Staff doctrine sponsor for this publication is the Director for Strategic Plans and Policy (J-5).

3. Supersession

This publication supersedes JP 3-11, 11 July 2000, *Joint Doctrine for Operations in Nuclear, Biological, and Chemical (NBC) Environments*.

4. Change Recommendations

a. Recommendations for urgent changes to this publication should be submitted:

TO: JOINT STAFF WASHINGTON DC//DAMO-FDQ
INFO: JOINT STAFF WASHINGTON DC//J7-JEDD//
CDRUSJFCOM SUFFOLK VA//JT10//

Routine changes should be submitted electronically to Commander, Joint Warfighting Center, Joint Doctrine Group and info the Lead Agent and the Director for Operational Plans and Joint Force Development J-7/JEDD via the CJCS JEL at http://www.dtic.mil/doctrine.

b. When a Joint Staff directorate submits a proposal to the Chairman of the Joint Chiefs of Staff that would change source document information reflected in this publication, that directorate will include a proposed change to this publication as an enclosure to its proposal. The Military Services and other organizations are requested to notify the Joint Staff J-7 when changes to source documents reflected in this publication are initiated.

c. Record of Changes:

CHANGE NUMBER	COPY NUMBER	DATE OF CHANGE	DATE ENTERED	POSTED BY	REMARKS

5. Distribution of Publications

Local reproduction is authorized and access to unclassified publications is unrestricted. However, access to and reproduction authorization for classified joint publications must be in accordance with DOD Regulation 5200.1-R, *Information Security Program*.

6. Distribution of Electronic Publications

a. Joint Staff J-7 will not print copies of JPs for distribution. Electronic versions are available on JDEIS at https://jdeis.js.mil (NIPRNET), and https://jdeis.js.smil.mil (SIPRNET) and on the JEL at http://www.dtic.mil/doctrine (NIPRNET).

b. Only approved joint publications and joint test publications are releasable outside the combatant commands, Services, and Joint Staff. Release of any classified joint publication to foreign governments or foreign nationals must be requested through the local embassy (Defense Attaché Office) to DIA Foreign Liaison Office, PO-FL, Room 1E811, 7400 Pentagon, Washington, DC 20301-7400.

c. CD-ROM. Upon request of a JDDC member, the Joint Staff J-7 will produce and deliver one CD-ROM with current joint publications.

GLOSSARY
PART I - ABBREVIATIONS AND ACRONYMS

AE	aeromedical evacuation
AFI	Air Force instruction
AFMAN	Air Force manual
AFMIC	Armed Forces Medical Intelligence Center
AFTTP(I)	Air Force tactics, techniques, and procedures (instruction)
ALARA	as low as reasonably achievable
AMedP	Allied Medical Publication
AOI	area of interest
AOR	area of responsibility
APOD	aerial port of debarkation
BW	biological warfare
BWC	Biological Weapons Convention
C2	command and control
CBRN	chemical, biological, radiological, and nuclear
CCDR	combatant commander
CJCS	Chairman of the Joint Chiefs of Staff
CJCSI	Chairman of the Joint Chiefs of Staff instruction
CJCSM	Chairman of the Joint Chiefs of Staff manual
COA	course of action
COLPRO	collective protection
CONUS	continental United States
CWC	Chemical Weapons Convention
DOD	Department of Defense
DODD	Department of Defense directive
DODI	Department of Defense instruction
DTRA	Defense Threat Reduction Agency
DU	depleted uranium
EMP	electromagnetic pulse
FM	field manual (Army)
FP	force protection
GCC	geographic combatant commander
HEMP	high-altitude electromagnetic pulse
HN	host nation
HNS	host-nation support
HSPD	homeland security Presidential directive
HSS	health service support
IGO	intergovernmental organization

