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*MCRP 4-11.1F
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MULTI-SERVICE TACTICS, TECHNIQUES, AND PROCEDURES FOR HEALTH SERVICE SUPPORT IN A CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR ENVIRONMENT

MARCH 2016

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FOREWORD

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



STEPHEN L. JONES
Major General, USA Commanding
U.S. Army Medical Department
Center and School



ROBERT S. WALSH
Lieutenant General, US Marine Corps
Deputy Commandant, Combat
Development and Integration



S. A. STEARNEY
Rear Admiral, US Navy
Commander
Navy Warfare Development Command



ROOSEVELT ALLEN, JR.
Major General, USAF, NC
Director, Medical Operations and
Research, Office of the Surgeon
General

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Multi-Service Tactics, Techniques, and Procedures for Health Service Support in a Chemical, Biological, Radiological, and Nuclear Environment

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Preface

PURPOSE

This publication establishes doctrinal multi-Service tactics, techniques, and procedures (MTTP) for health service support (HSS) units operating in a chemical, biological, radiological, and nuclear (CBRN) and/or toxic industrial material (TIM) environment. It is the intent of this document to inform the combatant commanders (CCDRs), joint force commanders (JFCs), joint force medical commanders and medical planners, and component commanders and their staffs on the tools available to provide the best quality of HSS in a CBRN environment to enhance mission success. This publication bridges the gaps between Service and Joint HSS publications.

SCOPE

This publication provides information for use by the component commanders and their staffs, command surgeons, medical planners, and individuals responsible for HSS in a CBRN environment. Commanders have the direct responsibility for protecting their forces within a CBRN environment. On future battlefields, failure to properly plan and execute CBRN defensive operations may result in significant casualties, disruption of operations, and even mission degradation. Further, the commander's mission and execution plans must address the implications of HSS in a CBRN environment.

This publication contains MTTP relative to HSS in the following specific areas:

- Chemical, biological, radiological, and nuclear aspects of HSS.
- Casualty prevention.
- Casualty care and management.
- Medical evacuation in a CBRN environment.
- Patient decontamination.
- Veterinary service support.
- Preventive medicine/public health support.
- Medical laboratory support.
- Combat and operational stress control (COSC).
- Medical logistics support.
- Homeland defense.
- Collective protective shelter (CPS) systems.

For Service-specific information or detailed procedures refer to—

- Appendix A, Chemical, Biological, Radiological, and Nuclear Casualty Estimation.
- Appendix B, Health Service Support Chemical, Biological, Radiological, and Nuclear Annex to an Operation Order.
- Appendix C, Service-Specific Chemical, Biological, Radiological, and Nuclear Defense Capabilities.
- Appendix D, Veterinary Guidelines for Food Contamination and Decontamination.

APPLICABILITY

The principal audience for this publication is the trained members of the Armed Forces Medical Services and other medically qualified personnel.

Commanders, staff, and subordinates ensure their decisions and actions comply with applicable United States (U.S.), international, and, in some cases, host-nation laws and regulations. Commanders at all levels ensure their Service members operate in accordance with the law of war and the rules of engagement. See Field Manual (FM) 27-10.

This publication uses joint terms where applicable. Selected joint and Army terms and definitions appear in both the glossary and the text. Terms for which this publication is the proponent publication (the authority) are italicized in the text and are marked with an asterisk (*) in the glossary. Terms and definitions for which this publication is the proponent publication are boldfaced in the text. For other definitions shown in the text, the term is italicized and the number of the proponent publication follows the definition.

This publication discusses both continental United States (CONUS) and outside the continental United States (OCONUS) response to a CBRN incident. Chapter 11 applies to CONUS and Department of Defense (DOD) installation CBRN incident emergency management/response.

For the purpose of this publication, the term *casualty* means any person who is lost to the organization by having been wounded, ill, or injured. The use of the term *patient* means once the casualty has entered the medical stream (combat medics/corpsmen/Air Force medics or medical treatment facility [MTF]), the role of first aid in the care of the casualty ceases and the casualty becomes the responsibility of the HSS chain. Once the casualty has entered the HSS chain, he is referred to as a patient.

This publication implements or is in consonance with the following North Atlantic Treaty Organization (NATO) Standardization Agreements (STANAGs):

Title	STANAGs
Emergency Alarms of Hazard or Attack (CBRN and Air Attack Only)—Allied Tactical Publication-85	2047
Allied Joint Doctrine for Medical Support—Allied Joint Publication (AJP)-4.10	2228
NATO Handbook on the Medical Aspects of Nuclear, Biological, and Chemical (NBC) Defensive Operations (Nuclear)—Allied Medical Publication (AMedP)-6(C) Volume I	2461
NATO Handbook on the Medical Aspects of NBC Defensive Operations (Biological)—AMedP-6(C) Volume II	2462
Recording of Operational Ionizing Radiation Exposure for Medical Purposes and Management of Dosimeters—AMedP-7.8	2474
Medical Support Planning for NBC Environments	2478
NATO Planning Guide for the Estimation of CBRN Casualties—AMedP-8(C)	2553
Concept of Operations of Medical Support in CBRN Environments—AMedP-7(D)	2873
Medical Aspects in the Management of a Major Incident/Mass Casualty Situation—AMedP-1.10	2879
Orders for the Camouflage of Protective Medical Emblems on Land in Tactical Operations	2931
Emergency Supply of Water in Operations	2885
Training of Medical Personnel for NBC Defence Operations	2954
Aeromedical Evacuation—Allied Aeromedical Publication (AAMedP-1.1)	3204

This publication applies to the Active Army, Army National Guard/Army National Guard of the United States, and United States Army Reserve unless otherwise stated.

The proponent and the preparing agency of this publication is the United States Army Medical Department Center and School, United States Army Health Readiness Center of Excellence. Send comments and recommendations on a DA Form 2028 (Recommended Changes to Publications and Blank Forms) to **Commander, United States Army Medical Department Center and School, United States Army Health Readiness Center of Excellence, ATTN: MCCS-FDL (ATP 4-02.7), Building 4011, Suite D, 2377 Greeley Road, JBSA Fort Sam Houston, Texas 78234-7731**; by e-mail to usarmy.jbsa.medcom-ameddcs.mbx.ameddcs-medical-doctrine@mail.mil; or submit an electronic DA Form 2028. All recommended changes should be keyed to the specific page, paragraph, and line number. A rationale for each proposed change is required to aid in the evaluation and adjudication of each comment.

IMPLEMENTATION PLAN

Participating Service command offices of primary responsibility will review this publication, validate the information, references, and incorporate it in Service and command manuals, regulations, and curricula as shown below.

UNITED STATES ARMY

The U.S. Army will incorporate this publication in U.S. Army training and doctrinal publications as directed by the Commander, U.S. Army Training and Doctrine Command. Distribution is according to initial distribution number 114899 requirements for FM 4-02.7.

UNITED STATES MARINE CORPS*

The United States Marine Corps (USMC) will incorporate the procedures in this publication in USMC training and doctrinal publications as directed by the Deputy Commandant for Combat Development and Integration. Distribution is according to USMC publication distribution.

UNITED STATES NAVY

The United States Navy (USN) will incorporate these procedures in USN training and doctrinal publications as directed by the Commander, Navy Warfare Development Command. Distribution is according to Military Standard Requisition and Issue Procedure Desk Guide Naval Supply Systems Command Publication-409 (NAVSUP P-409).

UNITED STATES AIR FORCE

The United States Air Force (USAF) will validate and incorporate appropriate procedures according to applicable governing directives. Distribution is according to Air Force Instruction (AFI) 33-360.

UNITED STATES COAST GUARD

The United States Coast Guard (USCG) will validate and refer to appropriate procedures when applicable. No material contained herein should conflict with USCG regulations or other directives from higher authority or supersede or replace any order or directive issued by higher authority.

USER INFORMATION

THE UNITED STATES ARMY MEDICAL DEPARTMENT CENTER AND SCHOOL

The United States Army Medical Department Center and School developed this publication with the joint participation of the approving Service commands.

SERVICE AND JOINT DOCTRINE

This publication reflects current Service and joint doctrine on prevention, protection, and medical management of CBRN casualties.

***Marine Corps PCN: 144 000168 00**

RECOMMENDED CHANGES

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

- **Army.**

Commander
United States Army Medical Department Center and School
United States Army Health Readiness Center of Excellence
ATTN: MCCS-FDL
2377 Greeley Road Suite D
JBSA Fort Sam Houston, TX 78234-7731
DSN 471-9411/9524 COMM (210) 221-9411/9524
e-mail: usarmy.jbsa.medcom-ameddcs.mbx.ameddcs-medical-doctrine@mail.mil

- **Marine Corps.**

Commanding General
Deputy Commandant, Combat Development and Integration
ATTN: C42 (Director)
3300 Russell Road
Quantico, VA 22134-5001
DSN 278-6234; COMM (703) 784-6234
Web site: <https://www.doctrine.usmc.mil/>

- **Navy.**

Commander
Navy Warfare Development Command
1528 Piersey Avenue, BLDG O-27
Norfolk, VA 23511-2699
DSN 341-4748; COMM (757) 341-4748
Web site: <https://ndls.nwdc.navy.mil>

- **Air Force.**

Commander
Curtis E. LeMay Center for Doctrine Center Development and Education
ATTN: DDJ
401 Chennault Circle
Maxwell AFB, AL 36112-6004
DSN 493-7442; COMM (334) 953-7442
e-mail: lemayctr.ddj.wrklw@us.af.mil

Introduction

Army Techniques Publication 4-02.7 remains generally consistent with FM 4-02.7 on key topics while adopting updated terminology and concepts as necessary. Key topics include CBRN aspects of HSS, casualty prevention, casualty care and management, medical evacuation in a CBRN environment, patient decontamination, veterinary service support, preventive medicine/public health support, medical laboratory support, COSC, medical logistics support, homeland defense, and CPS systems.

The material presented in this publication reflects enduring practices and MTTP for the HSS in a CBRN and TIM environment. Implementation of these tactics, techniques, and procedures enable commanders, members of the Armed Forces Medical Services, and other medically qualified personnel to preserve the health of their Service members in order for them to accomplish their mission.

Summary of changes include—

- Designating this publication as an Army techniques publication in compliance with the Army's Doctrine 2015 initiative. This publication supersedes FM 4-02.7 dated July 2009.
- Adding the National Strategy for Biosurveillance definition of *biosurveillance*.
- Adding chapter on preventive medicine/public health support.
- Adding the definitions and descriptors of CBRN four levels of identification.
- Adding an appendix that discusses veterinary guidelines for food contamination and decontamination.
- Removing the appendix that discusses Service-specific tasks list.

Army Techniques Publication 4-02.7 consists of 12 chapters and 4 appendixes as follows:

- Chapter 1 provides introduction information on the conduct of HSS in a CBRN environment. This chapter also discusses health threat; management of CBRN casualties; military operations in a CBRN environment; and HSS planning considerations.
- Chapter 2 discusses casualty prevention; comprehensive medical surveillance activities; predeployment, deployment, and postdeployment procedures; actions before, during, and after a CBRN attack; and other CBRN defensive measures.
- Chapter 3 provides casualty care and management information. This chapter also describes responsibilities during a mass casualty event; triage; mission-oriented protective posture (MOPP) levels; roles of medical care; and management of casualties in a MTF.
- Chapter 4 discusses patient movement; tactical, operational, and strategic medical evacuation; medical air evacuation under high-level biosafety containment; aeromedical evacuation (AE) process; and patient isolation unit (PIU).
- Chapter 5 describes procedures for patient decontamination. This chapter also discusses levels of decontamination; zones of contamination; decontamination materials; detection devices; safety, heat injury prevention, and water consumption; and core components and location of the patient decontamination site (PDS).
- Chapter 6 provides information on veterinary service support. This chapter also discusses food protection measures; veterinary medical care; veterinary public health; veterinary unit operations; support for subsistence; testing, screening, and collecting food samples in the field; and decontamination and disposition of subsistence.
- Chapter 7 describes preventive medicine and public health support. This chapter also discusses water safety and management; detection and treatment of contaminated water; sample collection and management, engineer support; environmental effects on planning; and medical reports.
- Chapter 8 discusses medical laboratory support. This chapter discusses field laboratories; samples collection and management; handling/storage of samples within the laboratory; four levels of CBRN identification; nationally recognized reference laboratories; and other DOD laboratories.

- Chapter 9 provides information on COSC. This chapter describes combat and operational stress reactions (COSR); leadership actions; individual responsibilities; and behavioral health (BH) personnel responsibilities.
- Chapter 10 discusses medical logistics support. This chapter also discusses medical logistics support considerations; protecting supplies in storage and during shipment; and movement control.
- Chapter 11 provides information on homeland defense. This chapter also discusses CONUS or DOD installation emergency management/response to a CBRN incident and describes U.S. Army role; USCG role; USN and USMC role; USAF role; and roles of other DOD assets.
- Chapter 12 discusses CPS systems. This chapter provides information on types CPS systems; chemically protected deployable medical system; employment; patient decontamination; and operations, entry, and exit guidelines.
- Appendix A discusses CBRN casualty estimation. This appendix provides information on casualty estimates; joint medical planning tool; medical planners' toolkit; and joint effects model.
- Appendix B discusses HSS CBRN annex to an operation order. This appendix provides information on planning actions before, during, and after a CBRN/toxic industrial material event; and provides a sample format of an HSS plan for CBRN operations.
- Appendix C discusses Service-specific CBRN defense capabilities. This appendix discusses the United States Army, United States Marine Corps, United States Navy, and United States Air Force CBRN defense capabilities; and provides a list of technical reachback capability to contact for technical subject matter expertise.
- Appendix D discusses veterinary guidelines for food contamination and decontamination. This appendix also discusses protection of food from contamination; consumption of food contaminated with CBRN; food inspection and monitoring; food detection and decontamination; and considerations when food decontamination is not possible.

PROGRAM PARTICIPANTS

The following commands and agencies participated in the development of this publication:

- **Joint**
 - Joint Requirements Office, Chemical, Biological, Radiological and Nuclear Defense, Rm 1D958, 8000 Joint Staff Pentagon, Washington, DC 20318-8000
 - Program Assistance Program Analysis Directorate Joint Program Executive Office for Chemical and Biological Defense, 5183 Blackhawk Road, Building # E2800, Aberdeen Proving Ground, MD 21010-5424
 - Armed Forces Radiobiology Research Institute, 8901 Wisconsin Avenue, Building 42, Bethesda, MD 20889-5603
 - Uniformed Services of the Health Sciences, 4301 Jones Bridge Road, Bethesda, MD 20814-4799
- **Army**
 - United States Army Office of The Surgeon General, 7700 Arlington Blvd, Ste 5143, 3SW420C, Falls Church, VA 22042-5143
 - United States Army Medical Command ATTN: MCHQ-COM, 2748 Worth Road, Ste 11, RM 216, JBSA Fort Sam Houston, TX 78234-6000
 - United States Army Public Health Center, 5158 Blackhawk Road, Aberdeen Proving Ground, MD 21010-5403
 - United States Army Chemical, Biological, Radiological, and Nuclear School, 484 MANSCEN Loop, Ste 2617, Fort Leonard Wood, MO 65473-8926
 - United States Army Medical Research Institute of Chemical Defense, 3100 Ricketts Point Road, Aberdeen Proving Ground, MD, 21010-5400
 - United States Army Medical Research Institute of Infectious Diseases, 1425 Porter Street, Frederick, MD 21702-5011
 - United States Army Medical Research and Materiel Command, ATTN: CBRN Defense Coordinating Office, MCMR-RTM, 504 Scott Street, Fort Detrick, MD 21702

- **Marine Corps**
 - Deputy Commandant, Combat Development and Integration, ATTN: C42 (Director), 3300 Russell Road, Quantico, VA 22134-5021
 - Headquarters, United States Marine Corps, Safety Division, 701 South Courthouse Rd, Suite 2100, Arlington, VA 22204-2462
- **Navy**
 - United States Navy Warfare Development Command, 1528 Piersey Avenue, Bldg O-27, Norfolk, VA 23511-2699
- United States Navy Bureau of Medicine and Surgery, 7700 Arlington Blvd, Suite 5113, Falls Church, VA 22042
- **Air Force**
 - Air Force Medical Support Agency, ATTN: Medical Readiness Training, 7700 Arlington Blvd, Falls Church, VA 22042
 - Office of the Air Force Surgeon General, ATTN: Health Physics Consultant, 7700 Arlington Blvd, Falls Church, VA 22042

Chapter 1

Chemical, Biological, Radiological, and Nuclear Aspects of Health Service Support

GENERAL

1-1. Planning for military operations at all levels inherently includes provisions for adequate HSS. Commanders are responsible for the maintenance of the health of their commands to ensure mission accomplishment in the event of a CBRN incident. Maintaining the physiological and psychological health of military forces is a basic requirement for combat effectiveness. The JFC at all levels is faced with the possibility that any operation may have to be conducted in a CBRN environment.

1-2. A CBRN environment is an operational environment that includes the deliberate employment or accidental release of CBRN weapons, contamination with TIMs or contamination with radiological materials, and poses challenges to U.S. military operations worldwide. Responsibility for operations in any theater involves peacetime preparations and transition to operations with forces from areas outside the theater and inherently involves joint, multinational, and interagency dimensions. Medical forces may be required to operate in a CBRN environment.

1-3. The JFC must plan and integrate U.S. and multinational force capabilities to sustain the operational tempo in the air, sea, land, and space domains. The component command surgeons, working with the appointed joint force surgeon, are responsible for guiding and integrating all HSS capabilities available to the command to support mission accomplishment in a CBRN environment. In planning for HSS in potential CBRN environments, preparations should include a complete review of available medical intelligence related to adversary capability and capacity, preexposure immunizations, pretreatments, prophylaxes, and medical barrier materials applicable to the entire force, including multinational, interagency, contractor, and civilian participants. Basic doctrine for joint HSS operations is contained in Joint Publication (JP) 4-02 and JP 3-11.

HEALTH THREAT

1-4. The health threat is a composite of ongoing or potential adversary actions; adverse environmental, occupational, and geographic and meteorological conditions; endemic diseases; and employment of CBRN agents that have the potential to affect the short- or long-term health (including psychological impact) of personnel.

1-5. Weapons and environmental conditions that can wound, injure, or sicken Service members beyond what the capability of the Military Health System is capable of providing timely medical care for are considered major health threats. Weapons or environmental conditions that produce qualitatively different wound or disease processes are also considered major health threats. Adding to the environmental, disease and nonbattle injury (DNBI), and combat and operational stress health threats is the adversaries use of—

- Chemical warfare (CW) agents.
- Biological warfare (BW) agents.
- Radiological dispersal devices.
- Nuclear weapons.
- Toxic industrial materials.
- Directed-energy devices/weapons.

CHEMICAL WARFARE

1-6. Many nations view an offensive CW capability as a reasonable and affordable deterrent to the military advantage of a potential adversary. Table 1-1 on page 1-2 provides a list of known CW agents that are a part

of the Chemical Warfare Convention. For more information about CW agents, refer to ATP 4-02.85/NTRP 4-02.22/AFTTP(I) 3-2.69.

Table 1-1. Chemical warfare agents

<i>Nerve</i>	<i>Blister (vesicant)</i>	<i>Incapacitating</i>	<i>Choking (lung-damaging)</i>	<i>Blood (cyanide)</i>
Tabun (GA) Sarin (GB) Soman (GD) Cyclosarin (GF) O-ethyl Methylphosphonotiolate (VX)	Impure Sulfur Mustard (H) Sulfur Mustard (HD) Mustard-Lewisite mixture (HL) Lewisite (L) Nitrogen Mustard (HN)	3-quinuclidinylbenzilate (BZ) D-Lysergic Acid Diethylamide (LSD)	Phosgene (CG) Phosgene Oxime (CX)	Hydrogen Cyanide (AC) Cyanogen Chloride (CK)

1-7. The U.S. is in the process of destroying its stockpiles of CW weapons. Many weapons have already been destroyed and the storage facilities have been rendered safe of all CW agent residues.