IO	information operations
IPE	individual protective equipment
ISR	intelligence, surveillance, and reconnaissance
JFC	joint force commander
JIPOE	joint intelligence preparation of the operational environment
JMAO	joint mortuary affairs office
JMETL	joint mission-essential task list
JP	joint publication
JSA	joint security area
JSC	joint security coordinator
kph	kilometers per hour
kt	kiloton
MADCP	mortuary affairs decontamination collection point
MCRP	Marine Corps reference publication
MCWP	Marine Corps warfighting publication
MHE	materials handling equipment
MOPP	mission-oriented protective posture
MSC	Military Sealift Command
MSR	main supply route
MTF	medical treatment facility
MTTP	multi-Service tactics, techniques, and procedures
NATO	North Atlantic Treaty Organization
NEO	noncombatant evacuation operation
NGO	nongovernmental organization
NSPD	national security Presidential directive
NTRP	Navy tactical reference publication
NTTP	Navy tactics, techniques, and procedures
NWP	Naval warfare publication
OEG	operational exposure guide
OGA	other government agency
OPSEC	operations security
PA	public affairs
PHEO	public health emergency officer
PIR	priority intelligence requirement
POD	port of debarkation
POE	port of embarkation
PPE	personal protective equipment
PSS	personnel services support
PVNTMED	preventive medicine

RCA	riot control agent
RDD	radiological dispersal device
RED	radiological exposure device
RES	radiation exposure status
ROE	rules of engagement
ROM	restriction of movement
RSE	retrograde support element
RSOI	reception, staging, onward movement, and integration
SecDef	Secretary of Defense
SME	subject matter expert
SOF	special operations forces
SPOD	seaport of debarkation
STANAG	standardization agreement (NATO)
TIB	toxic industrial biological
TIC	toxic industrial chemical
TIM	toxic industrial material
TIR	toxic industrial radiological
TTP	tactics, techniques, and procedures
USAMRIID	United States Army Medical Research Institute of Infectious Diseases
USANCA	United States Army Nuclear and Combating Weapons of Mass Destruction Agency
USTRANSCOM	United States Transportation Command
VEE	Venezuelan equine encephalitis
WMD	weapons of mass destruction

PART II — TERMS AND DEFINITIONS

Unless otherwise annotated, this publication is the proponent for all terms and definitions found in the glossary. Upon approval, JP 1-02, *Department of Defense Dictionary of Military and Associated Terms*, will reflect this publication as the source document for these terms and definitions.

absorbed dose. None. (Approved for removal from JP 1-02.)

acute radiation dose. Total ionizing radiation dose received at one time and over a period so short that biological recovery cannot occur. (1-02. SOURCE: JP 3-11)

acute radiation syndrome. An acute illness caused by irradiation of the body by a high dose of penetrating radiation in a very short period of time. Also called ARS. (1-02. SOURCE: JP 3-11)

aerosol. None. (Approved for removal from JP 1-02.)

avoidance. None. (Approved for removal from JP 1-02.)

binary chemical munition. None. (Approved for removal from JP 1-02.)

biological agent. A microorganism that causes disease in personnel, plants, or animals or causes the deterioration of materiel. (JP 1-02. SOURCE: JP 3-11)

biological ammunition. None. (Approved for removal from JP 1-02.)

biological defense. None. (Approved for removal from JP 1-02.)

biological environment. None. (Approved for removal from JP 1-02.)

biological hazard. An organism, or substance derived from an organism, that poses a threat to human or animal health. This can include medical waste, samples of a microorganism, virus, or toxin (from a biological source) that can impact human health. (JP 1-02. SOURCE: JP 3-11) (Approved for inclusion in JP 1-02.)

biological operation. None. (Approved for removal from JP 1-02.)

biological threat. None. (Approved for removal from JP 1-02.)

biological warfare. Employment of biological agents to produce casualties in personnel or animals, or damage to plants or materiel; or defense against such employment. (JP 1-02; JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

biological weapon. An item of materiel which projects, disperses, or disseminates a biological agent including arthropod vectors. (JP 1-02. SOURCE: JP 3-11)

blister agent. A chemical agent which injures the eyes and lungs, and burns or blisters the skin. Also called vesicant agent. (JP 1-02. SOURCE: JP 3-11)

blood agent. A chemical compound, including the cyanide group, that affects bodily functions by preventing the normal utilization of oxygen by body tissues. (JP 1-02; JP 3-11)

centigray. A unit of absorbed dose of radiation (one centigray equals one rad). (JP 1-02. SOURCE: JP 3-11)

chemical agent. A chemical substance which is intended for use in military operations to kill, seriously injure, or incapacitate mainly through its physiological effects. The term excludes riot control agents when used for law enforcement purposes, herbicides, smoke, and flames. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

chemical ammunition. None. (Approved for removal from JP 1-02.)

chemical ammunition cargo. None. (Approved for removal from JP 1-02.)

chemical, biological, and radiological operation. None. (Approved for removal from JP 1-02.)