BIOLOGICAL WARFARE

1-8. Biological warfare is defined by the U.S. intelligence community as the intentional use of disease-causing organisms (pathogens), toxins, or other agents of biological origin to incapacitate, injure, or kill humans and animals, or harm/destroy crops. Historically, BW has primarily involved the use of pathogens in assassinations or as sabotage agents in food and water supplies to spread disease among target populations.

1-9. For purposes of health threat assessment, we are interested only in those BW agents that incapacitate, injure, or kill humans or animals.

1-10. Biological agents can be classified into two major categories: pathogens (including bacteria and viruses) and toxins. See Table 1-2 for examples of known or suspected weaponized biological agents.

Table 1-2. Examples of known or suspected biological warfare agents

<i>Pathogens</i>	<i>Toxins</i>
<i>Bacillus anthracis</i> (Anthrax) <i>Francisella tularensis</i> (Tularemia) <i>Yersinia pestis</i> (Plague) <i>Brucella species</i> (Brucellosis) <i>Vibrio cholerae</i> (Cholera) Variola major (Smallpox) Viral Hemorrhagic Fevers	Botulinum Toxin Mycotoxins Enterotoxins Ricin

1-11. Many governments recognize the industrial and economic potential of advanced biotechnology and bioengineering. The same knowledge, skills, and methodologies are being applied to the development of nontraditional agents (enhanced, emerging, and genetically modified) (refer to Table 1-3). Naturally occurring infectious organisms can be made more virulent, antibiotic resistant, and manipulated to render protective vaccines ineffective. These developments complicate the ability to detect and identify BW agents and to operate in areas contaminated by the BW agents. The first indication that a BW agent release/attack has occurred may be casualties presenting at a MTF with symptoms not fitting the mold for endemic diseases in the area of operations (AO). See Chapter 7 for sampling requirements, sampling procedures, packaging and shipping, and chain-of-custody requirements.

Table 1-3. The future of biological warfare agents

<i>Current threat</i>	<i>Future</i>
Pathogens Limited number of toxins	Genetically modified pathogens Expanded range of toxins (organo-toxins) Protein fractions

NUCLEAR WEAPONS AND RADIOLOGICAL DISPERSAL DEVICE THREATS

1-12. Depending on the distance from detonation and the amount of shielding, medical planners can expect mass casualties in a brigade combat team that has experienced a nuclear strike. In addition to the casualties, a nuclear weapon detonation can generate an electromagnetic pulse that will cause catastrophic failures of electronic equipment components. A radiological dispersal device is an improvised assembly or process, other than a nuclear explosive device, designed to disseminate radioactive material in order to cause destruction, damage, or injury. The radiological dispersal device can disperse radioactive material over an area of the battlefield causing effects from nuisance levels of radioactive material to life-threatening levels without the thermal effects and the blast effects of a nuclear detonation.

TOXIC INDUSTRIAL MATERIALS

1-13. Toxic industrial materials can present a health threat to deployed forces. A *toxic industrial material* is a generic term for toxic, chemical, biological, 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 (JP 3-11). These materials are found throughout the world and are used on a daily basis for commercial and private purposes. Large storage facilities and transportation tankers (over the road and railcars), as well as smaller containers of materials, pose a danger to the health of civilians and military personnel.

1-14. Accidental spills or releases and adversary actions can lead to the release of these materials into the environment causing potential casualty-producing effects. Medical treatment facilities and nuclear power plants use radioactive materials that can pose a health hazard if accidentally released or used by hostile forces, adversaries, or others to contaminate an area. Biological materials used in medical research and pharmaceutical manufacturing may also be used to produce casualties.

1-15. Many toxic industrial chemicals (TICs) produce the same effects on personnel as CW agents and sometimes are of similar chemical structure as CW agents. However, there is quite a difference in their potency; in most TICs the potency is much lower. For example, chlorine used to treat water supplies has been used as a CW agent; organophosphate pesticides can cause the same effects as some nerve agents. For detailed information on TICs see ATP 4-02.85/NTRP 4-02.22/AFTTP(I) 3-2.69.

DIRECTED-ENERGY DEVICES/WEAPONS

1-16. Directed-energy weapons are weapons that direct energy by means other than a projectile in an intentional or deliberate targeted direction. Directed-energy weapons transfer energy to a target for a desired effect and take the form of lasers, high-powered microwaves, and particle beams.

1-17. In recent events, laser pointers have come to the public's attention since the Federal Aviation Administration reported hundreds of incidents in which aircrafts were illuminated by lasers. The likelihood of lasers being pointed at commercial and military airline pilots during takeoff and landing has raised concerns that this may be an inexpensive form of a device which could be used by adversaries.

MANAGEMENT OF CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR CASUALTIES

1-18. Medical personnel face the possibility that any operation may have to be conducted in a CBRN environment (refer to JP 4-02). The management of CBRN casualties will be specific to the particular threat

or hazard encountered; however, there are some common management principles that should be considered no matter the hazard or threat type. These principles include—

- First responders or medical providers should have an index of suspicion that casualties may have been exposed to CBRN agents.
- Increased levels of personal protection may be required for all medical personnel caring for CBRN casualties.
- The threat of the use of CBRN agents may create a level of anxiety in medical personnel even with adequate personal protection.
- Decontamination may be a critical first step in casualty management.
- Medical units must conduct CBRN monitoring adjacent or as close as reasonably possible to the entry points to MTFs.
- Medical planners must ensure the mass casualty situations are included in HSS plans.

1-19. The initial management and treatment of casualties contaminated with a CBRN agent will vary with the tactical situation and the nature of the contaminant. Some of the planning factors to consider include—

- Assessing whether the deliberate release of a CBRN agent is realistic in a particular situation.
- Identifying all possible endemic diseases in the area.
- Assessing the effects of the release of a CBRN agent in the operational area.
- Treating patients exposed to a CBRN agent with traumatic wounds due to other causes.

CHEMICAL WARFARE AGENT

1-20. Health service support operations in a CW environment are complex. In addition to providing care in protected environments or while dressed in protective clothing, medical personnel will have to treat chemically (traditional and nontraditional) injured and contaminated casualties in large numbers. Types of injuries associated with traditional CW are—

- Nerve agent injuries are classified as mild or severe. Classification is based on the signs and symptoms presented by the individual. The individual may only be having minor problems (such as miosis) or may be convulsing and exhibiting severe respiratory distress. Some individuals can return to duty (RTD) after receiving a single injection of the nerve agent antidote; others may require additional doses of the nerve agent antidote followed by convulsant antidote (diazepam) and assisted ventilation. Additionally, some individuals may require more doses of atropine once they reach an MTF. For more information on nerve agent antidote, see ATP 4-02.85/NTRP 4-02.22/AFTTP(I) 3-2.69.
- Individuals exposed to blister (vesicants) agents may not know that they have been exposed to the agent until hours or days later. The first indication of exposure may be small blisters on the skin. Others will have immediate burning because of a high level of exposure. The individual with a few small blisters or reddening of the skin is suffering mild injuries and may require admission to an MTF for treatment before they can continue with the mission, whereas, the individual with severe injuries may have to be evacuated from the theater.
- Incapacitating agents produce injury by depressing or stimulating the central nervous system. These agents affect the central nervous system by disrupting the high integrative functions of memory, problem solving, attention, and comprehension. Higher doses manifest as lethargy or coma, decreased respiratory rate, miosis, bradypnea, and possible apnea.
- Blood (cyanide) agents produce their effects by interfering with oxygen use at the cellular level. The agent prevents the oxidative process within cells. In high concentrations, there is an increase in the depth of respiration within a few seconds. The casualty cannot voluntarily hold his breath. Violent convulsions occur after 20 to 30 seconds with cessation of respiration within one minute. Cardiac failure follows within a few minutes. Inhalation is the usual route of entry.
- Choking (lung-damaging) agents cause effects range from mild (eye and airway irritation) to severe (pulmonary edema).

1-21. Nontraditional agents are chemicals and biochemicals reportedly researched or developed with potential application or intent as CW agents, but which do not fall in the category of traditional CW agents or TICs.

MANAGEMENT OF CHEMICAL AGENT CASUALTIES

1-22. Movement of chemical agent casualties can spread the contamination to clean areas. All casualties are decontaminated as far forward, on an already established thorough decontamination or mass casualty decontamination site, as the situation permits. Chemically contaminated casualties must be decontaminated before they are admitted into a MTF. The admission of one contaminated casualty into a MTF will contaminate the facility; thereby, reducing treatment capabilities in the facility.

1-23. As with other CBRN weapons, a mass casualty situation may result when CW agents are employed. For more information on management of a mass casualty situation, refer to STANAG 2879. Additional HSS personnel and equipment must be provided quickly if the level of care is to be maintained. Treatment at far forward MTFs is limited to life- or limb-saving care. Casualties that can survive evacuation to the next role of care are not treated at the forward facility. This provides time for treating those casualties that cannot survive immediate evacuation. Refer to Appendix A for CBRN casualty estimation.

1-24. *Decontamination* is 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 3-11). Decontamination of chemically contaminated casualties requires the removal of their contaminated clothing and the use of a variety of decontamination kits and solutions. **Patient decontamination is defined as the removal and/or the neutralization of hazardous levels of chemical, biological, radiological, and nuclear contamination from patients before admission into a medical treatment facility under the supervision of medical personnel to prevent further injury to the patient during the decontamination process.**

1-25. Patient decontamination serves multiple purposes; it protects the patient from further injury, it prevents exposing medical personnel to the contamination, and it prevents contamination of the MTF. See Chapter 5 for details on patient decontamination. Army Techniques Publication 4-02.85/NTRP 4-02.22/AFTTP(I) 3-2.69 provides additional information on treatment procedures for CW agent casualties.

BIOLOGICAL WARFARE AGENT

1-26. The impact of BW on HSS may be as simple as a few casualties with mild traveler's diarrhea or as complex as a large portion of the unit/installation with fever of unknown origin. Biological warfare agents are most likely to be delivered covertly and by aerosol. Compared to chemical agents, most biological agents have a long incubation period from infection to clinical symptoms. For more information on BW agents incubation period, refer to ATP 4-02.84/MCRP 4-11.1C/NTRP 4-02.23/AFMAN 44-156_IP and United States Army Medical Research Institute of Infectious Disease (USAMRIID), Medical Management of Biological Casualties Handbook. For these reasons, the first indication of a BW attack will most likely be casualties arriving at an MTF with an illness. The primary route of entry for BW agents is by inhalation; however, other routes include ingestion and percutaneous inoculation.

1-27. Inhalation of agent aerosols, with resultant deposition of infectious or toxic particles within alveoli, provides a direct pathway to the systemic circulation. The process of breathing causes a continuing flux of BW agent to exposed individuals. The major health risk is pulmonary retention of inhaled particles. Droplets as large as 20 microns can infect the upper respiratory tract; however, natural anatomic and physiological processes generally filter these relatively large particles and only much smaller particles (ranging from 0.5 to 5 microns) reach the alveoli efficiently.

1-28. Food and water supplies may be contaminated during an aerosol BW attack. Unwary consumption of such contaminated materials could result in disease. Inhaled aerosols also lead to agent being ingested as particles trapped in the respiratory tract will eventually be swallowed.

1-29. Direct contamination of food and water could be used as a means to disseminate infectious agents or toxins. This method of attack is most suitable for sabotage activities and might be used against limited targets such as water supplies or food supplies of a specific unit or base.

1-30. Intact skin provides an excellent barrier for most, but not all, BW agents. However, mucous membranes and damaged skin constitute breaches in this normal barrier through which BW agents may readily pass.

1-31. The spread of diseases may be accomplished by releasing infected arthropods such as mosquitoes, ticks, or fleas. These live vectors can be produced in large numbers and infected by allowing them to feed on infected animals, infected blood reservoirs, or artificially produced sources of a BW agent.

1-32. Preservation of toxins for extended periods and the protective influence of dust particles onto which microorganisms adsorb when spread by aerosols have been documented. Therefore, the potential exists for the delayed generation of secondary aerosols from contaminated surfaces. To a lesser extent, particles may adhere to an individual or to clothing, creating additional exposure hazards.

1-33. The spread of potential BW agents by person-to-person contact has been documented. An unaware individual can be a highly effective carrier of a communicable agent, could readily become a source of dissemination (for example, plague or smallpox).

MANAGEMENT OF BIOLOGICAL WARFARE CASUALTIES

1-34. A BW agent attack can produce a mass casualty situation at all roles of care. Therefore, HSS planners must ensure that mass casualty situations are included in HSS plans.

1-35. A majority of patients presenting to the MTF with symptoms or disease due to BW agent exposure will not require decontamination; during the delay between BW agent exposure and onset of symptoms external contamination would likely have dissipated to a large degree. Contamination can be removed by use of soap and water, which is the most preferred method. See Chapter 5 for details on patient decontamination.

1-36. During a CBRN incident, biologically contaminated casualties require decontamination before admission into a MTF. Patients suspected of having been exposed to BW agents may require isolation or quarantine to reduce the possibility of spreading the disease to health care providers and other patients. Specimens must be collected and submitted to the designated supporting laboratory for identification to determine if infectious disease isolation precautions are necessary.

1-37. Treatment is dependent upon the BW agent used. Patients are treated as described in ATP 4-02.84/MCRP 4-11.1C/NTRP 4-02.23/AFMAN 44-156_IP.

RADIOLOGICALLY CONTAMINATED CASUALTIES

1-38. Casualties from fallout areas may have contamination on their skin and clothing. Removal of the contamination should be accomplished as soon as possible, but definitely before admission into a clean treatment area. The distinction must be made between radiation-injured casualties and those that are radiologically contaminated. Although casualties may have received substantial radiation exposure, this exposure alone does not result in the individual being contaminated. Normally, contaminated casualties do not pose a short-term hazard to the medical staff; rather the contamination is a hazard to the casualty's health. Under unusual circumstances and without casualty decontamination, medical personnel may receive sufficient exposure to receive cutaneous radiation injuries, especially with extended exposure. Standard precautions will mitigate the risk of these injuries to clinical providers. Certain isotopes emit radiation which may penetrate protective garments, causing continued radiation exposure to the victim and health care workers. This contamination also must be removed.

1-39. Radiologically contaminated casualties are normally decontaminated before admission to an MTF. Monitoring is conducted when potentially contaminated casualties arrive at the MTF. This monitoring is conducted at the MTF's receiving point/entry control point (ECP) before admitting the casualty. To properly handle radiologically contaminated casualties, medical personnel must detect the contamination. Detectors should be used to monitor casualties for contamination. Generally, a reading on the meter three to five times the background reading indicates that the casualty may be externally or internally radiologically contaminated.

Note. While contamination control measures should be practiced for radiologically contaminated casualties, lifesaving medical care should be administered as soon as possible with priority over thorough decontamination.

1-40. Radioactive decontamination is simple; removing all outer clothing and a brief washing or brushing of exposed skin will reduce about 90 percent of external contamination; vigorous bathing or showering is unnecessary. Do not let radiological contamination interfere with immediate lifesaving treatment or the best possible medical care. See Chapter 5 for details on patient decontamination.

1-41. Treatment procedures for radiation injuries are described in the Emergency War Surgery; Armed Forces Radiobiology Research Institute's (AFRRI) Medical Management of Radiological Casualties Handbook; and ATP 4-02.83/MCRP 4-11.1B/NTRP 4-02.1/AFMAN 44-161(I).

MANAGEMENT OF CASUALTIES INJURED BY NUCLEAR WEAPONS

1-42. Management of casualties injured by the immediate effects of nuclear weapons (flash, blast, and thermal) is the same as for conventional battlefield injuries, although the injury severity may be increased and combined injuries are likely. First aid (self-aid, buddy aid, and combat lifesaver) for lacerations, broken bones, and burns are performed.

Note. Combat lifesavers in the U.S. Army or USMC are Service members that have been trained to conduct enhanced first aid.

Types of Injuries Associated With Nuclear Warfare

1-43. There are different types of injuries associated with nuclear warfare. Four of them are discussed below.

Flash Injury

1-44. The intense light of a nuclear fireball can cause flash blindness. The duration of blindness depends upon the length of exposure and the intensity of flash. However, even at night it is unlikely that flash blindness will last more than a few minutes. Most individuals can continue their mission after a short recovery period. Severe cases may have retinal and optic nerve injuries that lead to permanent blindness; these cases will require evacuation to an MTF.

Blast Injury

1-45. Blast injuries have four types of effects—

- Primary injuries are due to overpressure (for example, eardrum rupture, and lung injury).
- Secondary blast injury is due to flying debris (for example, penetrating injury due to shrapnel).
- Tertiary blast injury is due to translational injury (for example, the victim is blown into the air and suffers blunt trauma by deceleration).
- Quaternary blast injury occurs from other effects, such as burns, delayed pulmonary or circulatory collapse, or infections.

Thermal Injury

1-46. Thermal injuries are generated by—

- Direct thermal radiation (flash burns and eye injuries).
- Indirect (flame) effects.

Radiation Injury

1-47. Casualties produced by ionizing radiation alone or with other injuries will be common. Due to the limitations inherent in field medical treatment and mass casualty care, it may not be possible to determine the total radiation exposure of most victims; however, a dose estimate can be done based on physiological

symptoms. When available, results from tactical or occupational dosimetry systems can be used as a starting point for determining total absorbed dose. Refer to STANAG 2474 and ATP 4-02.83/MCRP 4-11.1B/NTRP 4-02.21/AFMAN 44-161(I) for more information on ionizing radiation exposure. Additionally, total exposure may not be received at one time, but as the result of several incidents in contaminated regions. A high radiation exposure may allow determination of dose through biodosimetry techniques used by the Armed Forces Radiobiological Research Institute. For more information on biodosimetry, refer to ATP 4-02.83/MCRP 4-11.1B/NTRP 4-02.21/AFMAN 44-161(I).

HANDLING AND MANAGEMENT OF TOXIC INDUSTRIAL MATERIALS CASUALTIES

1-48. Although the hazards of weaponized chemicals have long been recognized, the hazards of industrial materials have only recently become more widely understood. Deliberate adversary release or inadvertent release of TIMs significantly increases hazards to the indigenous population and deployed U.S. forces. While CW agents are highly toxic and lethal in small amounts, the countries producing them are generally known and are few in number when compared with the quantities and universal nature of TIMs.

1-49. Toxic industrial materials should be recognized for the multiple health hazards they pose as well as the potential risks resulting from an explosion or fire associated with these products. Many TIMs pose a significant human health hazard via inhalation of vapors. Vapor concentrations at or near the point of release may be very high in confined spaces or areas with little or no ventilation and may displace or reduce the oxygen concentration below that required to sustain life.

1-50. Toxic industrial materials are often available in enormous quantities, do not require extensive research, and can be mass-produced. Toxic industrial materials could be released from industrial plants or storage depots through accidental or deliberate action. Toxic industrial materials could also be used as improvised weapons and have the potential for inclusion in clandestine weapons programs or concept of operations (CONOPS) plans.

1-51. Toxic industrial materials include chlorine, ammonia, solvents, pesticides, fertilizers, and petrochemicals that are extensively used in the manufacturing of plastics, rubber, textile fibers, drugs and detergents. Toxic industrial materials are used within industrial plants, sold and transported to other plants, and distributed through commercial and retail outlets. Toxic industrial materials can be found in almost every town, city, or country in the world.

1-52. There are thousands of commercial facilities worldwide that produce, process, or stockpile chemicals that are TIMs and also fall within the purview of the Chemical Weapons Convention. These include dual-use chemicals, which can be used for legitimate industrial purposes and as CW agents. Each year, more than 70,000 different chemicals amounting to billions of tons of material are produced, processed, or consumed by the global chemical industry. Many of these chemicals may be sufficiently hazardous to be a threat, either by deliberate or accidental release. The release of large volumes of TIM may result in the contamination of soil and potable water resources (surface water and groundwater), and could cause long-term ecological damage. Check the United States Chemical Weapons Convention Web site for more information.

1-53. Beyond their toxicity, TIMs may present other significant hazards. Industrial chemicals are often corrosive and can damage equipment to include electronic equipment. Many industrial materials are flammable, explosive, or react violently with air or water. These hazards can be greater than the immediate toxic effects from an industrial chemical release. Nonlethal exposures to TICs can illicit short- and/or long-term health effects, ranging from short-term transient effects to long-term disability.

Operational and Crisis Action Planning

1-54. In concurrence with deliberate and crisis action planning, CCDRs, command surgeons, HSS planners, preventive medicine personnel, bioenvironmental engineers, and public health personnel should develop an

understanding of the potential hazards from TIM in the AO. Information required to support vulnerability analyses and assessments during the planning process include some of the following key factors—

- Identifying all possible industrial plants, storage sites, and shipping depots.
- Identifying TIMs routinely produced, used, or processed in the area. Knowledge of the manufacturing processes used at an industrial plant is especially important as TIMs are often used as intermediates in the production of plastics, pesticides, and herbicides or other products and materials.
- Assessing the effects of the release of TIMs either as a result of collateral damage or an accident.
- Assessing whether the deliberate release of a TIM is realistic in a particular situation. Factors that should be considered in this assessment are—
 - Terrain and meteorological conditions.
 - Political environment (serves as a bargaining chip).
 - Military advantage or benefit to be gained.
 - Psychological impact.
 - The need for special detectors and/or modifications to detectors.

1-55. Potential information items for the commander. These items include—

- How does one determine if there is a potential threat?
- Is there a special way one needs to react to these chemicals that is different from the way he has been trained?
- Where is it safe to be?
- How much exposure is safe?
- What decontamination equipment can be used or is needed?
- What are the short-term and long-term health effects?
- What are the effects on noncombatants?
- What are the effects on military equipment including individual protective equipment (IPE)?

Hazard Level Zones Determination

1-56. Plans supporting determination of hazards levels (hot, warm, and cold zones) for each hazard site and immediate evacuation from the hazard's path are the best defense against a TIM hazard. Commanders should consult with the engineer officer, CBRN officer, legal officer, command surgeon/medical commander, intelligence officer, public health staff, meteorologists, fire and security personnel, emergency response hazardous materials (HAZMAT) incidents team, civil-military operations officer and public affairs officer when identifying hazard levels (zones). These staff officers can provide guidance for hazard isolation, site entry control, decontamination, on-scene medical treatment, evacuation, civilian populace, and in-place protection.

1-57. When evacuating the hazard area, evacuees should not be permitted to congregate except at established safe distances. Evacuation to established safe distance does not guarantee complete safety for evacuated personnel. Evacuated personnel should be moved to a designated location by a specific route and to a distance where additional movement is not required following a radical wind shift. Refer to the Department of Transportation Emergency Response Guidebook for Hazardous Materials Incidents and information on hazard level zones. This guidebook can be found on the Department of Transportation Web site.

Vulnerability Mitigation to Toxic Industrial Material Hazards

1-58. Each TIM incident has multiple considerations. When planning, ensure to obtain key information regarding effects, toxicity, production, storage facilities, and transportation of TIMs. This information can be acquired through companies that produce the TIMs, experts (for example, scientific or civilian industrial personnel, CW treaty experts), material safety data sheets, local civilian authorities that have emergency response procedures and resources, and other agencies (such as Centers for Disease Control and Prevention [CDC]; United States Environmental Protection Agency; and Agency for Toxic Substances and Disease Registry).

1-59. Refer to National Center for Medical Intelligence (USAF School of Aerospace Medicine) and U.S. Army Public Health Center (APHC) (Provisional) Web site for additional information. Reachback information can be found in Appendix C.

Note. Military CBRN protection, detection, and decontamination equipment were not designed for handling all TIMs.

1-60. In conducting detection procedures, some plants, facilities, storage containers, or transport containers may be identified by markers. These could take the form of international hazardous chemical markers that are diamond-shaped (United Nations markers) and contain information that can be used to identify the exact industrial chemical. When encountering a suspect industrial chemical, attempt to identify the exact TIM and all possible information on the material. For proper handling, protection, and hazard-management information, responders seek guidance from their command and control element. Other sources for assistance include the Chemical Transportation Emergency Center hot line, for emergency assistance within the U.S. and Canada: 1-800-262-8200 or from OCONUS: 1-703-741-5500. Commanders also identify the local civilian authorities that may have additional emergency response procedures and resources.

1-61. Commanders should consider the use of appropriate protective equipment tailored to a TIM threat at each location. Toxic industrial materials present hazards that may render CBRN equipment and procedures ineffective. Each TIM should be evaluated individually to establish protection and response procedures and to select associated equipment requirements. Mission-oriented protective posture ensemble, CBRN detection equipment, and CBRN decontamination procedures are specifically designed for use and tested against CW agents. The military protective mask may be used under emergency conditions to protect against the immediate toxic effects of some TIMs and while evacuating from the immediate hazard zone. However, the protective mask may or may not be effective in protecting against high concentrations of TIM over an extended period of time.

Precautions and Decontamination in Toxic Industrial Material Environment

1-62. Personnel or equipment that may have been contaminated with TIMs can usually be decontaminated by washing with large amounts of soapy water. Contaminated clothing should be immediately removed and disposed of in a safe manner.

1-63. If a TIM release has not occurred, a minimum hazard level zone based on mission requirements, surveys, and assessments of the TIM facility should still be established. If a TIM release occurs, planners should—

- Coordinate with civilian or host nation emergency response teams.
- Identify the probable TIMs, extent of possible contamination, minimum protective equipment, and personnel safety considerations.
- Coordinate with higher headquarters and the host nation to identify support availability.
- Develop an incident response plan. For detailed information and procedures for response plans, refer to Service-specific publications that provide templates for plan development (for example, MTTTP for CBRN Consequence Management and AFI 10-2501).
- Implement the TIM reconnaissance plan and assign units to prepare and execute the reconnaissance missions.
- Use commercial detectors which can provide confirmation of individual TIM, if available.
- Coordinate with decontamination elements for decontamination of personnel and equipment.
- Coordinate for transport and delivery of collected samples to the supporting laboratory.
- Avoid hazard areas as long as possible. When conducting reconnaissance or rescue operations near or within the hazard area, equip ground survey teams with respiratory protection (for example, self-contained breathing apparatus) and skin protection certified for TIMs. Use aerial or visual reconnaissance to help collect information to support operations.
- Coordinate with theater medical elements (for example, public health teams) for follow-on health risk assessments, as dictated by mission requirements.

Toxic Industrial Material Information Management Resources

1-64. The Department of Transportation Emergency Response Guidebook lists HAZMAT commonly shipped in the U.S. This publication is primarily a guide to assist first responders in quickly identifying the specific or generic hazards of the materials involved in the incident and protecting themselves and the general public during the initial response phase of the incident.

1-65. The National Institute for Occupational Safety and Health Pocket Guide to Chemical Hazards provides reference information in a table format, which can be used for hazard assessment and management. The information includes chemical names, synonyms, trade names, exposure limits, physical and chemical properties, chemical incompatibilities and reactivities, personal protection measures, and health hazards. For more information on the National Institute for Occupational Safety and Health Pocket Guide to Chemical Hazards, check the CDC Web site.

1-66. The Hazardous Materials Injuries: A Handbook for Pre-Hospital Care, provides guidance on TIM hazards for first responders. This manual details basic procedures to be accomplished with existing medical protocols.

MILITARY OPERATIONS IN A CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR ENVIRONMENT

1-67. A number of potential adversaries have or are in the process of developing weapons of mass destruction (WMD). Some adversary groups and several countries designated as *State Sponsors of Terrorism* have also shown an interest in pursuing a CBRN capability. Others are strongly engaged in the sale or transfer of associated CBRN technology. Chemical, biological, radiological, and nuclear weapons are considered *asymmetric threats*, since adversaries will seek an advantage over the U.S. by using unconventional approaches to circumvent or undermine our strengths while exploiting our vulnerabilities. The potential for catastrophic use of WMD is greater than it has been in many decades. Aimed at responding to the overwhelming power and superiority of the military infrastructure of the U.S., either domestically or abroad, terrorist employment of WMD could seriously disrupt the execution and tempo of military operations. It is imperative that HSS plans are prepared to reduce the effects that WMD has on the execution and tempo of military operations.

1-68. The medical commander must consider the nature of the environment. If the immediate environment is vulnerable to CBRN attack, the commander should determine the level of protection that would be needed during and after the attack. The mission of medical units in a CBRN environment is to survive the attack and sustain the supported force. In addition to providing medical care after the attack, the commander needs to know whether to expect residual contamination to remain and how long it is likely to persist. The commander needs to determine—

- Level of protection required. Is eye and respiratory protection sufficient or is full body coverage required?
- When to increase the protective posture. Donning protective clothing too soon can have an unwarranted negative impact on the Service member's ability to perform mission-related tasks. Will donning it too late result in casualties?
- Medical facility decontamination. Is facility decontamination required and, if so, which option is best?
- When to relax the protective posture. When is it safe to remove protective clothing to reduce heat stress and other restrictions on job performance? Is split-MOPP operation applicable to the situation?
- In addition to these considerations, the commander must consider other vulnerability reduction measures and be prepared to provide support to branches and sequels of the supported commander's operation.

COMBAT OPERATIONS

1-69. The U.S. Armed Forces operate across the range of military operations in an effort to deter war, resolve conflict, promote peace, and support of civil authorities in domestic and foreign emergencies as permitted

by law. Most combat operations will require the commander to balance offensive, defensive, and stability operations.

1-70. State-supported and nonstate adversary groups may employ CBRN weapons, or natural and man-made disasters may contaminate areas with toxic materials; whose mitigation will require the efforts of specialized military forces. The conduct of combat operations in a CBRN environment may require coordination and cooperation with agencies, organizations, and individuals, outside the military chain of command or direct control. In some situations, the JFC may be in a supporting role to civil authorities or to host nation authorities. Regardless of the role, the JFC and joint force elements must be prepared for CBRN use and contamination with toxic materials at any point, including the transition from noncombat to combat environments. Additionally, Chairman of the Joint Chiefs of Staff instruction (CJCSI) 3214.01E defines responsibilities for planning and conducting military consequence management (CM) operations in response to incidents on foreign soil involving WMD (ATP 3-11.41/MCRP 3-37.2C/NTTP 3-11.24/AFTTP 3-2.37). Refer to JP 3-0 for more information on combat and joint operations.

1-71. The HSS planning activities generally include hospitalization, preventive medicine/public health, veterinary services, medical logistics, and medical regulating and patient movement. Plans for OCONUS and CONUS operations should include provision for surge medical requirements using on-hand and rapidly deployable capabilities. Special consideration is required for HSS to noncombatant evacuation operation evacuees who may have been exposed to CBRN or other toxic agents. In the U.S., there may be a requirement to augment civilian medical capabilities in the handling of casualties resulting from CBRN incidents or other toxic material contamination. The ability of domestic and host nation medical facilities to handle mass casualties from CBRN effects should be assessed and factored into joint and multinational HSS planning.

1-72. Close coordination with HSS personnel and other public health providers in the theater is a vital means of detecting CBRN incidents, since casualties from such an attack may appear initially in the civilian medical system.

HEALTH SERVICE SUPPORT IN MULTINATIONAL OPERATIONS

1-73. Political, military, economic, social, information, infrastructure, physical environment, and time can have great impact on the delivery of HSS. Participating nations' forces of member nations must be supported either by national assets or through the alliance/coalition assets. Because resource contributions will vary between nations, some may contribute logistically, while others contribute military forces. Commanders of multinational forces should seek to ensure that member forces are appropriately supplied consistent with their nation capabilities and the terms established at the formation of the alliance and/or coalition. Plans in multinational operations should be coordinated with member forces.

1-74. Medical logistics is a major challenge for multinational operations. Chemical, biological, radiological, and nuclear planning issues to consider are—

- Stockage levels.
- Logistics mobility.
- Interoperability.
- Infrastructure.
- National resource limitation.
- Host nation and alliance/coalition support limitations/agreements. Joint force commanders typically form multinational logistics staff sections early to facilitate coordination and support of operations. For more information on logistics in support to multinational operations, see JP 4-08.

1-75. Operations abroad may involve military support to other countries' civil authorities. This support is controlled by the U.S. ambassador/country team or provided directly by the JFC according to bilateral or multinational arrangements. In all circumstances, commanders must reduce the vulnerability to a CBRN attack and be prepared to mitigate and recover from the consequences of a CBRN attack. Joint force commanders and joint/multinational elements must be prepared for CBRN use and contamination with TIMs at any point. For further guidance regarding stability operations, refer to Department of Defense Instruction (DODI) 3000.05.

OPERATIONS IN EXTREME ENVIRONMENTS

1-76. The adversary's employment of CBRN weapons or TIMs in the extremes of climate or terrain warrants additional consideration. These considerations include the peculiarities of urban terrain, mountains, snow and extreme cold, jungle, and desert operations in a CBRN environment with the resultant CBRN-related effects upon medical treatment and medical evacuation.

1-77. In mountain operations, passes and gorges may tend to channel a nuclear blast and the movement of BW and CW agents. Ridges and steep slopes may offer some shielding from thermal and radiation effects. Close terrain may limit concentrations of personnel and fewer targets may exist; therefore, a lower patient workload may be anticipated. However, the terrain will complicate medical evacuation operations and may require patients to be decontaminated, treated, and held for longer periods than would be required for other operational areas.

1-78. The effects of extreme cold weather combined with CBRN-induced injuries have not been extensively studied. However, with traumatic injuries, cold hastens the progress of shock, providing a less favorable prognosis. Thermal effects will tend to be reinforced by reflection of thermal radiation from snow- and ice-covered areas. Care must be exercised when moving chemically contaminated patients into a warm shelter. A CW agent on the patient's clothing may not be apparent. As the clothing warms to room temperature, the CW agent may vaporize (off-gas), contaminating the shelter and exposing the occupants to potentially hazardous levels of the agent. A three-tent system is suggested for processing patients in extreme cold operations. The first tent (unheated) is used to strip off potentially contaminated clothing. The second tent (heated) is used to perform decontamination, perform emergency medical treatment (EMT), and detect off-gassing. The third tent (heated) is used to provide the follow-on care and patient holding.

1-79. In rain forests and other jungle environments, the overhead canopy will, to some extent, shield personnel from thermal radiation. However, the canopy may ignite and create forest fires and result in burn injuries. By reducing sunlight, the canopy may increase the persistency effect of CW agents near ground level. The canopy also provides a favorable environment for BW agent dispersion and survival.

1-80. In desert operations, personnel may be widely dispersed, presenting less profitable targets. However, the lack of cover and concealment exposes personnel to increased hazards. Smooth sand is a good reflector of nuclear thermal and blast effects; generating an increase in the number of injuries. High temperatures will increase the discomfort and debilitating effects on personnel wearing MOPP, and increase heat injuries.

HEALTH SERVICE SUPPORT PLANNING CONSIDERATIONS

1-81. Health service support is integral to theater strategic, deliberate, and crisis plans. To provide adequate HSS, definitive planning and coordination with component/joint planning and intelligence staffs are required. The HSS activities must ensure adequate preparations before and during the transition to these operations in a joint environment. Additional guidance is provided in JP 3-0 and JP 4-02.

1-82. The CCDR establishes the command's HSS requirements and uses directive authority to ensure the proper coordination of all HSS capabilities in the force. Planning for HSS must include all aspects of HSS requirements especially the unique characteristics and effects of CBRN hazards and TIMs. Health service support planning must begin simultaneously with the operational planning process to ensure its synchronization with the campaign plan or operation plan (OPLAN). Timely, effective planning and coordination are essential for ensuring HSS mission success. The health threat, occupational and environmental health (OEH) threats, medical intelligence, patient estimates, theater evacuation policy, hospitalization, patient movement, and available lift, all play a significant part in supporting the theater mission. The medical planners must consider the above listed factors in planning HSS in support of the CCDR. Joint Publication 4-02 reflects more detail on HSS planning. Plans must include preventive medicine/public health, bioenvironmental engineering, and veterinary support as part of the early entry force to ensure DNBI prevention and food safety considerations begin as the force enters the theater of operations. Refer to JP 5-0 for additional information on contingency and crisis action planning.

1-83. It is imperative that medical CBRN defense be fully integrated into the deliberate planning process to maximize readiness. Key elements include patient estimates, comprehensive health surveillance, prophylaxis (including immunizations), diagnostics, mass casualty management, evacuation, and patient decontamination

requirements. The potential for high numbers of casualties among the indigenous population may make local medical facilities unavailable to the joint force. Gaps in the medical CBRN defense capabilities of multinational forces must be addressed in order to ensure multinational cohesion and effectiveness in both planning and operations. Joint and multinational exercises must include realistic standards for conducting HSS operations in a CBRN environment.

1-84. In addition, key staff elements must be closely coordinated with during the planning process. The CBRN staff will have conducted the CBRN intelligence preparation of the operational environment and development of CBRN aspects of courses of action. In addition, CBRN, operations, intelligence, information, and public affairs staffs will require input during the planning process in selection of decision points and trigger levels following CBRN incidents. Medical input is key in developing biological surveillance plans which aid in the rapid decisionmaking necessary to reduce the risk to the force. Additional information can be found in ATP 3-11.37/MCWP 3-37.4/NTTP 3-11.29/AFTTP 3-2.44. Planning must also consider the use of all HSS capabilities to prevent, detect, respond, and recover from CBRN attack. Each capability has a role to play to mitigate the effects of an attack and each must be synchronized with both the medical and nonmedical capabilities.

1-85. The USAF theater medical system operates within the air expeditionary task force and joint task force (JTF) structures to support CDR's objectives independent of location. This section offers the planning guidance for employment of Air Force Medical Service (AFMS) assets in CBRN environments. This guidance assists operational planners and the Air Force forces as they develop CONOPS in support of JFC deliberate and crisis action plans. The AFMS CBRN specialized teams or unit type codes (UTC) are designed to be location independent, scalable, deployable and tailorable, based on expected threat and/or operational needs, while providing a portfolio of CBRN capabilities. The UTCs may be deployed individually for specific threats, or when combined, can become an overarching and robust CBRN response force module team (AFMS CBRN Force Module). This module includes all the CBRN-specialized capabilities. When deployed as the AFMS CBRN Force Module, these UTCs provide a specific and greater synergistic effect against most CBRN threats. Planners shall review and understand the AFMS's UTC mission capability statements and individual tactics, techniques, and procedures /CONOPS to better understand how best to employ them. A summary of the AFMS UTCs is provided in Appendix C.

- The AFMS CBRN Force Module is composed of the prevention and aerospace medicine (PAM) team (all increments, FFPM1-7); biological augmentation team (BAT); Air Force radiation assessment team (AFRAT); and theater epidemiology team (TET). This module, or conglomeration of UTCs, provides Air Force commanders, Joint commanders and/or lead federal agency overarching expeditionary CBRN capabilities with the capacity to execute simultaneous missions within CONUS and OCONUS. These teams are rapidly deployable, equipped with rugged and specialized equipment, and ready to support the DOD worldwide based on the CBRN threat.
- Other AFMS UTCs or teams described in this document deploy in conjunction with a deployable/expeditionary MTF. They directly support and depend on the deployed MTF to perform their mission. Planning the flow of resources into the theater and the continued sustainment of those resources should involve input from the commander and his planning, operations, and logistics staffs to ensure campaign objectives are met with minimal overall operational risk. This must be considered during all phases of campaign planning and execution. Health service support planners should provide the commander a risk analysis and recommendations on courses of action to support CBRN-related operations.

COMMAND AND CONTROL SYSTEMS IN A CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR ENVIRONMENT

1-86. The JFC controls the command and control system to ensure that data and information get to the right place on time and in a form that is quickly usable by its intended recipients. In this regard, command and control systems play a critical role in delivering this data throughout the joint force. These communications systems permit the JFC to pass critical information at decisive times, to exploit tactical success, and to facilitate future operations. Logistics, operations, and intelligence functions all depend on responsive command and control systems. The command and control systems are the central system tying together all

aspects of joint operations and allowing commanders and their staffs to initiate, direct, monitor, question, and react.

1-87. In a CBRN environment, an unbroken chain of communications must extend from the CCDR, through the Service component commanders, to all subordinate commanders. The command and control systems must provide this chain of rapid, reliable, and secure flow and processing of data to ensure continuous information exchange throughout the force. To ensure the continuous and uninterrupted flow and processing of information, joint Services must have command and control systems that are interoperable, flexible, responsive, mobile, disciplined, survivable, and sustainable.