chemical, biological, radiological, and nuclear defense. Measures taken to minimize or negate the vulnerabilities and/or effects of a chemical, biological, radiological, or nuclear incident. Also called CBRN defense. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

chemical, biological, radiological, and nuclear environment. Conditions found in an area resulting from immediate or persisting effects of chemical, biological, radiological, or nuclear attacks or unintentional releases. Also called CBRN environment. (JP 1-02; JP 3-11) (Approved for inclusion in JP 1-02.)

chemical, biological, radiological, and nuclear hazard. Chemical, biological, radiological, and nuclear elements that could cause an adverse affect through their accidental or deliberate release, dissemination, or impacts. Also called CBRN hazard. (JP 1-02. SOURCE: JP 3-11) (Approved for inclusion in JP 1-02.)

chemical, biological, radiological, and nuclear protection. Measures that are taken to keep chemical, biological, radiological, and nuclear threats and hazards from having an adverse effect on personnel, equipment, or critical assets and facilities. Also called CBRN protection. (JP 1-02. SOURCE: JP 3-11) (Approved for inclusion in JP 1-02.)

chemical, biological, radiological, and nuclear sense. Activities that continually provide chemical, biological, radiological, and nuclear threat and hazard information and intelligence in a timely manner to support the common operational picture. Also called CBRN sense. (JP 1-02. SOURCE: JP 3-11) (Approved for inclusion in JP 1-02.)

chemical, biological, radiological, and nuclear shape. The command and control activity that integrates the sense, shield, and sustain operational elements to characterize chemical, biological, radiological, and nuclear hazards and threats and employ necessary capabilities to counter their effects. Also called CBRN shape. (JP 1-02. SOURCE: JP 3-11) (Approved for inclusion in JP 1-02.)

chemical, biological, radiological, and nuclear shield. Individual and collective protection measures essential to mitigating the effects of chemical, biological, radiological, and nuclear hazards. Also called CBRN shield. (JP 1-02. SOURCE: JP 3-11) (Approved for inclusion in JP 1-02.)

chemical, biological, radiological, and nuclear sustain. The decontamination and medical activities to restore combat power and continue operations. Also called CBRN sustain. (JP 1-02. SOURCE: JP 3-11) (Approved for inclusion in JP 1-02.)

chemical, biological, radiological, or nuclear incident. Any occurrence, resulting from the use of chemical, biological, radiological and nuclear weapons and devices; the emergence of secondary hazards arising from counterforce targeting; or the release of toxic industrial materials into the environment, involving the emergence of chemical, biological, radiological and nuclear hazards. (JP 1-02. SOURCE: JP 3-11) (Approved for inclusion in JP 1-02.)

chemical, biological, radiological, or nuclear weapon. A fully engineered assembly designed for employment to cause the release of a chemical or biological agent or radiological material onto a chosen target or to generate a nuclear detonation. Also called CBRN weapon. (JP 1-02. SOURCE: JP 3-11) (Approved for inclusion in JP 1-02.)

chemical contamination. None. (Approved for removal from JP 1-02.)

chemical defense. None. (Approved for removal from JP 1-02.)

chemical environment. None. (Approved for removal from JP 1-02.)

chemical hazard. Any chemical manufactured, used, transported, or stored which can cause death or other harm through toxic properties of those materials. This includes chemical agents and chemical weapons (prohibited under the Chemical Weapons Convention), as well as toxic industrial chemicals and toxic industrial materials. (JP 1-02. SOURCE: JP 3-11) (Approved for inclusion in JP 1-02.)

chemical operation. None. (Approved for removal from JP 1-02.)

chemical warfare. All aspects of military operations involving the employment of lethal and incapacitating munitions/agents and the warning and protective measures associated with such offensive operations. Since riot control agents and herbicides are not considered to be chemical warfare agents, those two items will be referred to separately or under the broader term "chemical," which will be used to include all types of chemical munitions/agents collectively. Also called CW. (JP 1-02. SOURCE: JP 3-11)

chemical weapon. Together or separately, (a) a toxic chemical and its precursors, except when intended for a purpose not prohibited under the Chemical Weapons Convention; (b) a munition or device, specifically designed to cause death or other harm through toxic properties of those chemicals specified in (a), above, which would be released as a result of the employment of such munition or device; (c) any equipment specifically designed for use directly in connection with the employment of munitions or devices specified in (b), above. (JP 1-02. SOURCE: JP 3-11)

clearance decontamination. The final level of decontamination that provides the decontamination of equipment and personnel to a level that allows unrestricted transportation, maintenance, employment, and disposal. (JP 1-02. SOURCE: JP 3-11) (Approved for inclusion in JP 1-02.)