1-88. In a high threat CBRN environment, it is imperative that the communications architecture includes lines of communication among deployed combat units, medical units tasked with providing medical care, and specialized units providing CBRN detection, warning, and decontamination functions. Units at all levels must be capable of detecting and identifying CBRN agents, warning of and reporting CBRN events, performing individual and collective protection measures, decontaminating personnel, equipment, and terrain, and administering first aid according to unit medical operations and exposure guidance. For more information on HSS command and control, see FM 4-02 (Army), Air Force Doctrine Document (AFDD) 2-0 (USAF), and FM 3-11/MCWP 3-37.1/NWP 3-11/AFTTP (I) 3-2.42 (USMC).

OPERATIONAL COMMUNICATIONS

1-89. The Annex K of any OPLAN details the communications architecture between echelons of command and between supported and supporting units and provides security procedures and frequencies. Refer to Appendix B for more information and a sample of a HSS CBRN annex for an OPLAN. In cases where no OPLAN is published, the tasking order should provide communications details or it is determined in predeployment planning between the medical commander and the supported command surgeon for medical communications and within the deploying medical forces for internal communications. It is critical to ensure that communications assets and systems are compatible with systems used in the theater of operations.

1-90. National policy dictates the survivability of a national military command system through which decisions are transmitted to the command forces. It is not practical or economically feasible to make all communication systems or elements of a system equally survivable. The degree of survivability for communication systems supporting the function of command and control should be commensurate with the survival potential of the associated command centers. Refer to JP 6-0 for more information.

OBTAINING MEDICAL INTELLIGENCE INFORMATION ON CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR THREATS

1-91. Operations in a CBRN environment place a great need for HSS demands on the intelligence system. A clear and commonly shared assessment of adversary CBRN capabilities and U.S., multinational, and host nation's HSS capabilities and limitations in countering adversary CBRN use are of great importance. The CBRN threat information gathered by the component/joint intelligence staff is used by the deployed HSS staff for planning and the employment of HSS assets. Threat assessments should include the identification of industrial sites in the theater that use, produce or store large quantities of TIMs. Toxic industrial materials could become a health hazard to deployed forces if these sites are accidentally or intentionally destroyed or left in normal operation. Threat information is also used to prepare the health threat and update environmental health and industrial facility databases.

1-92. The National Center for Medical Intelligence (NCMI) prepares and coordinates integrated, all-source intelligence for the U.S. DOD and other government and international organizations on foreign health threats and other medical intelligence issues to protect U.S. interests worldwide.

1-93. The NCMI responds to requests from the Armed Forces for emergency, up-to-date medical intelligence assessments. The mission and functions of NCMI are to—

- Assess potential health risks and foreign health care capabilities in order to plan for the proper medical countermeasures, health care support, and medical personnel support.
- Assess foreign military and civilian medical capabilities, including treatment facilities, medical personnel, emergency and disaster response, logistics, and medical/pharmaceutical industries.

- Maintain and update an integrated database on all foreign military medical treatment, training, pharmaceutical, and research and production facilities.
- Identify and assess environmental risks that can degrade force health or effectiveness: chemical and microbial contamination of the environment, TICs and radiation accidents, and environmental terrorism.
- Assess the impact of foreign environmental health issues and trends on environmental security and national policy.
- Identify, assess, and report on infectious disease risks that can degrade mission effectiveness of deployed forces.
- Alert operational and policy customers to: foreign disease outbreaks that have implications for national security and policy formulation, including potential homeland defense implications regarding deliberately introduced versus naturally occurring disease outbreaks.
- Assess foreign basic and applied biomedical and biotechnological developments of military medical importance.
- Assess foreign civilian and military pharmaceutical industry capabilities.
- Assess foreign scientific and technological medical advances for defense against CBRN threats and hazards.

1-94. Accurate and timely medical intelligence is a critical HSS tool for planning, executing, and sustaining all military operations. A supporting intelligence element should exist at some point in the medical unit's chain of command. This element, whether military or civilian, should be the primary source for the HSS planner to access the necessary intelligence for the execution of HSS operations. The HSS personnel must develop a feedback system with the supporting intelligence element to provide and receive intelligence updates.

1-95. When obtaining intelligence to meet specific medical requirements, HSS personnel first determine if local intelligence data or NCMI medical intelligence publications can satisfy requirements. If significant requirements remain unanswered then a formal request for information should be submitted through intelligence channels. The request will be reviewed by the component/joint intelligence officer, joint staff operations (J-3), or at a level where the desired information is available. These requests could conceivably be passed up to the primary source of the DOD strategic intelligence, the Defense Intelligence Agency. In this case, Defense Intelligence Agency may validate the requirements and submit them to NCMI for completion. The requirements become tasks for NCMI to respond to the requester.

1-96. There are other specialized organizations that provide expert information resources on medical aspects of CBRN threats, casualty prevention, CBRN agent sample and specimen collection, and medical care and management of casualties. These include the Defense Threat Reduction Agency, the Armed Forces Radiobiology Research Institute, the Naval Medical Research Center (NMRC), the U.S. Army Medical Research Institute of Infectious Disease, the United States Army Medical Research Institute of Chemical Defense (USAMRICD), and the Army Public Health Center (Provisional). See Appendix C, Table C-1 (on page C-10), for more information on technical reachback points of contact.

1-97. United States Air Force HSS posture in a CBRN environment is consistent with Air Force ground support operational posture. Air bases are lucrative targets for attack. The USAF deployed medical facilities (such as expeditionary medical support [EMEDS] field hospitals) may be located near active airfields that are likely targets for military or adversary CBRN attack. Specialized teams can provide capabilities independent of installations or expeditionary air bases (such as performing vulnerability assessments) and present the opportunity to exploit intelligence. The AFMS assets support the passive defense component of USAF operational counter CBRN doctrine as well as any JTF tactical surveillance and identification components of the crosscutting element of command, control, communications, and computer systems.

1-98. Medical assets and information can save lives and maximize combat effectiveness by providing critical components of the air base "passive defense," conducting tactical CBRN surveillance and identification missions, and by properly treating, stabilizing, and processing CBRN casualties.

1-99. The deployed medical commander, CBRN Force Module commander and/or specialized team leader have a need-to-know and must be cognizant of operational intelligence pertaining to the CBRN threat. The deployed medical commander and force module commanders, UTC leaders, and key staff must have

appropriate security clearances for access to this information. The deployed medical commander or equivalent and his key CBRN staff must be integrated into the air expeditionary task force and/or JTF battle staff and CBRN cell, as tactically and situationally appropriate.

JOINT WARNING AND REPORTING NETWORK

1-100. The Joint Warning and Reporting Network (JWARN) is a computer-based application that integrates CBRN data and facilitates sensor information into Joint and Service command and control systems for AO situational awareness. The JWARN incorporates sensor alert information and CBRN observation reports from the field, generates a plot of the hazard area, displays it on the common operational picture, and generates the warning message to units. The JWARN replaces the manual processes of incident reporting and hazard plot generation.

1-101. The JWARN is a joint automated CBRN warning, reporting, and analysis software tool that resides on joint and Service command and control systems such as the Global Command and Control System—Joint Global Command and Control System; Maritime; and Command and Control Personal Computer/Joint Tactical Common Workstation; or stand-alone computers.

1-102. The JWARN software automates the NATO CBRN warning and reporting process to increase the speed and accuracy of information sharing to support force protection decision making and situational awareness. The JWARN uses the common operational picture of the host command and control network to display ground maps; unit locations; location of CBRN events; and the predictor actual location of hazards to support the commanders' situational awareness and response capability.

1-103. The JWARN operators in command cells support CBRN force protection, battlefield management, and operational planning by predicting chemical, biological, and radiological hazard areas based on sensor and observer reports, identifying affected units and operating areas, and transmitting warning reports.

1-104. The JWARN provides the JFC with the capability to—

- Report CBRN and TIM hazards detection.
- Analyze the detections to enable identification of the hazard and the affected locations and units.
- Disseminate warning information to affected units.
- Control and configure a local sensor network.
- Generate and display hazard areas interconnected to weather and medical databases.
- Retrieve and archive automatically event data to enable postoperations forensic evaluation.

1-105. The JWARN provides benefits to the Warfighter—

- Automates the current largely manual, error-prone process.
- Minimizes time from detection to warning (less than 2 minutes).
- Provides timely warning and dewatering of affected units to maximize combat effectiveness.
- Automates recording and archiving of hazard data to support commander decisionmaking and enable forensic analysis.
- Integrates with current and command and control systems.

1-106. The JWARN is designed to—

- Integrate and be compatible with Joint Service command and control systems located in the command and control centers at the appropriate level, defined by Service-specific annexes, and employed by CBRN defense specialists and other designated personnel.
- Disseminate warnings and transfer data for decisions down to the lowest level on the battlefield.
- Provide additional data processing, production of plans and reports, and access to specific CBRN information to improve the efficiency of limited CBRN defense personnel assets.
- Accelerate the warfighter's response to an adversary CBRN attack.

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Chapter 2

Casualty Prevention

GENERAL

2-1. Casualty prevention, a force multiplier, is essential throughout the health life cycle of Service members. Before deployment, good health requires control of environmental (to include disease and COSR) and occupational threats to prevent casualties and to maintain a healthy and fit force. During deployment, the adversary and the total environment present a health threat to the forces. The adversary threat produces most combat-related casualties commonly called battle injuries, while disease, environmental injuries (such as heat and cold), and COSR threats produce DNBI casualties. Implementation of casualty prevention management limits casualties from environmental, occupational, operational, and CBRN warfare threats.

2-2. Casualty prevention is a CBRN passive defense force multiplier focusing on threats posed by adversary forces and complex endemic and environmental health threats. Casualty prevention concentrates on countering two types of threats: health threat and adversary threat. The health threat is composed of a complex set of environmental and operational factors that combine to produce DNBI which, historically, creates the largest number of military casualties. The adversary threat usually produces smaller numbers of more seriously injured casualties. The adversary threat depends on the adversary's willingness and ability to use conventional and nonconventional weapons systems, munitions, and CBRN agents. Failure to counter any of these threats jeopardizes mission accomplishment and ultimately impacts achieving operational objectives. Medical readiness provides the means to mitigate these threats. Information provided by ongoing comprehensive health surveillance and DNBI reporting is critical to support CBRN operations, and are used as passive defenses and medical surveillance for casualty prevention.

2-3. Passive defense protects personnel from the effects of a CBRN attack and improves the capability of personnel to survive and sustain operations in a CBRN environment. Passive defense includes HSS measures, a process that begins before deployment, and encompasses the entire deployment scenario. Tactical level doctrine has traditionally segregated CBRN passive defense into the distinct principles of contamination avoidance, protection, and decontamination. While these principles remain valid, they are now recognized as components of the more expansive concepts of hazard awareness and understanding and contamination mitigation. For more information on passive defense, see FM 3-11/MCWP 3-37.1/NWP 3-11/AFTTP (I) 3-2.42 and FM 3-11.4/MCWP 3-37.2/NTTP 3-11.27/AFTTP (I) 3-2.46. Preparations for operations in potential CBRN environments begin early in predeployment and include threat assessments, medical screenings, preexposure immunizations, pretreatments, prophylaxes, mask fit testing and risk-based training on the ability to survive and operate in CBRN environments, training for HSS personnel in the use of protective equipment, and training of medical personnel in the specifics of CBRN casualty care. For more information on training of medical personnel for CBRN defense operations, refer to STANAG 2954.

2-4. Casualty prevention seeks to provide the line commander the best available health-based risk assessment of the tactical situation, improving his situational awareness, and enabling the Service members to perform the mission. It becomes imperative that passive defenses be aggressively pursued and established throughout the deployment process. For example, implementing a force health protection (FHP) program early on, as indicated through health surveillance (including medical and OEH surveillance activities), we can secure and sustain an effective force.

2-5. Prevention of DNBI casualties requires the full commitment of individual Service members and unit commanders. Force health protection actions and preventive medicine measures required to prevent and/or mitigate DNBI include—

- Implementing and refining comprehensive health surveillance to include medical and OEH surveillance activities.
- Collecting and analyzing specimens and samples.
- Developing objective exposure measurements to identify DNBI threats.
- Determining effective methods of assessment.
- Developing countermeasures to mitigate actual and potential health threats.

2-6. Geographic dispersion of forces and improved personal protective systems will reduce injuries. Prevention of CBRN casualties requires full use of detection capabilities, timely reporting, and use of protective measures.

COMPREHENSIVE HEALTH SURVEILLANCE ACTIVITIES

2-7. Comprehensive health surveillance is an important factor of FHP to promote, protect, and restore the physical and mental health of DOD personnel.

2-8. According to Department of Defense Directive (DODD) 6490.02E, comprehensive, continuous, and consistent health surveillance shall be conducted by the Military Services to implement early intervention and control strategies using technologies, practices, and procedures in a consistent manner across the military service.

- *Health surveillance* is the regular or repeated collection, analysis, and interpretation of health-related data and the dissemination of information to monitor the health of a population and to identify potential risks to health, thereby enabling timely interventions to prevent, treat, or control disease and injury. It includes OEH surveillance and medical surveillance (JP 4-02).
- *Medical surveillance* is the ongoing, systematic collection, analysis, and interpretation of data derived from instances of medical care or medical evaluation, and the reporting of population-based information for characterizing and countering threats to a population's health, well-being, and performance (JP 4-02).
- *Occupational and environmental health surveillance* is the regular or repeated collection, analysis, archiving, interpretation, and dissemination of OEH-related data for monitoring the health of, or potential health hazard impact on, a population and individual personnel, and for intervening in a timely manner to prevent, treat, or control the occurrence of disease or injury when determined necessary (JP 4-02).

2-9. The determination of unit-specific rates of illness and injuries (including related CBRN/TIM casualties) of public health significance is the foundation of these programs. Surveillance is closely integrated with the timely dissemination of data to those responsible for the prevention and control of DNBI casualties. Implementing guidance is found in DODI 6490.03. The establishment of uniform and standardized health surveillance and readiness procedures for all deployments is contained in DODD 6490.02E and DODI 6055.01.

2-10. Surveillance forms a basis for medical resource allocation, refines knowledge of the health threat, and permits continual assessment of the effectiveness of measures used to prevent and control DNBI. The surveillance teams gather, analyze, and submit this information to commanders, command surgeons, medical planners, and others that require this information.

2-11. In the current National Security Strategy, the president committed the U.S. to new approaches to counter biological threats. He called for obtaining timely and accurate insight on current and emerging risks. Biosurveillance, including early detection, is one of the first lines of defense against these threats. *Biosurveillance* is defined as the process of gathering, integrating, interpreting, and communicating essential information related to all-hazards threats or disease activity affecting human, animal, or plant health to achieve early detection and warning, contribute to overall situational awareness of the health aspects of an incident, and to enable better decisionmaking at all levels (National Strategy for Biosurveillance). This enhanced national biosurveillance capability will be applied broadly to identify and understand potential

human, animal, or plant health impacts resulting from CBRN and environmental incidents, as well as influenza and other public health trends, all of which may also be leveraged in the service of global health efforts.

2-12. This definition of biosurveillance is consistent with that of Presidential Policy Directive-21 and now emphasizes an all-hazards scope and informed decisionmaking. This National Strategy for Biosurveillance flows from the National Security Strategy, which highlights the importance of disease surveillance for public health threats, and is consistent with the National Strategy for Countering Biological Threats, which emphasizes information sharing among federal departments and agencies to identify biological threats.

2-13. Routine disease surveillance information may be the sentinel indicator of biological agent use. Early disease recognition enables effective intervention. A BW attack may create a mass casualty situation in the AO. The medical commanders have the core knowledge and competency for many BW passive defense actions. The medical commander fields deployable and forward-deployed assets that employ biotechnology to rapidly and accurately identify specific pathogens of military concern. This capability, coupled with health surveillance systems built on advanced information technology and management architecture can provide early recognition of a covert BW attack and rapid identification of agents, vastly improving commander situational awareness and enabling early and appropriate intervention.

2-14. The risk of disease can be mitigated by the rapid diagnosis of BW infection. Medical units (including preventive medicine/public health, veterinary detachments and field hospitals), now have the capability to identify BW agents in specimens and samples. Diagnostic systems issued to these units use polymerase chain reaction or immunoassay to identify the nucleic acid or antigen of some threat agents, respectively.

BIOLOGICAL THREATS

2-15. Endemic disease and BW agent threats in the joint operational area must be identified during the predeployment period. Infectious diseases in the AO should be prioritized and monitored according to the threat each poses to the force and the achievement of the mission.

2-16. During deployment, vigilant monitoring of DNBI rates (sick call, outpatient treatment, and hospital admissions) in relation to the numbers and location (current and previous) of deployed personnel and the number of known local disease vectors and endemic diseases is required for effective planning and refinement of appropriate countermeasures to biological agents and infectious disease. Information drawn from historical data, type of deployment, duration of the deployment, and the level of support needed can be used to create a predictive DNBI surveillance model.

DISEASE INCIDENCE FOLLOWING THE USE OF CHEMICAL, BIOLOGICAL, RADIOLOGICAL AND NUCLEAR WEAPONS

2-17. Factors of prime importance in determining the nature and severity of the disease effects are—

- Immunization status of personnel.
- Disease vectors and supporting habitats.
- Underlying health status of the population.
- Population density.
- Degree of industrialization in the AO.
- Availability of health services.
- Availability of sanitation facilities.
- Availability of food supplies.
- Availability of water and ice.
- Climate.

2-18. Without preventive medicine capabilities, increased incidence and morbidity from diseases will follow. Some diseases will predominate in incidence, depending upon the geographical areas involved and the endemic diseases present.

2-19. In urban areas with temperate climates, several diseases are endemic threats which can become epidemic threats and may include—

- Dysentery (due to a variety of pathogens).
- Rickettsial diseases, particularly typhus and scrub typhus.
- Hepatitis.
- Tuberculosis.
- Malaria and cholera (in many parts of the world).

2-20. There are several reasons for the increased risk of disease including, but not limited to—

- Crowding of surviving populations with limited sanitary facilities as was seen during the flight of Rwandan refugees into the North Kivu region of Zaire, in Haiti after the catastrophic earthquake in 2010, and in Europe at the end of World War II.
- A lack of prophylaxes and immunizations with resultant increases in the susceptibility factor of a given population.
- A lack of pest management activities.
- The introduction of a BW agent in an AO where the disease organism is endemic.

RADIATION AND DISEASE

2-21. With the high levels of fallout covering wide areas, a large number of people will sustain sublethal whole-body doses of radiation. The interaction of radiation with infections is not clear; but it may be the result of latent infections manifesting and decreased resistance to infection. The result is an increased incidence of disease.

2-22. Each class and order of animals has marked differences in sensitivity to radiation. Arthropods, for example, are much more resistant than vertebrates. The normal balance between arthropods and birds that prey upon them in a given area may be severely upset, producing a marked overgrowth of arthropods. If the arthropods include vectors of disease there would be a serious increase in disease hazards. If there is an increase in arthropods that destroy vegetation there would be a serious destruction of food crops.

MEDICAL COUNTERMEASURES FOR CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR CASUALTY PREVENTION

2-23. The spectrum of HSS capabilities must include the ability to prevent and mitigate the effects of CBRN casualties and conventional injuries. Force health protection and HSS includes a combination of preventive and therapeutic measures that are effective in a CBRN environment. Therefore, commanders must ensure that all personnel are in a constant state of readiness to survive and accomplish their missions in CBRN environments. Commanders must ensure that personnel are fully trained in the techniques and procedures for CBRN survival. This includes regularly scheduled training and instruction in the use of all available IPE (include mask fitting/testing) and available medications (such as chemoprophylaxis and pretreatments).

2-24. It is important to monitor the health of the force to gauge the predeployment health status of units and to identify preexisting (baseline) health characteristics of an individual. Appropriate medical countermeasures must be implemented, particularly in the areas of food and water vulnerability, waste disposal, and personal protective measures (such as immunizations, prophylaxis, insect repellents, and insect nets).

2-25. Preventive measures in FHP/HSS planning for CBRN environments include—

- Development of the body's natural defenses through individual and unit health and fitness programs.
- Integration of military preventive medicine and civilian public health preventive capabilities to the extent feasible.
- Protection of medical supplies and equipment by using CW agent-resistant coatings and covers.
- Frequent testing of all food and water sources and supplies for CBRN contamination.

- Force protection measures extended to HSS organizations and facilities to ensure HSS availability in the event of adversary CBRN attacks.
- Integration of HSS units and facilities into joint force plans and activities to limit CBRN exposure and contamination following a CBRN attack, through application of CBRN defense principles.
- Monitor of local animal and insect populations for illness or death.

TRAINING AND EXERCISED FOR CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR DEFENSE

2-26. Medical readiness training is founded in the art of military medicine. The training includes an understanding of how the combat environment (including CBRN) affects—

- Service members and the related preventive and clinical interventions required.
- Hazard exposures and regional diseases.
- Baseline clinical competence, including mass casualty management.
- Clinical knowledge and skills specific to combat-unique injuries, CBRN injuries, and platform-specific roles, supplies, and equipment.

2-27. In addition to training clinical skills in casualty prevention and management, medical care providers must be trained to survive in a CBRN environment. Medical planners must be trained to plan for operations in a CBRN environment and collective training must include appropriate CBRN scenarios.

2-28. Individual and joint unit decontamination training across the force ensures the readiness to fight and win should an adversary employ CBRN weapons. Training is a responsibility shared by combatant commands, Services, and a number of DOD agencies. Training and exercise programs must incorporate the principles for operations in CBRN environments and include realistic consideration of CBRN weapons effects on sustained combat operations.

2-29. Training opportunities exist both internally and externally and should include the following:

- Initial and sustainment training.
- Individual, collective, and unit training.
- Intraagency and interagency training.

2-30. Exercises provide the opportunity to interact with other units or Services and federal, state, or local agencies. Exercises developed by non-DOD agencies provide an opportunity to improve military capabilities for support of homeland security operations with minimal resources. These exercises emphasize interoperability requirements and stress staff coordination. They also serve to identify shortfalls in communications or other capabilities that must be corrected.

PLANNING FOR HEALTH SERVICE SUPPORT OPERATIONS IN A CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR ENVIRONMENT

2-31. Medical personnel must include the unique characteristics and effects of CBRN weapons/agents in their HSS plans. Although most essential care is rendered outside the area of immediate combat in a nontactical environment, triage, patient decontamination, and initial resuscitative care are necessary in the operational area. Medical commanders must ensure that MTFs can locate clean areas to establish operations or employ CPS systems in areas that have the potential for being contaminated.

2-32. The CCDR and his medical planners establish the command's HSS requirements and ensure the proper coordination of all HSS capabilities. Medical plans must account for the possible disruption of supply lines, contamination or destruction of medical units, and the contamination of medical evacuation assets. Resupply of units in the downwind hazard area or on the far side of a contaminated area must account for the need to protect both the Class VIII supplies, the platform used to conduct the resupply, and the personnel conducting resupply. The CBRN medical countermeasures will be in demand after a CBRN attack. These countermeasures must be pushed to locations near the unit. The CBRN casualty estimation during the planning process will give medical planners and logisticians an approximate demand for CBRN medical countermeasures following a CBRN attack. Casualty estimation both aids in risk assessment, course of action analysis, and medical force planning.

2-33. The use of CBRN agents by the adversary, can cause targeted or large numbers of casualties in a short period of time. Commanders and medical planners must have procedures in place for CBRN casualty management. Effective care and management of CBRN casualties require planning to treat large numbers of individuals as discussed in Chapter 3.

2-34. Planners must include a comprehensive, workable plan to decontaminate casualties to be evacuated from the theater of operations. Contaminated casualties must be decontaminated before entering the strategic air evacuation system unless the CCDR and Commander, United States Transportation Command (USTRANSCOM) direct otherwise.

2-35. When BW agents are a threat, decontamination, isolation, and processing procedures must be in place to prevent the spread of contagious infections. Every attempt should be made to contain contagious diseases within the AO. Adequate preplanning is particularly critical when contagious casualties (for example, smallpox or plague) are anticipated. Preplanning coordination with USTRANSCOM on the use of air assets, and the Department of State for permission to fly contagious casualties over another nation's airspace, must be accomplished. Refer to Chapter 4 of this manual; ATP 4-02.84/MCRP 4-11.1C/NTRP 4-02.23/AFMAN 44-156_IP; and AFTTP 3-42.5 for more detailed information. The most current guidelines can be obtained from the Commander, USTRANSCOM.

2-36. The demand for public health support will increase commensurate with the CBRN threat. Preventive medicine and public health personnel and the command surgeon assist the CCDR in determining the health risks associated with CBRN hazards, the safety of drinking water and ice, and the appropriate time for using pretreatments, prophylaxes, immunizations, barrier creams, and other preventive medicine measures. Preventive medicine and public health personnel must establish and maintain comprehensive health surveillance programs. These programs are established before deployment and continue after deployment. To maintain combat effectiveness, commanders and HSS personnel must continually evaluate capabilities and make adjustments to conform to the CCDR's priorities.

PREPARATION, PLANNING, AND EXECUTION OF HEALTH SERVICE SUPPORT IN CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR ENVIRONMENT

2-37. Health service support encompasses a range of operational medical concepts designed to establish future benchmarks for the Military Health System. Military Health System support is more than clinical medicine; it involves enhanced methods of preventing casualties before, during, and after a military operation. The tenets of Military Health System include—

- Emphasis on fitness, preparedness, and preventive measures.
- Improvements in monitoring and surveillance of threats and forces engaged in military operations.
- Service member's and commander's awareness of the health threat before it can affect the force.

2-38. For more information on the efficiency and interoperability of medical support planning for operations in CBRN environments refer to STANAGs 2478 and 2873.

2-39. The CBRN operations process consists of plan, prepare, execute, and assess. It is a continuous process and performed concurrently during operations in a CBRN environment. It provides a framework for organizing CBRN passive defense activities necessary to conduct operations in CBRN environments. For more information on CBRN passive defense, refer to FM 3-11.4/MCWP 3-37.2/NTTP 3-11.27/AFTTP (I) 3-2.46.

PREDEPLOYMENT ACTIONS AND PROCEDURES

2-40. The capability to defend against CBRN attacks and sustain combat operations in CBRN environments requires forewarning and properly trained and equipped forces throughout the theater. Casualty prevention initiatives using passive defense measures are planned for early in the predeployment planning process.

2-41. Predeployment requires inclusion of detailed planning for HSS in a CBRN environment. Medical commanders and planners must look beyond mobilization. They must be prepared to deploy their command on short notice into a CBRN environment and conduct their mission, either in CONUS or OCONUS. They

must project the unit's theater requirements for each mission in order to provide the required support. In preparing for deployment, the medical commander must ensure that the following actions are addressed.

Medical Estimate of Situation

2-42. The HSS plans officer or noncommissioned officer (NCO) will do the medical estimate. Medical commanders will conduct a predeployment vulnerability assessment of preventive medicine/public health concerns (validating NCMI-identified health threats); and assess vulnerabilities to local food and water sources, potential epidemiological threats, local medical capabilities, vector/pest threats, and hygiene of local billeting and public facilities. These assessments will provide the necessary information to determine the initial force protection strategies and resources required to mitigate risks to DOD personnel and assets.

Casualty Prevention Measures

2-43. Immunization must be done prior to deployment—

- Department of Defense minimum requirements must be current (as defined by the most recent Advisory Committee on Immunization Practice vaccine-specific schedules).
- For additional information, refer to AR 40-562/BUMEDINST 6230.15B/AFI 48-110_IP/CG COMDTINST M6230.4G.

Deployment-Specific Medical Countermeasures

2-44. Based upon the geographical location and threat assessments, the CDR, under advisement of senior medical personnel, will determine the need for—

- Additional immunizations (for example, anthrax and smallpox).
- Chemoprophylactic medications (for example, ciprofloxacin and doxycycline).
- Medical device (for example, reactive skin decontamination lotion [RSDL]).

Individual Health Assessment

2-45. Conduct predeployment health assessments using the Department of Defense (DD) Form 2795 (Pre-Deployment Health Assessment) and ensure medical and dental requirements are current according to Service policy, including—

- Mandatory occupational health examination and training requirements (for example, respirator exams and fit testing).
- Dental Classes I/II.
- Significant health conditions (for example, medical profiles/waiver, and pregnancy).
- Collection of additional baseline biological samples as warranted by the deployment health threat.
- Human immunodeficiency virus testing according to Service policy or the supported CDR policy (serves dual purpose: human immunodeficiency virus screening and predeployment serum sample).
- Tuberculin skin test results must be documented appropriately in the deployment health record. Currency (or periodicity) of tuberculin skin test is established by Service-specific policies based upon analysis of Service-unique risk factors. Thus, Service policies may permit more than a 24-month period to elapse between tuberculin skin tests (for previous converters handle according to Service policy).
- Deoxyribonucleic acid sample on file.
- Ninety to 180-day supply of prescription medications.
- Required medical equipment (such as glasses, protective mask inserts, hearing aids, or dental orthodontic equipment).
- Medical Record. Create or update the deployed medical record DD Form 2766 (Adult Prevention and Chronic Care Flowsheet) with—
 - Blood type.
 - Medications/allergies.

- Special duty qualifications.
- Corrective lens prescription.
- Immunization record.
- Completed DD Form 2795. Medical summary sheet identifying medical conditions (such as Glucose-6-phosphate dehydrogenase deficiency, sickle cell trait).

2-46. The DD Form 2766 is the DOD standard form in the medical record for recording essential readiness indicators. This will be the common location for minimum documentation by all Services, which may be supplemented by other forms such as CDC 731 (International Certificate of Vaccination or Prophylaxis as Approved by the World Health Organization) and Service-specific forms. The DD Form 2766 will deploy with the individual.

Predeployment Training

2-47. Medical personnel will provide a health threat briefing to deploying personnel identifying health threats and countermeasures to include applicable immunizations and other preexposure drugs, such as pyridostigmine bromide.

2-48. All deploying personnel should be trained in CBRN-related self-aid, buddy aid, and combat lifesaver skills to include immediate decontamination, administration of CBRN medical countermeasures and barrier creams, and the wear/care and inspection of IPE or personal protective equipment (PPE).

2-49. The IPE is the personal clothing and equipment provided to all military personnel to protect them from CBRN hazards. Protective equipment that meets civilian certifications as required by the U.S. Department of Labor Occupational Safety and Health Administration (OSHA) is considered PPE.

2-50. If possible, all medical personnel should be trained in CBRN casualty triage, emergency treatment in a CBRN environment, and how to thoroughly decontaminate CBRN-contaminated casualties.

Review of Medical Plans

2-51. All medical predeployment/deployment plans pertinent to providing operational support (such as CCDR OPLANs, OPLAN Annex Q, deliberate plans, and CBRN passive defense plans) must be reviewed. These plans will define how the medical force will arrive at the deployment location, set up, and achieve initial operational capability status.

2-52. Medical planners need to conduct risk assessments for all known health hazards in accordance with JP 3-0, JP 2-01.3, and Service risk management guidance and incorporate health risk assessments into overall operational plans and specify requirements for risk control decisions by the appropriate level in the command.

2-53. Medical planners need to incorporate risk management and surveillance recommendations into the HSS Appendix, Annex Q (medical) of the deliberate or crisis action plan.

2-54. Medical planners will—

- Ensure personnel have their chemical protective overgarment, gloves, over boots, protective mask, skin decontaminating kits, and individual equipment decontamination kits.
- Ensure units have authorized CPS systems and that personnel are trained on their employment.

Coordinate Service and Support

2-55. Medical, civil engineering, transportation, and logistics support personnel must work together to provide a fully integrated CBRN defense capability. The medical commander coordinates with civil engineering readiness support when integrating CBRN considerations into the plan to prevent duplication of effort. The medical commander and his staff coordinate with the logistics planner to prioritize time-phased flow of medical materiel and personnel to accommodate the most appropriate time to have resources and CBRN passive defense capabilities in theater and ensure that these are integrated with related efforts.

2-56. For more information on predeployment health activities, refer to DODI 6490.03.

DEPLOYMENT ACTIONS AND PROCEDURES

2-57. The deployment phase consists of preattack, attack, and postattack postures. Detailed information on all phases of CBRN operations is found in FM 3-11/MCWP 3-37.1/NWP 3-11/AFTTP (I) 3-2.42.

Preattack Posture

2-58. Given the disruption of transportation, communications, and operations during and following a CBRN attack, it should be clear that preparation is the key to survival and effectively providing HSS. Preparing a simple and complete tactical standard operating procedure (SOP) and HSS plan that integrates CBRN is the first step. Critical training for medical personnel before a CBRN attack includes how to—

- Survive the attack individually and as a unit.
- Operate the Role 1 through Role 3 MTFs in a CBRN environment.
- Effectively care for CBRN patients.

2-59. Medical commanders maintain vigilance to ensure CBRN preparedness of their units that includes:

- Just-in-time training.
- Individual and unit protective equipment inspections.
- Refining the existing medical contingency response plan to reflect the current mission and identification of CBRN threat.
- Up-to-date documentation of health surveillance data in accordance with applicable policies.
- Review of casualty prevention and casualty care responsibilities.
- Review of decontamination capabilities and water supply for decontamination.
- Review of resupply issues to include adequate supplies of antidotes, anticonvulsants, bandages, mask filters, IPE for HSS staff and anticipated casualties, and patient protective wrap (PPW) for anticipated casualties.
- Verify CBRN defense HSS inventories are complete.

2-60. As with other military personnel, HSS personnel must—

- Use work/rest cycles during the early stages of the deployment to become acclimated to the AO (to include the ability to operate in MOPP Level 4), mission permitting.
- Take prophylaxes and pretreatments as prescribed.
- Keep immunizations up to date.
- Use the insect repellent system.
- Practice good personal hygiene.
- Drink adequate amounts of water.
- Request preventive medicine support when needed.
- Practice good field sanitation processes or measures.

2-61. The best defense for HSS personnel is to protect themselves, their patients, and medical supplies and equipment by applying contamination avoidance procedures. They must ensure that stored medical supplies and equipment are in protected areas or in their storage containers with covers in place. One method of having supplies and equipment protected is to keep them in their shipping containers until needed. Even minimal site preparation (collective protection) may improve survival, greatly reduce contamination, and maintain the ability to continue to provide HSS.

2-62. Pest control operations will be conducted using the integrated pest management program described in DODI 4150.07. Document the types, concentrations, amounts, application methods, dates and times, locations, and the personnel potentially exposed to the hazardous substances.

2-63. The medical commander should be knowledgeable of the various capabilities of supporting medical units that are assigned and available to the deployed location, as well as the reachback capability of medical assets assigned to support the theater. The medical commander should use all resources available to provide protective measures for all assigned personnel and casualties.

2-64. The medical commander will need to coordinate with supported units for nonmedical augmentation personnel to accomplish patient decontamination at the MTFs. Medical personnel will review supported units' CBRN plans, procedures, casualty collection points, decontamination sites, and resources available to support the HSS mission and will coordinate with the commander's staff of the supported unit to develop the HSS courses of action to obtain necessary materiel to support extended operations when resupply main supply routes are contaminated or transportation support is not available.

2-65. The supported CCDR will provide guidance and support to component commands to—

- Develop individual protection and unit deployment policy for deploying personnel to include which CBRN medical countermeasures should be issued to individuals or to units in bulk.
- Develop policy on the storage and handling of bulk issued CBRN medical countermeasures to ensure the material remains effective throughout the operation. Each type of CBRN medical countermeasure has unique storage requirements needed to prolong its efficacy.
- Ensure subordinate medical activities conduct timely, standardized, comprehensive surveillance, risk assessments, and prevention of health hazards.
- Ensure DOD health surveillance requirements are met for reporting and archiving of health surveillance data and reports (DNBI, reportable medical events, and OEH surveillance data). Ensure documentation in the individual medical records of all individual health treatment provided at all roles of care. Document periodic occupational and environmental monitoring summaries for each permanent or semipermanent basing location and update at least annually. File the occupational and environmental monitoring summaries in the medical records of each individual for which the exposure applies or archive the summaries so that they are readily available electronically to health care providers and redeployed personnel. This link is established by documenting the individual exposures in the Defense Occupational and Environmental Health Readiness System. Copies of the report should be submitted to the Military Exposure Surveillance Library for archiving. Refer to Technical Guide (TG) 230, DODIs 6055.01, 6055.05, and 6490.03 for more information.
- Ensure OEH risk assessments are continuously reviewed and updated throughout the deployment using data collected in theater. Significant newly identified OEH risks should be communicated to all appropriate organizations, including the Defense Intelligence Agency through NCMI, JTFs, combatant commands, Services, and Service OEH centers.

2-66. The JTF/combatant command personnel readiness unit will ensure the Defense Manpower Data Center is provided theaterwide rosters of all deployed personnel, their unit assignments, their unit's geographic locations. Accurate personnel deployment rosters are required to assess the relative significance of medical disease/injury in terms of the rate of occurrence among the deployed population. Without the means to identify the locations of deployed personnel it will not be possible to accurately determine potential exposures to CBRN agents and hazards.

Attack Posture

2-67. While it is possible that the CBRN attack will be a discrete short event, the more likely scenario is that the adversary will use CBRN throughout the conflict. The CBRN warning and reporting system will provide as much notice as is possible. For more information on CBRN warning and reporting system, see FM 3-11.3/MCRP 3-37.2A/NTTP 3-11.25/AFTTP(I) 3-2.56. Using the information provided, HSS personnel will continue their mission by using the best available protected areas. If warned of a CBRN attack, personnel should take up positions within the best available shelter; and leadership will direct movement out of these positions when it is safe or when mission dictates. When time permits and warnings are received that a CBRN attack is imminent or that a downwind hazard exists, HSS personnel should employ their CPS (see Chapter 12) or seek protected areas (buildings, tents, or other above ground shelters for BW or CW attack; culverts, ravines, basements, or other shielded areas for nuclear attack) for themselves and their patients.

2-68. Other considerations for casualty prevention during an attack posture include—

- Alarm conditions.
- Donning of IPE.
- Understanding MOPP level.

- Operation of CPS.
- Knowing the principles for surviving and operating in a CBRN environment.
- Monitoring of CBRN JWARN.

Postattack Posture

2-69. After a CBRN attack, medical personnel should assess their own health status, their subordinates, and those of their patients. All personnel must survey their equipment to determine the extent of damage and their capabilities to continue the mission. Other casualty assessment measures include—

- Surveillance for health risks and exposure symptoms requiring treatment.
- Detection of agents.
- Identification of the specific CBRN agent employed.
- Contamination avoidance.
- Continued protection measures.
- Contamination control/decontamination of personnel, equipment, supplies, and food stores as indicated.
- Triage/treatment of CBRN and conventional casualties.
- Coordination of casualty disposition/evacuation.
- Disposition of contaminated equipment and supplies.
- Patient quarantine.

2-70. All patients arriving at Roles 1 through 3 MTFs must be checked for CBRN contamination (use detectors or meters). In situations involving the rapid evacuation of casualties prior to identification of CBRN contamination, these systems can be used as monitoring devices in patient reception areas as they can be set to alarm when detecting contamination. The use of currently fielded detectors for patient monitoring has some limitations including: scarcity in fielding to medical units, not all chemical agents can be detected or at low enough levels, there are no real time or near-real time detectors for biological agents, and alpha particles may not be detected by radiation detectors.

2-71. Patients are decontaminated before treatment (see Chapter 5) to reduce the hazard to HSS personnel, unless life- or limb-threatening conditions exist. Patients requiring treatment before decontamination are treated in the EMT area of the PDS. Examples of patient conditions that may require treatment at the contaminated treatment station of the PDS are massive hemorrhage, respiratory distress, and/or severe shock.

Note. Not everyone has detectors. Detectors don't detect everything. Detectors do not provide real time.