collective nuclear, biological, and chemical protection. None. (Approved for removal from JP 1-02.)

collective protection. The protection provided to a group of individuals which permits relaxation of individual chemical, biological, radiological, and nuclear protection. Also called COLPRO. (JP 1-02. SOURCE: JP 3-11) (Approved for inclusion in JP 1-02.)

contaminate. None. (Approved for removal from JP 1-02.)

contaminated remains. Remains of personnel which have absorbed or upon which have been deposited radioactive material, or biological or chemical agents. (JP 1-02. SOURCE: JP 4-06)

contamination. 1. The deposit, absorption, or adsorption of radioactive material, or of biological or chemical agents on or by structures, areas, personnel, or objects. See also fallout; residual radiation. 2. Food and/or water made unfit for consumption by humans or animals because of the presence of environmental chemicals, radioactive elements, bacteria or organisms, the byproduct of the growth of bacteria or organisms, the decomposing material (to include the food substance itself), or waste in the food or water. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

contamination avoidance. Individual and/or unit measures taken to reduce the effects of chemical, biological, radiological, and nuclear hazards. (JP 1-02. SOURCE: JP 3-11) (Approved for inclusion in JP 1-02.)

contamination control. A combination of preparatory and responsive measures designed to limit the vulnerability of forces to chemical, biological, radiological, nuclear, and toxic industrial hazards and to avoid, contain, control exposure to, and, where possible, neutralize them. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

decontamination. The process of making any person, object, or area safe by absorbing, destroying, neutralizing, making harmless, or removing chemical or biological agents, or by removing radioactive material clinging to or around it. (JP 1-02. SOURCE: JP 3-11)

detection. 1. In tactical operations, the perception of an object of possible military interest but unconfirmed by recognition. 2. In surveillance, the determination and transmission by a surveillance system that an event has occurred. 3. In arms control, the first step in the process of ascertaining the occurrence of a violation of an arms control agreement. 4. In chemical, biological, radiological, and nuclear environments, the act of locating chemical, biological, radiological, and nuclear hazards by use of chemical, biological, radiological, and nuclear detectors or monitoring and/or survey teams. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

fallout. None. (Approved for removal from JP 1-02.)

half-life. The time required for the activity of a given radioactive species to decrease to half of its initial value due to radioactive decay. The half-life is a characteristic property of each radioactive species and is independent of its amount or condition. The effective half-life of a given isotope is the time in which the quantity in the body will decrease to half as a result of both radioactive decay and biological elimination. (JP 1-02. SOURCE: JP 3-11)

herbicide. A chemical compound that will kill or damage plants. (JP 1-02. SOURCE: JP 3-11)

immediate decontamination. Decontamination carried out by individuals immediately upon becoming contaminated to save lives, minimize casualties, and limit the spread of contamination. This may include decontamination of some personal clothing and/or equipment. Also called emergency decontamination. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

improvised nuclear device. None. (Approved for removal from JP 1-02.)

incapacitating agent. A chemical agent, which produces temporary disabling conditions which (unlike those caused by riot control agents) can be physical or mental and persist for hours or days after exposure to the agent has ceased. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

individual protection. None. (Approved for removal from JP 1-02.)

individual protective equipment. In chemical, biological, radiological, or nuclear operations, the personal clothing and equipment required to protect an individual from chemical, biological, and radiological hazards and some nuclear hazards. Also called IPE. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

industrial chemicals. None. (Approved for removal from JP 1-02.)

initial radiation. The radiation, essentially neutrons and gamma rays, resulting from a nuclear burst and emitted from the fireball within one minute after burst. (JP 1-02. SOURCE: JP 3-11)

ionizing radiation. Particulate (alpha, beta, and neutron) and electromagnetic (X-ray and gamma) radiation of sufficient energy to displace electrons from atoms, producing ions. (JP 1-02. SOURCE: JP 3-11) (Approved for inclusion in JP 1-02.)