2-72. Initially, patients from nuclear detonations will be suffering thermal burns and/or blast injuries. Nuclear blast and thermal injuries will manifest immediately; most radiation-induced injuries will not be observed for several hours to days. Patients exposed to chemical agents will manifest their injuries immediately upon exposure to the agent, except for blister (vesicants) agents. Patients exposed to biological agents may not show any signs of illness for hours to days after exposure, except for trichothecene mycotoxins. Also, expect patients and HSS personnel to be disoriented.

2-73. Incident reports (including acute and/or catastrophic exposures to TIMs and CBRN threats and hazards) with accompanying data must be accomplished—

- Initial reports must be made no later than 7 days after an incident or outbreak.
- Interim and final reports shall be forwarded no later than 7 days after investigation.
- Combatant commands will forward copies of the reports for storage in the Military Exposure Surveillance Library or Service-specific data collection system.
- Refer to DODI 6490.03 for more information.

2-74. It is advisable to assign preventive medicine/public health and/or veterinary representatives to monitor the breakout, preparation, and handling of food supplies in a contaminated environment. They should also be involved in the monitoring of potable water supplies for contamination.

2-75. In a CBRN environment, medical personnel are responsible for evaluating clinical specimens for use in identification of the agent.

2-76. In radiological defense, medical personnel are responsible for recording the accumulated radiological dose of each Service member, treating casualties from radiation illness, and monitoring personnel who appear to have absorbed, inhaled, or ingested radiological contamination.

2-77. Following an event involving a radiological or chemical agent, support commanders with contaminated platform/materiel decontamination clearance assessments to protect human and environmental health. To meet the Office of the Secretary of Defense policy for clearance criteria and guidance on materiel returning to CONUS, refer to JP 3-41 (Radiological Clearance Criteria Guidelines for Platforms and Materiel and Issuance of Chemical Clearance Guidelines for Platforms and Materiel).

REDEPLOYMENT

2-78. Forces redeploy out of the operational area as quickly as the situation dictates. However, the CCDR may have follow-on operations or security concerns that require a well-planned sequence to the drawdown of forces. The CCDR may order reconstitution operations to be completed prior to the redeployment of all forces. The CCDR must plan redeployment consistent with the follow-on operational mission requirements. For more information on redeployment, see JP 3-0 and JP 5-0.

2-79. Redeployment procedures involve the transfer of units, individuals, or supplies from one AO to—

- Another AO.
- Other locations within the area.
- Their home station/demobilization station for the purpose of further operational employment.
- Demobilization.

2-80. There are four phases to redeployment—

- Recovery, reconstitution, and redeployment planning activities.
- Movement to and activities at ports of embarkation.
- Movements to and activities at ports of debarkation.
- Reception, staging, onward movement, and integration.

2-81. Careful contingency planning that provides workable guidelines for the disposition of casualties and human remains (HR) must be conducted prior to the operation and prior to rotating personnel out of the AO. If BW agents have been used in the theater of operation, redeployment planning must include the health screening of personnel before their movement out of the theater to prevent the spread of disease. Planning must also incorporate close coordination with multinational unit commanders, who have forces in the theater to ensure disease containment.

2-82. Although many of the considerations for redeployment correspond to those for a deployment, there are differences. During deployment, elements of a unit are configured for strategic movement with the ultimate goal of reassembling the elements into an effective force in theater. During redeployment, unless the unit is redeploying to a new theater, the goal is to move forces home rather than building a force for theater operations. Therefore, redeployment preparation involves reestablishing unit integrity and accountability of personnel and equipment. In the reconstitution process, commanders reestablish the unit by undoing organizational changes made to the unit for operations in the theater. The unit may or may not redeploy to home station as a pure unit. Redeployment to new theaters may require organizational modifications, as in the original deployment.

2-83. The CCDR must consider actions to attain specific CBRN-related objectives and conditions, particularly those associated with disabling or destroying adversary CBRN capabilities. The CCDR must also ensure all personnel and equipment are decontaminated before redeployment. The CCDR establishes when HSS requirements and capabilities are drawn down or are no longer needed.

POSTDEPLOYMENT ACTIONS AND PROCEDURES

2-84. The postdeployment actions consist of a continual health surveillance monitoring and active collection of repository data. Actions will include—

- Postdeployment health assessment DD Form 2796 (Post Deployment Health Assessment [PDHA]) for exposures documentation.
- Continuation of medical treatment for redeploying personnel and documentation of casualties.
- All environmental exposures should be highlighted and surveillance data stored in the Military Exposure Surveillance Library or Service-specific data collection system. Data must be sent and archived according to DODI 6490.03. Refer to NTRP 4-02.9/AFTTP 3-2.82_IP/ATP 4-02.82 for more information regarding OEH surveillance activities.
- Disposition of contaminated equipment and supplies. Cleanup of CBRN waste from PDS is addressed during planning and is executed during decontamination operations and at their termination.
- Submission of HSS lessons learned in accordance with Service requirements and the Joint Uniform Lessons Learned System.

2-85. Medical debriefings are conducted with redeploying Service members on all significant health events, CBRN and TIM exposures, and concerns (also identified on postdeployment health assessments). Medical personnel will ensure these events and exposures are documented in individual Service member's health records. Medical debriefing ideally occurs within 5 days prior to departure from theater, but may be conducted within 5 days upon return to CONUS/home station.

2-86. Service members are identified in need of medical evaluation upon return to home/processing station based on review of medical treatment received in theater, the postdeployment health assessment, and other pertinent health surveillance data. Reserve Component members in need of a more detailed medical evaluation or treatment shall complete DD Form 2697 (Report of Medical Assessment) and, with the Service member's consent, be retained on active duty pending resolution of his medical conditions as provided in Section 12301, Title 10, United States Code (10 USC 12301), and implemented in Assistant Secretary of Defense Regular Army memorandum, Authority to Call Reserve Component Members to Active Duty for Medical Purposes.

2-87. Significant health related events/exposures are included in operational after action reports. This will include any disease outbreaks, location of TIM sources, contaminated sites (HAZMAT/wastes, CBRN, and other), presence of disease vectors, and other operational factors that affected the overall health status (acute, chronic, or latent effects) of the deployed Service members. Medical personnel ensure after action reports are provided to the intelligence community (including NCMI) and Service centers for lessons learned to be incorporated into future operational planning.

2-88. The Armed Forces Health Surveillance Center operates the Defense Medical Surveillance System (DMSS), a continuously expanding relational database that documents military and medical experiences of Service members throughout their careers. As the central repository of medical surveillance data for the U.S. Armed Forces, DMSS contains up to date and historical data on diseases and medical events (such as hospitalizations, ambulatory visits, reportable medical events, human immunodeficiency virus tests, and casualty data) and longitudinal data on personnel and deployments. The Armed Forces Health Surveillance Center routinely publishes summaries of notifiable diseases, trends of illnesses of special surveillance interest and field reports describing outbreaks and case occurrences in the Medical Surveillance Monthly Report, the principal vehicle for disseminating medical surveillance information of broad interest. Through DMSS, the Armed Forces Health Surveillance Center provides the sole link between the DOD Serum Repository and other databases.

2-89. Medical commanders must accomplish the following at the home station or processing station of the redeploying Service member:

- For deployments to high tuberculosis threat areas or operations, such as those involving close contact with large refugee populations, conduct tuberculosis screening after redeployment according to Service-specific requirements. For deployments to low endemic tuberculosis threat

areas, conduct tuberculosis screening according to Service-specific policy. Interpretation of the tuberculin skin test results should be according to Service policy.

- Collect, when indicated by Service policy, a serum sample for human immunodeficiency virus testing and storage in the serum repository. Collect additional biological samples as warranted by the events occurring in theater or postdeployment health assessment responses and evaluations.
- Conduct additional health assessments and/or health debriefings when indicated.
- Service members returning from a theater with deployment-related health concerns will be evaluated using the postdeployment health clinical practice guidelines. Health care providers should consult the Department of Defense Postdeployment Health Web site for further information on the clinical practice guidelines.

2-90. Medical personnel complete DD Forms 2900, (Post Deployment Health Re-assessment [PDHRA]), when required. A DD Form 2900 will be administered to each redeployed individual within 90 to 180 days after return to home station from a deployment that required completion of a postdeployment health assessment. For individuals who received wounds or injuries that required hospitalization or extended treatment before returning to home station, the reassessment will be administered 90 to 180 days following their return home. After the DD Form 2900 is completed, a trained health care provider will discuss health concerns indicated on the form and determine if referrals are required and will educate individuals on postdeployment health readjustment issues and provide information on resources available for assistance. The original of the completed DD Form 2900 must be placed in the deployed individual's permanent medical record. Medical personnel will submit copies of the completed DD Forms 2900 electronically to the DMSS. Services may require submission of the forms to DMSS via their surveillance hubs.

Chapter 3

Casualty Care and Management

GENERAL

3-1. Operational casualty management strategies include effective care and efficient management by HSS organizations. Organizations should be prepared to treat large numbers of casualties in the event of CBRN weapon use. Casualties may include combatants and noncombatants. Large numbers of individuals with COSR and psychological stress reactions should also be expected. Each element of the evacuation and treatment process must balance casualty care issues with the goal of conserving and restoring the command's combat capabilities.

TRIAGE

3-2. Triage is the classification of patients according to the type and seriousness of illness or injury. In a CBRN environment, triage must also consider the level of contamination of the patient to achieve the most orderly, timely, and efficient use of HSS resources. However, the triage process and classification of CBRN patients differs from conventional injuries. For more information on triage in a CBRN environment, refer to Emergency War Surgery and the Textbook of Military Medicine, Medical Aspects of Chemical and Biological Warfare.

3-3. A mass casualty situation in a CBRN environment will necessitate that the conventional treatment priorities be modified due to the magnitude of the casualty situation. This means a radical departure from the traditional practice of providing early complete essential treatment to each casualty on the basis of individual needs. For this concept of treatment, using priorities designed to assist in providing the greatest benefit for the largest number of patients without wasting specialist skill and medical resources, the following traditional categories of triage are used.

IMMEDIATE TREATMENT

3-4. To include those requiring emergency life- or limb-saving surgery. These procedures should not be time-consuming and should concern only those casualties with high chances of survival (examples are respiratory obstruction, accessible hemorrhage, and emergency amputation).

DELAYED TREATMENT

3-5. To include those badly in need of time-consuming major surgery/resuscitation, but whose general condition permits delay in surgery/treatment without unduly endangering life (examples are large muscle wounds; fractures of major bones; intraabdominal and/or thoracic, head, or spinal injuries; uncomplicated major burns; and some incapacitating effects of CBRN agents). To mitigate the effects of often critical delay in surgery/treatment, sustaining treatments (such as stabilizing intravenous [IV] fluids; splinting; administration of antibiotics; catheterizations; gastric decompression; relief of pain; and pharmacological and respiratory support for the effects of CBRN agents) are required.

MINIMAL TREATMENT

3-6. To include those with relatively minor injuries who can effectively care for themselves or who can be helped by untrained personnel (examples are minor lacerations, abrasions, fractures of small bones, minor burns, and nonincapacitating effects of CBRN agents).

EXPECTANT TREATMENT

3-7. To include casualties who have received serious and often multiple injuries, and whose treatment would be time-consuming and complicated with a low chance of survival (examples are severe multiple injuries; severe head or spinal injuries; large doses of radiation as determined by radiation instrumentation, dosimetry, or technical subject matter experts; widespread severe burns; and intractable central nervous system respiratory effects of CBRN agents). If fully treated, they make heavy demands on medical manpower and supplies. Until the mass casualty situation is under control, they will receive supportive care as allowed by manpower and resources available. Continued efforts to ensure their comfort by use of appropriate doses of narcotic analgesics and retriage as more resources become available is vital to manage these patients. These casualties should not be abandoned, and every effort should be devoted to their comfort. The possibility of survival should always be kept in mind, even with alarming injuries.

ADDITIONAL TRIAGE CONSIDERATIONS

3-8. Additional considerations that should be taken into account are those casualties who pose a risk to other casualties, medical personnel, and the treatment facility as follows:

- Casualties who have retained unexploded ordnance: these patients should be segregated immediately and treated last.
- Enemy prisoners of war/detainees—although treated the same as friendly casualties, it is essential that the threat of *suicide bombers* and *human booby traps* be prevented by carefully screening all enemy prisoners of war prior to moving into patient areas including triage area. Refer to ATP 4-02.46 for more information on the medical treatment of detainees.

Note. Enemy Prisoners of War status is the default status for detainees. Detainees will be treated according to the Geneva Convention Relative to the Treatment of Prisoners of War (until their status is determined by a military tribunal or other competent authority). (See FM 27-10 for information on the Geneva Conventions.) The U. S. uses the term Enemy Prisoners of War to identify an individual who is under DOD custody and control according to the Geneva Convention, Articles 4 and 5 (See JP 3-63.). The U. S. reserves the Geneva Convention term *prisoner of war* to identify its own or multinational armed forces that have been taken captive.

MISSION-ORIENTED PROTECTIVE POSTURES

3-9. In a CBRN incident, military personnel, including medical personnel, will be required to don MOPP IPE. *Mission-oriented protective posture* is defined as a flexible system of protection against CBRN contamination in which personnel are required to wear only that protective clothing and equipment appropriate to the threat level, work rate imposed by the mission, temperature, and humidity (JP 3-11). As MOPP levels increase, IPE is added to the equipment worn at lower levels. Each increase in the MOPP level reduces the time personnel must take to attain MOPP-4 and full protection. When the threat of CBRN use is high, commanders may establish a standing MOPP level (other than MOPP-0) for personnel during military operations. In the event of a CBRN attack, this effectively reduces the time required to attain MOPP-4.

3-10. The protective overgarment and hood can cause body heat buildup, which can lead to heat exhaustion. The protective mask and hood degrade the ability to see, speak, and hear. The rubber gloves restrict air circulation and limit the sense of touch and the ability to perform tasks requiring delicate manipulation. The wearing of full IPE or PPE can cause psychological stress (such as claustrophobia) in some people. All of these problems can reduce the effectiveness of HSS. Therefore, flexibility in adjusting the MOPP levels should be exercised to meet mission requirements, environmental conditions, and the threat of CBRN exposure.

3-11. Medical personnel will potentially be wearing IPE as they care for both military and likely civilian casualties. Not all casualties will be in MOPP gear. Without adequate IPE, casualties may suffer greater exposure to CBRN threats and hazards.

CIVILIAN CASUALTIES

3-12. Civilian casualties may become a problem in populated or built-up areas, as they are unlikely to have protective equipment and training. Roles 1, 2, and 3 MTFs may be required to provide assistance when civilian medical resources cannot handle the workload. However, aid to civilians will not be undertaken without command approval or at the expense of health services provided to U.S. personnel.

ROLES OF CARE

3-13. The U.S. military doctrine supports an integrated and capability-based health care system to triage, treat, evacuate, and return Service members to duty in the most efficient time and manner. Roles of medical care (previously referred to as *levels and echelons*) denote differences in capability rather than the quality of care. Each role has the capability of the role forward of it and expands on that capability. For information on the NATO definitions of roles of care, refer to STANAG 2228.

Role 1

3-14. Nonmedical personnel performing first aid procedures assist the combat medic in his duties. First aid is administered by an individual (self-aid/buddy aid) and enhanced first aid is provided by the combat lifesavers.

3-15. The first medical care military personnel receive is provided at Role 1 (also referred to as unit-level medical care). This role of care includes—

- Immediate lifesaving measures.
- Disease and nonbattle injury prevention and care.
- Combat and operational stress preventive measures.
- Patient location and acquisition (collection).

3-16. Treatment is provided by designated combat medics, treatment squads, or animal care specialists for working animals. Major emphasis is placed on those measures necessary for the patient to RTD or to stabilize him and allow for his evacuation to the next role of care. These measures include maintaining the airway, stopping bleeding, preventing shock, protecting wounds, immobilizing fractures, and other emergency measures, as indicated.

Role 2

3-17. Role 2 medical care provides advanced trauma management and EMT including continuation of resuscitation started in Role 1. Role 2 medical care provides a greater capability to resuscitate trauma patients than is available at Role 1. If necessary, additional emergency measures are instituted, but they do not go beyond the measures dictated by immediate necessities. Role 2 medical care has the capability to provide packed red blood cells (liquid), limited x-ray, laboratory, dental support, COSC, preventive medicine, and Role 2 veterinary medical and resuscitative surgical support. Role 2 medical care has a limited hold capability (for example, no bed capacity) and is classified into Role 2 light maneuver and Role 2 enhanced.

3-18. Role 2 light maneuver are light, highly mobile medical units designed to support land maneuver formations (normally brigade level). A Role 2 light maneuver medical unit is able to conduct advanced resuscitation procedures up to damage control surgery. It will evacuate its postsurgical cases to Role 3 (or Role 2 enhanced for stabilization and possible primary surgery) before evacuation to Role 4.

3-19. Role 2 enhanced provides basic secondary health care, built around primary surgery, intensive care unit, and ward beds. A Role 2 enhanced MTF is able to stabilize postsurgical cases for evacuation to Role 4 without the requirement to first route them through a higher Role 3 facility.

3-20. Role 2 medical care should have the minimum capability for packed red blood cells. Additional blood product support to include frozen plasma, cryoprecipitate, and platelets should be considered based on desired level of trauma management and availability of necessary supporting equipment and supplies.

Role 3

3-21. In Role 3, the patient is treated in an MTF or veterinary facility (for working animals) that is staffed and equipped to provide care to all categories of patients, to include resuscitation, initial wound surgery, and postoperative treatment. This role of care expands the support provided at Role 2. Patients who are unable to tolerate and survive movement over long distances receive surgical care in a hospital as close to the supported unit as the tactical situation allows. This role includes provisions for—

- Evacuating patients from supported units.
- Providing care for all categories in an MTF with the proper staff and equipment.
- Providing support on an area basis to units without organic medical assets.

Role 4

3-22. Role 4 medical care is found in U.S. base hospitals and robust overseas facilities. Mobilization requires expansion of military hospital capacities and the inclusion of Department of Veterans Affairs and civilian hospital beds in the National Disaster Medical System to meet the increased demands created by the evacuation of patients from the area of responsibility. The support-base hospitals represent the most definitive medical care available within the medical care system.

ROLE 1 HEALTH SERVICE SUPPORT IN A CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR ENVIRONMENT

3-23. When operating under a CBRN threat or when a CBRN attack is imminent, the MTF must prepare for continuation of its mission. Should an attack occur, the MTF must seek out a contamination-free area to establish a clean treatment area or must be collectively protected. Some MTFs have chemical biological protective shelter (CBPS) systems. When available, these systems serve as the primary shelter for the MTF; they are operated in the full chemical-biological (CB) mode when attack is imminent or has occurred. See Chapter 12 for information on establishing an MTF in a CBPS system. When operating in the CB mode only patients requiring life- or limb-saving procedures are allowed entry into the MTF. Patients that have minor injuries that can be managed in the contaminated EMT area of the PDS will receive treatment in this area. Patients with injuries that require further treatment, but can survive evacuation to the Role 2 MTF will have their MOPP immediately decontaminated, their injuries managed, the integrity of their MOPP restored, and be directed to an evacuation point to await transport to the Role 2 MTF. When patients or personnel are contaminated or are potentially contaminated, they must be decontaminated before admission into the clean treatment area (FM 3-11.4/MCWP 3-37.2/NTTP 3-11.27/AFTTP (I) 3-2.46 for personnel decontamination procedures and Chapter 5 for patient decontamination procedures).

3-24. Select sites for Roles 1 and 2 MTFs that are located away from likely adversary target areas. Cover and concealment is extremely important; they increase protection for operating the MTF.

3-25. Operating a CBPS system in the CB mode at the battalion aid station (BAS) requires at least eight medical personnel. The senior medical personnel/NCO performs patient triage, limited EMT, and minor injury care in the PDS. One medical personnel/combat medic supervises patient decontamination and manages patients during the decontamination process. Two medical personnel/combat medics work on the clean side of the hot line and manage the patients until they are placed in the clean treatment area or are sent into the CBPS for treatment. They also manage the patients that are awaiting evacuation to the Role 2 MTF. The physician, physician assistant, and two combat medics provide advanced trauma management in the clean treatment area or inside the CBPS. See Chapter 12 for CBPS entry/exit procedures.

3-26. When Roles 1 and 2 MTFs are receiving CBRN contaminated patients, they require at least eight nonmedical personnel augmentees from supported units to perform patient decontamination procedures under medical supervision. These MTFs are only staffed with medical personnel to provide patient care under conventional operational conditions. Without the augmentation support, they can either provide patient decontamination or patient care, but not both.

ROLE 2 HEALTH SERVICE SUPPORT IN A CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR ENVIRONMENT

3-27. Role 2 HSS responsibilities include, but are not limited to—

- Evacuating patients from the BAS and medical evacuation by air on an area support basis from within the brigade sustainment area.
- Providing Role 1 medical treatment on an area support basis.
- Operating the medical company Role 2 MTF, which provides a patient holding capability for up to 40 patients for 72 hours. See ATP 4-02.3 for detailed information on Role 2 conventional HSS operations.
- Providing limited dental service.
- Providing limited preventive medicine/public health support in the areas of medical surveillance, OEH surveillance, food service sanitation, water quality control (including CBRN contamination surveillance), and communicable disease control.
- Providing limited COSC; these patients are returned to duty as their condition permits.

3-28. In the division, corps, and echelons above corps, Role 2 MTFs are the same as for the brigade, except patients may be evacuated from a forward Role 2 MTF, as well as from a BAS.

3-29. When operating under a CBRN threat or when a CBRN attack is imminent, the Role 2 MTF must prepare for continuation of its mission.

3-30. Forward Surgical Teams (FSTs) are either organic to divisional and nondivisional medical units or are forward deployed in support of medical companies to provide a surgical capability. Refer to ATP 4-02.5 for more information on FST operations. However, when forward deployed and CBRN contamination is imminent, the FST must employ collective protection in order to continue its support mission. When operating in a contaminated area, the FST CBPS system must be complexed with the Role 2 MTF CBPS system. The FST cannot operate in a CBRN environment without the support of the Role 2 MTF. The FST does not have the capability to decontaminate patients. All patients are decontaminated in the Role 2 MTF PDS. The patients are then processed into the EMT section of the Role 2 MTF, where they are triaged and routed to the FST for surgery, if required.

ROLE 3 HEALTH SERVICE SUPPORT IN A CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR ENVIRONMENT

3-31. Many factors must be considered when planning for Role 3 MTF support on the integrated battlefield. The MTF staff must be able to defend against threats by individuals or small groups (two or three) of infiltrators; and survive CBRN strikes or TIM incidents while continuing their mission. This threat may include the introduction of CBRN or TIMs in the MTF area, the water or food supplies, and the destruction of equipment and/or supplies. On the larger scale of surviving CBRN strikes and continuing to support the mission, operating in a contaminated environment will present many problems for hospital personnel. The use of CBRN weapons or TIMs release can compromise the quality and quantity of health care delivered by medical personnel due to the contamination at the MTF, constrained mobility and evacuation, and contaminated logistical supply base. While providing hospital support, consider the following assumptions:

- Their location, close to other support assets, makes them vulnerable to CBRN strikes and release/dispersion of TIMs.
 - Command and control systems infrastructure, logistical nodes, and base clusters are high value targets.
 - Most CBRN weapons are designed for wide-area coverage. Chemical warfare and BW agents may present a hazard some distance downwind from the area of attack; also, residual radiation may extend for hundreds of kilometers from ground zero.
 - The large signature (size, heat, or infrared) of a hospital makes it easy to find and target (the assumption is that the hospital is very near the intended targets).
 - Medical treatment facilities located near road networks and airfields for access to evacuation routes increase their exposure to tactical strikes of CBRN weapons and exposure to TIMs releases.

- There are an ever-increasing number of countries and individuals with the ability to manufacture and deliver CBRN weapons/agents. This activity increases their use potential at all levels of conflict.

Note. When using existing civilian hospitals, the materials for a radiological dispersal device may be at these hospitals. Exploding the material in place is very practical for a small team of adversaries.

3-32. In addition to the wounding effects of CBRN weapons on personnel, their use will have other effects upon the health care delivery system as follows:

- Follow-on treatment may have to be delayed due to the need for patient and facility decontamination.
- The arrival of contaminated patients at the MTF will require MTF personnel to perform triage; administer EMT procedures in the patient decontamination area; supervise augmentation personnel performing patient decontamination; and constantly monitor the hospital for contamination. A Role 3 MTF requires at least 20 nonmedical personnel from supported units within the geographic area/base cluster of the hospital to perform patient decontamination under medical supervision.
- Patients may have been triaged and decontaminated at a Role 1 or Role 2 MTF. However, all patients must be triaged and checked for contamination as they arrive at the Role 3 hospital ambulance drop-off point. Triage ensures patients receive life- or limb-saving care in a timely manner. If patients are arriving from a suspected CBRN contaminated area, they must be decontaminated before admission into the clean treatment area of the MTF. The patient decontamination area is established on the downwind side of the MTF. When the MTF does not have collective protection, the patient decontamination point must be at least 50 yards downwind of the hospital entry point. When the MTF is located inside a base cluster, the patient decontamination area may have to be established some distance from the MTF to prevent contamination of other units in the area. Should this be the case, the patients may have to be transported by ambulance or other vehicle from the clean side of the patient decontamination area to the receiving point of the hospital.

3-33. Medical treatment facilities are not kept in reserve. All HSS personnel and equipment losses due to CBRN contamination will have to be replaced.

MANAGEMENT OF CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR CASUALTIES IN A MEDICAL TREATMENT FACILITY

3-34. Many factors must be considered when planning for hospitalization on the battlefield. To the maximum extent possible, MTFs are located away from tactical or logistical targets. The MTF staff must be able to defend against a CBRN threat and survive CBRN strikes while continuing their mission.

3-35. Without a CPS, MTFs may operate for a limited time in a nonpersistent agent environment, but are incapable of operating in a persistent agent environment. Without a CPS, treatment procedures in an actively contaminated area involving an open wound or the respiratory tract are limited. Exposing open wounds and the respiratory tract can provide a route of entry for the CBRN agent.

3-36. Chemical-biological filters will be a critical item of supply. Therefore logistics activities must ensure that sufficient quantities of replacement filters are available or are on order to meet mission requirements. Logistics will also be responsible for the safe disposal of the filter and all of the contaminated equipment that cannot be decontaminated (tentage, plastic sheets, blankets, linens, and contaminated uniform items). The following items are limited or no replacements available at a MTF:

- Individual protective equipment/PPE.
- Protective masks.

- Protective mask filters.
- Patient protective wraps.

3-37. Liquid CW agents can penetrate either the tent, extendable, modular, personnel (TEMPER) in about six hours or the general purpose (GP) tentage in a shorter period of time. These agents can penetrate the standard/packaging wrappings on medical supplies, sterilized equipment and supplies, and medications/solutions that come in contact with agent liquid, vapor, or contaminated dust. The vapor, liquid, and dust can also contaminate open water/food supplies. It is critical that these items be in a covered area or covered containers prior to an attack. It is very difficult to decontaminate most medical equipment. Decontamination may only be possible by weathering (allowing the agent to off-gas). For more information on CPS, refer to Chapter 12.

3-38. Other considerations when planning for CPS include—

- Without hardened protection, the MTF, staff, and casualties are susceptible to the blast, heat, and missiling effects of nuclear weapons.
- The MTF's medical equipment is vulnerable to the effects of electromagnetic pulse produced by nuclear weapons. The electromagnetic pulse has no known harmful effects to humans, animals, or plants, but is very damaging to electronic equipment.
- For more information on CPS, refer to Chapter 12.

PROTECTION OF MEDICAL TREATMENT FACILITIES

3-39. Protection of MTF assets requires intensive use of intelligence data and careful planning. The limited mobility of MTFs makes their site selection vital to minimize collateral damage from attacks on other units as follows:

- Medical treatment facilities must be located as close to the supported personnel as possible to provide responsive care. However, their limited mobility and a possible lack of CPS systems must be considered when selecting their locations.
- Protective factors (distance from other units and interposed terrain features) must be balanced against the operational factors (accessibility and time required for casualty transport).
- Regardless of the weapon system used, relatively large portions of any tactical area will remain uncontaminated. Medical treatment facilities should avoid movement through or operation in contaminated areas.

3-40. Many defensive measures will either impede or preclude performance of the MTF mission. A successful MTF defense operation against a CBRN threat is dependent on accurate, timely receipt of information via the CBRN reporting system. For more information on CBRN defensive operations, refer to STANAGs 2461 and 2462. This warning data will allow MTFs to operate longer without the limitations and problems associated with individual protection use, and then adopt a defensive posture when absolutely necessary. The detailed information on the areas affected and the types of agents used allows the MTF staff to—

- Predict the number and types of casualties to be expected.
- Establish a patient decontamination area.
- Request patient decontamination personnel augmentation assistance.

3-41. Since most MTF sections operate in sheltered areas, tentage, or International Organization for Standardization (ISO) shelters, some protection is provided against liquid and particulate (fallout) hazards. Positioning equipment (such as trucks) under trees or other cover provides similar effects. Setting up MTFs in existing structures (concrete or steel buildings) provides the maximum protection from hazards and eliminates many decontamination problems.

This paragraph implements STANAG 2931.

3-42. Concealment and good operations security will help prevent identifying a unit's position. However, camouflaging the MTF must be weighed against the loss of Geneva Conventions protection. The NATO STANAG 2931 provides for camouflage of the Geneva emblem on medical facilities where the lack of

camouflage might compromise tactical operations. Medical facilities on land, supporting forces of other nations, will display or camouflage the Geneva emblem in accordance with national regulations and procedures. When failure to camouflage would endanger or compromise tactical operations, the camouflage of medical facilities may be ordered by a commander of at least brigade level or equivalent. Such an order is to be temporary and local in nature and countermanded as soon as the circumstances permit. It is not envisaged that large, fixed medical facilities would be camouflaged. The STANAG defines medical facilities as medical units, medical vehicles, and medical aircraft on the ground. Refer to STANAG 2931 and FM 4-02 for additional information.

3-43. Dispersion is a defensive measure employed by commanders; however, hospital operations limit the value of this technique. One technique that may be used is locating sections of the MTF (such as the motor pool, personnel billets, laundry, and logistical storage) further from the MTF complex than normal. This would increase dispersion without severely compromising the HSS mission.

UNITED STATES MARINE CORPS OPERATIONS CASUALTY MANAGEMENT

3-44. Casualty management in USMC operations poses some interesting challenges. There are three scenarios (shipboard, sustained operations ashore, and amphibious operations) that must be addressed by USMC HSS resources.

Shipboard

3-45. Ships may become contaminated directly as a result of an actual hit, contact with ship-to-shore or ship-to-ship connectors, or nearby airburst. Clouds of vapor or aerosols which drift offshore, may also contaminate ships indirectly. Initial casualties, which will primarily be exposed deck personnel or personnel within spaces contaminated by penetrating chemical vapors, should be moved to a collection area where initial triage and hasty decontamination can be performed before transfer to the ship's medical department.

Sustained Operations Ashore

3-46. These operations are generally characterized by established bases and logistical support.

Amphibious Operations

3-47. In the early stages of amphibious operations, the assault force is extremely vulnerable because of the lack of an established support base ashore. Casualties will be moved from the point of illness or injury to different roles of care. Movement of the casualties may not progress sequentially through each role. Depending on the tactical situation and degree of air superiority, casualties may move from the point of illness or injury directly to Role 3 care. Nonambulatory casualties should be placed in PPWs before transfer between medical roles.

OPERATION OF A MEDICAL TREATMENT FACILITY IN A CHEMICAL ENVIRONMENT

3-48. Initial triage, EMT, and decontamination are accomplished on the dirty side of the hot line of the PDS. Life-sustaining care is rendered, as required, without regard to contamination. Normally, the senior medical personnel perform initial triage and EMT. Secondary triage, advanced trauma management, and patient disposition are accomplished on the clean side of the hot line. When treatment must be provided in a contaminated environment outside the CPS, the level of care may be greatly reduced because medical personnel and patients are in MOPP Level 4. However, lifesaving procedures must be accomplished. See ATP 4-02.85/NTRP 4-02.22/AFTTP(I) 3-2.69 and the USAMRICD's Medical Management of Chemical Casualties Handbook for specific treatment of CW agent patients.

3-49. Decontamination of most chemically contaminated patients and equipment requires the use of materials that will remove and neutralize the agent. See FM 3-11.5/MCWP 3-37.3/NTTP 3-11.26/AFTTP(I) 3-2.60 for military equipment decontamination procedures and Chapter 5 for specific patient decontamination procedures.

WARNING

Cross contamination of patients by decontamination personnel can result in further injury to the patient. Personnel decontaminating patients must handle patients carefully to prevent themselves from becoming contaminated.

Individual Protection

3-50. When CPS systems are not available, using the correct MOPP level is essential in MTF mission performance. The level of MOPP assumed depends upon the level of threat.

3-51. An alternative approach for the MTF commander is the use of the mask-only posture. This posture is acceptable when the hazard is from vapor only (such as nonpersistent agents). Casualties and personnel in tents and expandable shelters are protected for a limited time from solid or liquid contamination (transfer hazards). Personnel can work efficiently and for longer periods in mask-only posture instead of MOPP Level 4. However, the commander must weigh these factors against the potential contamination transfer risk. This risk should be small, except in areas where casualties or materiel are received from the outside. Individuals returning to or bringing materiel from the outside must be extremely careful not to bring contamination into the mask-only area. When considering this alternative, remember that except those casualties in PPW, the casualties must also be at mask-only posture.

3-52. Medical facilities must ensure that they have an adequate supply of new replacement filters on hand for casualties as well as staff. Casualties who have gone through decontamination will need to have their filters replaced immediately after decontamination. Decontamination team members will need to have their filters replaced periodically (for example, between each shift, when filters get wet) according to Services' SOP. The MTF personnel should plan for the safe storage and disposal of patient and medical staff's contaminated respirator filters.

3-53. The MTF should utilize a warning system that alerts all personnel of impending or present hazards. This system must include visual and auditory signals; the signals must operate inside and outside of the MTF complex. There are numerous problems associated with warning personnel; they include—

- The wide area covered by MTF operations.
- Some shift personnel will be asleep at all times of the day or night.
- The considerable noise from the power generation and environmental control equipment.
- Tentage and equipment, which interrupts the line of sight.

3-54. When the CBRN alarm is activated, all personnel (including off duty personnel) report to their duty stations as soon as they are in MOPP. This allows for 100 percent personnel accountability and provides additional personnel to secure casualties and materiel.

3-55. With all openings secured and the ventilation system turned off, the noncollectively protected MTF is at its best posture. For nonpersistent agents (vapor hazards), personnel and casualties stay at the designated MOPP level until the all clear signal is given; then normal operations are resumed.

Note. Casualties with injuries that prevent them from assuming a protective posture should be evacuated immediately to a clean treatment facility.

Casualty Protection

3-56. Patient protection depends on ensuring that patients have adequate individual protection. Each patient's protective mask must be available and serviceable. The MTF personnel should check all patients' masks as soon as they arrive at the MTF. If patient came from a contaminated area, the mask must be decontaminated and the filter changed. The mask decontamination and filter change may have to be performed by MTF personnel. If patients' medical conditions permit, they may be able to perform this task.

Medical personnel should not wait until the warning has been received to begin checking the mask. Each area must have an established plan for operations (to include assisting patients assuming MOPP or other protective posture) in the CBRN environment.

3-57. Medical treatment facility personnel always mask themselves first and then assist casualties in masking. On minimal care wards, most casualties can put on their own masks. For those who cannot, other casualties can assist them after putting on their own masks. On the intermediate care wards, some casualties will be able to put on their masks, but many will require assistance.

3-58. Many casualties with head and neck wounds or who are on life-support devices will be unable to wear their individual protective masks; these casualties must be placed in PPWs with blowers. While the PPWs have two ports for IV or blood infusion lines, the staff may have to adapt for other devices (catheters, traction, and cardiac monitors) by using tape and other means to seal the gaps created in the seal around the edge of the PPW. Casualties requiring assisted ventilation are at extreme risk, unless their air supply is protected.

Materiel Protection

3-59. Protection of materiel, especially expendable supplies, requires covers and barriers. All materiel not required for immediate use is kept in shipping containers, medical chests, or under cover (such as tentage, plastic sheeting, or tarpaulin) for protection against particulate or liquid hazard. Protection against vapor hazards may require multiple barriers through which the vapor must penetrate. For example, a situation where IV solutions are in their individual plastic bags, in the cardboard shipping box, on a covered pallet, or in a military van (MILVAN) container. This represents four barriers against the vapor hazard. These principles should be used to the maximum extent practical.

Environmental Protection

3-60. As noted previously, the MTF offers some protection against liquid or fallout contamination, but little protection against vapor hazards.

3-61. When MOPP Level 2 posture must be assumed, close and secure all tent flaps, vents, and doors to prevent the entrance of liquids or particles. All MTF personnel outside of shelters assume command-directed MOPP level. Cover or move all equipment and supplies into shelters if possible. Keep all equipment and supplies not immediately needed covered or in closed containers.

3-62. When MOPP Level 3 or mask-only posture is assumed shutdown the MTF ventilation system if in a nonchemically protected facility to prevent drawing vapors into the MTF. This measure provides some protection of the internal environment during the time required for the vapor to penetrate the tentage. For chemically protected facilities keep the ventilation on to maintain positive airflow.

OPERATION OF A MEDICAL TREATMENT FACILITY IN A BIOLOGICAL ENVIRONMENT

3-63. A biological agent attack (such as the adversary use of bomblets, rockets, spray or aerosol dispersal, release of arthropod vectors, and adversary or insurgent contamination of food and water) may be difficult to recognize. Airborne dissemination is a likely means of delivery of biological agents. While such biological agents may produce large numbers of casualties, initial casualties may be seen at the MTF in small numbers. When a trend is identified, the use of a BW agent may be suspected.

3-64. Frequently, BW agent exposure does not have an immediate effect on exposed personnel. All HSS personnel must monitor for BW agent indicators such as—

- Increases in disease incidence or fatality rates.
- Sudden presentation of an exotic disease.
- Other sequential epidemiological events.

3-65. Biological agent attack protective measures are the same as the measures for CW agents when bombs, sprays, or aerosols are used. General protective measures are the same as for any infectious disease; specific protective measures are used once the method of transmission has been identified. The difficulty in rapidly identifying biological agents may force the use of higher levels of MOPP for longer periods of time.

Faced with this situation, a careful evaluation of the mask-only posture is necessary before implementing any level of MOPP.

3-66. Passive defensive measures (such as immunizations, good personal hygiene, physical conditioning, using insect repellents, wearing the protective mask, and practicing good sanitation) will mitigate the effects of many BW agent intrusions.

3-67. Designating a single MTF to care for these patients (from a casualty care or disease transmission standpoint) may not be necessary. However, if there are a limited number of cases, consolidating them all at one facility maximizes the use of limited diagnostic laboratory and personnel assets. Quarantine of exposed personnel or isolation of casualties may be warranted in some cases, particularly with infectious biological agent exposure. If these situations exist (although this only applies to a small number of biological threats), then quarantine and isolation procedures should be followed. A list of contagious diseases is listed in Chapter 4. For additional information refer to ATP 4-02.84/MCRP 4-11.1C/NTRP4-02.23/AFMAN 44-156_IP and current Air Force directives on isolation procedures.

3-68. Health service support commanders and leaders must enforce contamination control to prevent illness or injury to HSS personnel and to preserve the MTF. Incoming vehicles, personnel, and patients must be surveyed for contamination. Ventilation systems in MTFs (without CPS) must be turned off if BW agent exposure is imminent.

3-69. Decontamination of most BW agent contaminated patients and equipment can be accomplished with soap and water. Soap and water will not kill all biological agents; however, it will remove the agent from the skin or equipment surface. See Chapter 5 for specific patient decontamination procedures.

3-70. Treatment of BW agent patients may require observing and evaluating the individual to determine necessary medications, isolation requirements, or medical management procedures. See ATP 4-02.84/MCRP 4-11.1C/NTRP 4-02.23/AFMAN 44-156_IP, and the USAMRIID's Medical Management of Biological Casualties Handbook or USAMRIID's Web site for specific guidance and understanding of the biological threats faced by personnel in a CBRN environment, effective medical defenses against these threats, and patients' treatment procedures.