mission-oriented protective posture. A flexible system of protection against chemical, biological, radiological, and nuclear contamination. This posture requires personnel to wear only that protective clothing and equipment (mission-oriented protective posture gear) appropriate to the threat level, work rate imposed by the mission, temperature, and humidity. Also called MOPP. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

mission-oriented protective posture gear. Military term for individual protective equipment including suit, boots, gloves, mask with hood, first aid treatments, and decontamination kits issued to military members. Also called MOPP gear. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

nerve agent. A potentially lethal chemical agent which interferes with the transmission of nerve impulses. (JP 1-02. SOURCE: JP 3-11)

nonpersistent agent. A chemical agent that when released dissipates and/or loses its ability to cause casualties after 10 to 15 minutes. (JP 1-02. SOURCE: JP 3-11)

nuclear, biological, and chemical-capable nation. None. (Approved for removal from JP 1-02.)

nuclear, biological, and chemical conditions. None. (Approved for removal from JP 1-02.)

nuclear, biological, and chemical defense. None. (Approved for removal from JP 1-02.)

nuclear, biological, and chemical environment. None. (Approved for removal from JP 1-02.)

nuclear defense. None. (Approved for removal from JP 1-02.)

nuclear radiation. Particulate and electromagnetic radiation emitted from atomic nuclei in various nuclear processes. The important nuclear radiations, from the weapon standpoint, are alpha and beta particles, gamma rays, and neutrons. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

nuclear weapon. A complete assembly (i.e., implosion type, gun type, or thermonuclear type), in its intended ultimate configuration which, upon completion of the prescribed arming, fusing, and firing sequence, is capable of producing the intended nuclear reaction and release of energy. (JP 1-02. SOURCE: JP 3-11)

operational decontamination. Decontamination carried out by an individual and/or a unit, restricted to specific parts of operationally essential equipment, materiel and/or working areas, in order to minimize contact and transfer hazards and to sustain operations. This may include decontamination of the individual beyond the scope of immediate decontamination, as well as decontamination of mission-essential spares and limited terrain decontamination. See also decontamination; immediate decontamination; thorough decontamination. (JP 1-02. SOURCE: JP 3-11)

operational exposure guide. The maximum amount of nuclear/external ionizing radiation that the commander considers a unit may be permitted to receive while performing a particular mission or missions. Also called OEG. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term "operation exposure guide" and its definition and are approved for inclusion in JP 1-02.)

overpressure. The pressure resulting from the blast wave of an explosion. It is referred to as "positive" when it exceeds atmospheric pressure and "negative" during the passage of the wave when resulting pressures are less than atmospheric pressure. (JP 1-02. SOURCE: JP 3-11)

pathogen. A disease producing microorganism that directly attacks human tissue and biological processes. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

persistency. In biological or chemical warfare, the characteristic of an agent which pertains to the duration of its effectiveness under determined conditions after its dispersal. (JP 1-02. SOURCE: JP 3-11)

persistent agent. A chemical agent that, when released, remains able to cause casualties for more than 24 hours to several days or weeks. (JP 1-02. SOURCE: JP 3-11)

personal protective equipment. The equipment provided to shield or isolate a person from the chemical, physical, and thermal hazards that can be encountered at a hazardous materials incident. Personal protective equipment includes both personal protective clothing and respiratory protection. Also called PPE**.** See also individual protective equipment. (JP 1-02. SOURCE: JP 3-11) (Approved for inclusion in JP 1-02.)

precursor. Any chemical reactant which takes place at any stage in the production by whatever method of a toxic chemical. This includes any key component of a binary or multicomponent chemical system. (JP 1-02. SOURCE: JP 3-11)

protection. 1. Preservation of the effectiveness and survivability of mission-related military and nonmilitary personnel, equipment, facilities, information, and infrastructure deployed or located within or outside the boundaries of a given operational area. 2. In space usage, active and passive defensive measures to ensure that United States and friendly space systems perform as designed by seeking to overcome an adversary's attempts to negate them and to minimize damage if negation is attempted. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

radiation dose. The total amount of ionizing radiation absorbed by material or tissues. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

radiation dose rate. Measurement of radiation dose per unit of time. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

radiation exposure status. Criteria to assist the commander in measuring unit exposure to radiation based on total past cumulative dose, normally expressed in centigray. Also called RES. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

radiological dispersal device. An improvised assembly or process, other than a nuclear explosive device, designed to disseminate radioactive material in order to cause destruction, damage, or injury. Also called RDD. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

radiological exposure device. A radioactive source placed to cause injury or death. Also called RED. (JP 1-02. SOURCE: JP 3-11) (Approved for inclusion in JP 1-02.)

residual radiation. Nuclear radiation caused by fallout, artificial dispersion of radioactive material, or irradiation which results from a nuclear explosion and persists longer than one minute after burst. (JP 1-02. SOURCE: JP 3-11)

riot control agent. Any chemical, not listed in a schedule of the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction which can produce rapidly in humans sensory irritation or disabling physical effects which disappear within a short time following termination of exposure. Also called RCA. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

split-mission oriented protective posture. The concept of maintaining heightened protective posture only in those areas (or zones) that are contaminated, allowing personnel in uncontaminated areas to continue to operate in a reduced posture. Also called split-MOPP. (JP 1-02. SOURCE: JP 3-11) (Approved for inclusion in JP 1-02.)

survey. None. (Approved for removal from JP 1-02.)

thermal radiation. 1. The heat and light produced by a nuclear explosion. 2. Electromagnetic radiations emitted from a heat or light source as a consequence of its temperature; it consists essentially of ultraviolet, visible, and infrared radiations. (JP 1-02. SOURCE: JP 3-11)

thorough decontamination. Decontamination carried out by a unit, with or without external support, to reduce contamination on personnel, equipment, materiel, and/or working areas equal to natural background or to the lowest possible levels, to permit the partial or total removal of individual protective equipment and to maintain operations with minimum degradation. This may include terrain decontamination beyond the scope of operational decontamination. See also immediate decontamination; operational decontamination. (JP 1-02. SOURCE: JP 3-11)

toxic chemical. None. (Approved for removal from JP 1-02.)

toxic industrial biological. Any biological material manufactured, used, transported, or stored by industrial, medical, or commercial processes which could pose an infectious or toxic threat. Also called TIB. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

toxic industrial chemical. A chemical developed or manufactured for use in industrial operations or research by industry, government, or academia. For example: pesticides, petrochemicals, fertilizers, corrosives, poisons, etc. These chemicals are not primarily manufactured for the specific purpose of producing human casualties or rendering equipment, facilities, or areas dangerous for human use. Hydrogen cyanide, cyanogen chloride, phosgene, and chloropicrin are industrial chemicals that also can be military chemical agents. Also called TIC. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

toxic industrial material. A generic term for toxic or radioactive substances in solid, liquid, aerosolized, or gaseous form that may be used, or stored for use, for industrial, commercial, medical, military, or domestic purposes. Toxic industrial material may be chemical, biological, or radioactive and described as toxic industrial chemical, toxic industrial biological, or toxic industrial radiological. Also called TIM. (JP 1-02. SOURCE: JP 3-11) This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

toxic industrial radiological. Any radiological material manufactured, used, transported, or stored by industrial, medical, or commercial processes. For example: spent fuel rods, medical sources, etc. Also called TIR. (JP 1-02. SOURCE: JP 3-11)

toxin. Poisonous substances that may be produced naturally (by bacteria, plants, fungi, snakes, insects, and other living organisms) or synthetically. (JP 1-02. SOURCE: JP 3-11) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

toxin agent. None. (Approved for removal from JP 1-02.)

vesicant agent. See blister agent. (JP 1-02. SOURCE: JP 3-11)

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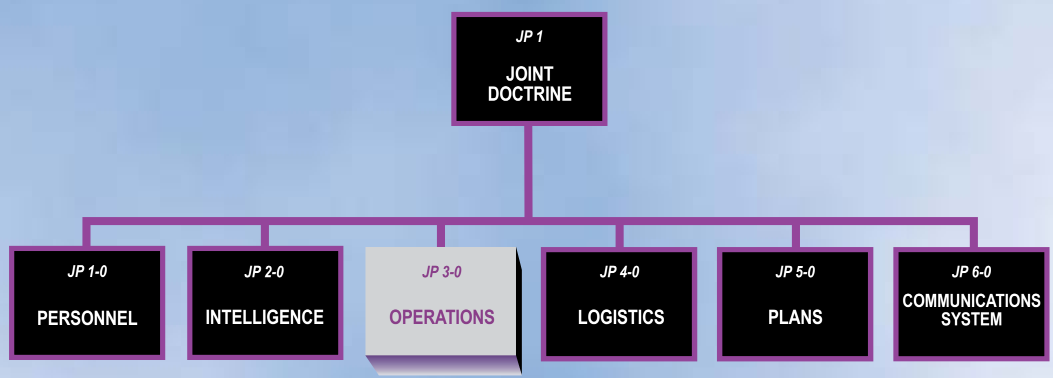
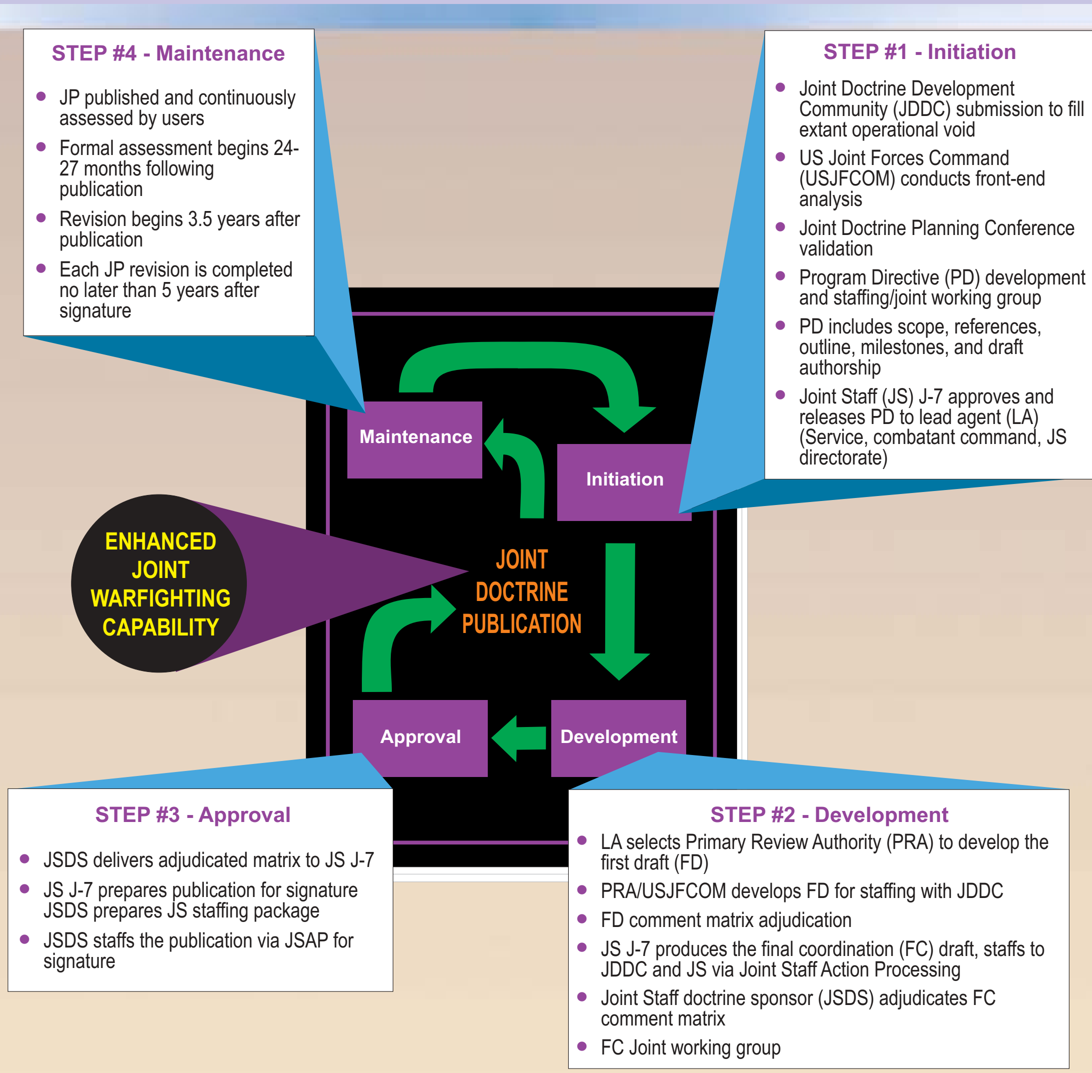
JOINT DOCTRINE PUBLICATIONS HIERARCHY



All joint publications are organized into a comprehensive hierarchy as shown in the chart above. **Joint Publication (JP) 3-11** is in the **Operations** series of joint doctrine publications. The diagram below illustrates an overview of the development process:



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