3-71. Medical surveillance is essential. Most biological agent patients initially present with common nonspecific symptoms such as low-grade fever, chills, headache, malaise, and coughing. A higher rate of patients than normal based on the number and location of personnel, known disease vectors, and endemic diseases may be the first, best, or only indication of biological agent attack. Daily medical treatment summaries, especially DNBI reports, need to be prepared and analyzed. A significant, but unexplained or unpredictable increase in the rate of patients presenting with unusual or the same symptoms may indicate a disease outbreaks or the employment of biological agents. Since presenting symptoms can take days or more to manifest depending on the incubation period for a particular pathogen; daily analysis of medical summaries provide a delayed or lagging indicator of possible biological agent use. This means that the use of a biological agent may have happened several days before it is recognized and depending on operations, several hundreds of miles away. However, using medical and intelligence recommendations, commanders can initiate preventive, treatment, and mitigating measures and reduce the total numbers of personnel lost due to the illness and the impact of the mission. See DODD 6490.02E and DODI 6490.03 for information on medical surveillance procedures. See Chapter 8 for suspected specimen collection, packaging, chain-of-custody documentation, and shipment to the supporting medical laboratory. See ATP 4-02.84/MCRP 4-11.1C/NTRP 4-02.23/AFMAN 44-156_IP for preventive, protective, and treatment procedures.

OPERATION OF A MEDICAL TREATMENT FACILITY IN A NUCLEAR ENVIRONMENT

3-72. The HSS mission must continue in a nuclear environment. Chemical-biological protective shelters are essential to continue the support role. Well-constructed shelters with overhead cover and expedient shelters (reinforced concrete structures, basements, railroad tunnels, or trenches) provide good protection from nuclear attacks.

3-73. Most protective measures against nuclear attack require engineer and/or intensive logistics support. This support includes placing sandbag walls around tents, digging trenches for casualty occupation, or constructing earthen berms. Occupying existing structures, depending upon their strength and potential

flammability, may be the best protection against the effects of a nuclear strike. Leaving equipment packed and loaded until actually needed for operations will help protect materiel in a CBRN environment.

3-74. Personnel and casualty protection requirements will depend upon the threat—

- If the threat is nuclear fallout, the MTF structure provides protection; the fallout can be brushed or washed off. This allows protection while permitting casualty care to continue virtually uninterrupted. A need to relocate the MTF will depend upon the degree of contamination, the amount of decontamination possible, and the projected stay before a normal move in support of tactical operations.
- A nuclear attack can result in several types of blast injuries. Primary blast injury is caused by the blast wave itself, secondary blast injury is caused by fragments of debris propelled by the explosion, and tertiary blast injury is due to the acceleration of the body or part of the body by the blast wave or blast wind. Medical treatment facility tentage alone offers little protection against blast and shrapnel effects. If the casualties are to remain in the tents, they are placed on the floor. Place all equipment on the ground or as low as possible and secure all loose objects. In GP tents and TEMPER, sandbags can be piled around the base of the tent poles to add stability. The tent poles and casualties cots/beds should keep the canvas off the ground enough (if the tent collapses) to continue minimal casualty care.

3-75. Armored vehicles provide some protection against the blast and radiation effects of nuclear weapons. Patients generated in a nuclear attack will likely suffer multiple injuries (combination of blast, thermal, and radiation injuries) that will complicate medical care. Nuclear radiation patients fall into three categories—

- The irradiated patient is one who has been exposed to ionizing radiation, but is not contaminated. They are not radioactive and pose no radiation threat to health care providers. Patients who have suffered exposure to initial nuclear radiation will fit into this category.
- The externally contaminated patient has radioactive dust and debris on his clothing, skin, or hair. This radioactive debris can cause burns if not removed quickly. This usually presents a housekeeping problem to the MTF, similar to the lice-infested patient arriving at a peacetime MTF. However, an accumulation of radioactive debris from several patients admitted to the MTF may present a threat to other personnel. The externally contaminated patient is decontaminated at the earliest time consistent with required medical care. Lifesaving care is always rendered, when necessary, before decontamination.
- The internally contaminated patient is one that has ingested or inhaled radioactive material or radioactive material has entered the body through an open wound. The radioactive material continues to irradiate the patient internally until radioactive decay and/or biological elimination removes the radioactive isotope. Attending medical personnel are shielded, to some degree, by the patient's body. Inhalation, ingestion, or injection of radioactive material sufficient to present a threat to health care providers is highly unlikely.

3-76. Medical units operating in a radiation fallout environment will face three problems—

- The MTF may be immersed in fallout, requiring decontamination and relocation efforts.
- Patients may continue to be produced from continued radiation exposure.
- The contaminated environment hinders medical evacuation operations.

3-77. Decontamination of most radiologically contaminated patients and equipment can be accomplished by removing outer layer of clothing or with soap and water. Soap and water will not neutralize radioactive material however; it will remove the material from the skin, hair, or material surface. The waste can become a concentrated point of radiation and requires coordination with CBRN personnel and the supporting engineer unit. One way to mitigate waste is to coordinate with the CBRN officer and the supporting engineer unit to construct containment areas for the contaminated wastewater.

MEDICAL TREATMENT SERVICES

3-78. The MTF must designate a hot line that delineates the area of possible contamination (between the hot zone and warm zone). See Chapter 5 for detailed information and for layout of the *zones of contamination*.

3-79. The hot line must be manned by personnel who can provide security to ensure that contaminated individuals do not enter the clean treatment facility or clean treatment area.

3-80. Engineering controls, such as concertina wire or other sturdy fencing material should be used when available to restrict travel across the hot line to the clean area, except through guarded ECPs.

3-81. At these ECPs, casualties are checked for contamination using currently available detection devices.

3-82. Providing emergency services will be complicated by several factors—

- Varying levels of treatment received prior to arrival at the MTF.
- Combined conventional wounds and CBRN agent effects.
- Heat-related complications associated with MOPP use.
- Increased numbers of psychological casualties who must be triaged quickly to allow for treatment of those who need emergency management.
- The need to have EMT personnel at the patient drop-off point for triage.
- The potential of having to triage and provide casualty care while in MOPP gear.
- Reduced ability for EMT personnel to communicate between the various phases of the decontamination/treatment process.
- The need to provide supervision/guidance to the nonmedical decontamination augmentation personnel from the supported units.

3-83. The provision of general medical services in the MTF will be continued with minimal interruptions in the CBRN environment. The noninvasive nature of these services allows their continuation at most MOPP levels. General medical services will be constrained by MOPP Levels 3 and 4 and the mask-only posture. Most of these constraints will be—

- Communication limitations.
- Loss of the oral route for administering medications to casualties.
- Limited ability to accurately evaluate the eyes, nose, and mouth of casualties wearing a protective mask.
- Reduced ability to perform examination/assessment of casualties in PPW or MOPP Levels 3 and 4.
- Inability to provide oxygen therapy or ventilator support to a casualty in a vapor hazard environment, unless a CB filter mask is available.
- Logistics constraints based upon the fact that key areas such as dietetics, supply, and laundry are not included in the chemically protected deployable medical systems (CPDEPMEDS). These services may be reduced or delayed in the CBRN environment.

Surgical Services

3-84. Surgical services will be severely limited in the CBRN environment outside of a CPS. At any level above MOPP 0, surgical services are halted if performed in an unprotected, contaminated area except for life- and limb-saving expedient procedures (or expedient procedures to save life and limb). These emergency procedures may be performed with limited contamination risk to the patient if performed in a relatively contamination-free area (such as an EMT area that has not been contaminated by a CBRN attack) where MOPP gear is worn by staff only as a precautionary measure. Surgery cannot be safely performed outside a CPS in a contaminated area due to a variety of factors including—

- Lack of protected ventilation for casualties during and after surgery.
- Inability to maintain a sterile field while using MOPP gear.
- Direct access for the CBRN agent through open wounds to the circulatory and respiratory systems.
- Decreased dexterity and vision resulting from MOPP gear use.
- Inability to quickly place the patient in a PPW should the need arise.

3-85. A relatively high number of trauma cases, can quickly exceed MTF capabilities when MTF services are already severely constrained by CBRN contamination. The MTF location and the possible need for hasty relocation are two major planning considerations for the commander and staff.

3-86. Patient accounting and medical regulating are critical factors in the transfer of casualties from an MTF without CPS that must move out of a CBRN environment. Medical treatment facilities without CPS should stop receiving casualties when a persistent hazard is identified. Casualties should be transferred to a clean MTF.

Nursing Services

3-87. Providing nursing care in a contaminated medical treatment area without CPS is influenced by the amount of protective gear worn by the nursing staff and the casualties. The casualties may be in MOPP gear, in a PPW, or wearing only their protective mask; any of which will interfere with care. Nursing personnel may be at any MOPP level or in protective mask only.

3-88. Direct assessment of a patient's vital signs is extremely limited at MOPP Level 3 or 4; however, a carotid artery pulse can be taken by palpating the neck area. The patient's respiratory rate and level of consciousness may be assessed visually. Palpitation of the blood pressure through a PPW may be possible if it is relatively strong or at least in the normal range. The patient's temperature cannot be easily monitored; this is an area of concern due to the possibility of heat stress.

3-89. Only gross neurological signs can be assessed through the PPW. However, even this assessment is complicated by the presence of miosis and by the health care provider's mask. Cardiac and urinary output monitoring is continued uninterrupted for casualties wearing a mask only and for casualties in the PPW.

3-90. Oral hygiene and bathing are postponed until a safe environment is available (MOPP Level 2 or less). All toileting will occur within the MTF complex using a bedpan, a urinal, a bucket, a container with a plastic liner, or a chemical toilet.

3-91. At MOPP Level 3 or 4, feeding must be postponed. A nutritional assessment is needed to determine how long each patient can tolerate a fasting state when the MOPP Level 3 or 4 remains for over 24 hours.

3-92. Intravenous solutions, blood, and injections can be given to casualties in an unprotected ward. Normally, oral medications are only given at MOPP Level 2 or lower.

3-93. Treatment procedures that have the potential of contaminating the patient's pulmonary or circulatory systems are conducted only at MOPP Level 2 or below. However, EMT procedures may have to be performed in the contaminated treatment area or the patient decontamination area.

3-94. Continuous oxygen therapy requires a collective protection environment or a CB filter-supported respirator.

3-95. Delivery of nursing care at MOPP Level 3 or 4 is limited due to the sensory restrictions of MOPP gear. Time is taken to reassure the patients on a personal basis, as much as possible, and by routinely monitoring the ward environment. Communications are difficult and identities are masked. Use of handwritten name tags for staff and casualties (including casualties in PPW) is required to ensure the identity of all personnel.

3-96. As with all procedures, the time required for recordkeeping rises markedly at MOPP Level 3 or 4. Contaminated paperwork cannot be evacuated with the patient. Essential information should be transcribed onto uncontaminated documents for evacuation with the patient. A record of patient exposure time to a contaminated area is prepared to assess the cumulative risk to the patient.

3-97. Dressing changes cannot be performed while the patient is in a PPW or at MOPP Level 3 or 4.

3-98. Chest tubes and nasogastric tubes in a contaminated environment should be managed in a way similar to the administration of IV fluids. Casualties with these tubes will require close monitoring.

3-99. Nursing staff should be monitoring the patient's psychological status. Casualties may require additional monitoring for stress reactions when placed in a PPW or MOPP suit.

Dental Services

3-100. Dental service support is provided at the AO at Roles 2 and 3. Since dental units have a bigger footprint and are collocated with other support assets, they are vulnerable to a CBRN strike. The CBRN operations have an impact at all levels; thus, dental units must be prepared to survive on the integrated

battlefield. Chemical, biological, radiological, and nuclear defense measures must be included in the dental unit's SOP. Intensive training on individual and collective tasks must be conducted on a regular basis. Survival depends on the ability of personnel to use basic survival skills against a CBRN attack. Although the likelihood to treat dental patients in a CBRN environment is extremely low, dental units must have plans for providing dental services.

3-101. As a general rule, in the aftermath of a CBRN attack, dental treatment operations will cease until deliberate decontamination of the unit and its equipment has been accomplished. After a CBRN attack, the resources of the dental unit are redirected toward support of any mass casualty situation that may have been generated at an adjacent MTF or toward decontamination and relocation to a noncontaminated area. Dental units do not possess CPS; therefore, providing dental services in a CBRN environment will be limited to treatment of maxillofacial emergencies requiring immediate attention. This care will be provided at an MTF in a CPS.

3-102. Decontamination of patients is an absolute requirement before admission into a clean MTF or dental facility. Neither dental units nor their dental treatment facilities are equipped for patient decontamination. Contaminated patients arriving at a dental treatment facility requiring urgent attention must be directed or evacuated to the nearest MTF with a patient decontamination capability. Contaminated patients are triaged and decontaminated before treatment (except for life- or limb-saving care). Both triage and decontamination should be accomplished as far forward as possible. Specific details on patient decontamination are in Chapter 5.

3-103. Dental treatment facilities must also consider the need to protect patients in their care in the event of a CBRN attack or when the threat of an attack is high. Special consideration must be made for maxillofacial patients whose condition prevents them from wearing protective masks.

3-104. In the event of an attack or when the alarm sounds, dental providers and patients immediately cease work and mask. Only after putting on their own mask, do the dental treatment providers assist the patient, if necessary, by removing material that impede the patients masking. Only those materials that impede masking or may compromise the airway (such as rubber dam frames or impressions) are removed. The rest are left in place until the all clear is sounded. Special attention must be given to medicated patients in less than a fully conscious state or that are incapacitated.

3-105. The MOPP level should be taken into account when determining the category and extent of dental treatment. Patients should be at the MOPP level prescribed for the dental facility by its parent headquarters. Dental treatment at MOPP Levels 3 and 4, of course, is impossible because of the requirement to wear the protective mask. However, treatment is still possible at MOPP Levels 0, 1, and 2. Treatment at MOPP Level 2 should be limited only to emergency care requiring urgent attention. At MOPP Level 1, most types of dental emergencies can be accommodated. However, only minimal essential treatment should be undertaken to reduce the risk of the patient being caught in a compromised state. At MOPP Level 0, the provision of dental treatment generally is not limited. The degree of the CBRN threat forecast for the area should be considered before undertaking extensive treatment.

3-106. Patients with maxillofacial injuries that prevent proper fit and seal of the individual protective mask must be placed in a PPW. Though patients with these types of injuries are most likely found in MTFs, dental treatment facilities should nevertheless be prepared for patients presenting to the dental treatment facility. Since the dental treatment facility does not have any PPWs, these patients should be immediately evacuated to the adjacent MTF for treatment.

RESTRICTION OF MOVEMENT, ISOLATION, AND QUARANTINE

3-107. To prevent the spread of an infectious disease or contagious illness, public health authorities use different strategies. Three of these strategies are: restriction of movement, isolation, and quarantine. These are common practices in public health and aim to prevent and control exposure to unexposed and uninfected individuals to potentially infected or infectious persons. These measures may be voluntarily implemented or be a directive by public health authorities or by military commanders.

3-108. The three strategies differ in that restriction of movement restricts persons to stop the spread of a contagious illness; isolation applies to persons who are known to have an illness or they are symptomatic;

and quarantine applies to those who have an exposure or suspected exposure to an infectious disease but are not symptomatic. During a declared public health emergency, a commander, in consultation with the public health emergency officer, may exercise special powers relating to persons necessary to prevent the spread of communicable diseases. To the extent necessary for protecting or securing military property or places and associated military personnel, such special powers may also include persons other than military personnel who are present on a DOD installation or other area under DOD control. For more information, refer to DOD 5200.08-R.

Restriction of Movement

3-109. Restriction of movement refers to potentially infected persons and the restriction of their movement to stop the spread of that illness. Restrictions of movement may be implemented to prevent the spread of communicable diseases. In the case of military personnel, restrictions of movement, including isolation or quarantine, or any other measure necessary to prevent or limit transmitting a communicable disease may be implemented. In the case of persons other than military personnel, restrictions of movement may include limiting ingress and egress to, from, or on a military installation.

Isolation

3-110. Isolation refers to the separation of persons who have a specific infectious illness from a healthy population. Isolation allows for the target delivery of specialized medical care to people who are ill, while protecting healthy people from getting sick. Infected people in isolation may be cared for in their homes, in hospitals, or in designated MTFs. Isolation is a standard procedure used in hospitals for patients with tuberculosis and certain other infectious diseases. In most cases, isolation is voluntary; however, many levels of government (federal, state, and local), especially the DOD have basic authority to compel isolation of sick people to protect the public.

3-111. Protective sequestration is a form of reverse isolation where uninfected Service members are isolated from the infected population or contaminated environment as a tactical or strategic reserve. Protective sequestration is a measure or option that commanders may use after a CBRN incident.

Quarantine

3-112. Quarantine refers to the separation and restriction of movement of persons who, while not yet ill and have not shown signs and symptoms of the disease, have been exposed to an infectious agent and therefore, may become infectious. Quarantine involves the confinement and active, continued health surveillance of an individual who is suspected of having been exposed to an infectious agent until determined that they are free of infection. Quarantine is medically very effective in protecting those personnel not exposed to an infectious agent from contracting the disease.

WORRIED WELL OR PSYCHOLOGICAL EFFECTS

3-113. During a CBRN incident, many people are fearful of having been exposed to CBRN threats and hazards, even though they are either at very low risk or have tested negative for exposure. The common term used to describe people in this situation is *worried well or people with psychological effects*. This term generally refers to people who are worried (or convinced) that they have been exposed to a CBRN hazard agent, even though they are physically well and do not actually display the signs and symptoms of being exposed to a CBRN hazard.

3-114. The actual cause is usually psychological, rather than medical among *worried well* people. Psychological problems commonly associated with *worried well* people include—

- Clinical depression.
- Severe anxiety disorders.
- Phobias.
- Obsessive-compulsive disorder.
- Other psychological disorders.

3-115. These psychological problems can only be diagnosed by a qualified BH professional such as a BH counselor, a psychologist, or a psychiatrist. When a Service member presents himself to an MTF during a CBRN incident, the Service member should be considered at some risk of exposure until he has been tested and examined by the above mentioned BH professionals; afterwards, the BH professional can determine if the Service member is one of the *worried well*. It is only through examination, testing, and history taking that the potential of being exposed to a CBRN hazard can be discounted.

3-116. During the sarin gas release in the Tokyo subway system in 1995, the hospitals were presented with over 5,500 possible casualties. Only 1,000 were casualties related to the attack and only 12 deaths were related to this catastrophe. The total number of those who presented themselves to the hospital with complaints of postexposure symptoms exceeded the number who did require medical treatment caused by exposure.

3-117. The importance of the appropriate response to the *worried well* during a CBRN incident has to be considered. Medical personnel and BH treatment providers must be prepared to provide some level of treatment for individuals showing acute or transient emotional and behavioral signs and symptoms. While the acutely ill patients have priority of treatment, attention must also be paid to the *worried well* and others affected psychologically. If the *worried well* personnel are not cared for immediately, the command or community will experience BH consequences, even long after the CBRN crisis is over.

MEDICAL TREATMENT FACILITY DECONTAMINATION

3-118. The decontamination of MTFs and mission-essential surfaces and equipment requires a well-thought-out process. Fixed-site decontamination capabilities must be planned, coordinated, tested, and adapted for each MTF prior to a CBRN incident. Mobile decontamination equipment capabilities may be available at a fixed site to decontaminate buildings, equipment, roads, ramps, and helipads. Loading docks, entries and exits, and building exteriors can be decontaminated with more conventional methods such as using calcium hypochlorite (in U.S. Army and USMC medical equipment set [MES] kit) and soap and water. Commanders should identify all systems that are capable of contributing to the decontamination effort (for example, water hydrants, fire hoses, fire trucks, steam cleaners, and water pumps). The commander should designate and train teams that can perform decontamination for fixed-site operations. For more detailed information on fixed facility decontamination procedures, types of contamination and how to decontaminate them, and decontamination of specific surfaces and materials, refer to FM 3-11.5/MCWP 3-37.3/NTTP 3-11.26/AFTTP(I) 3-2.60 and FM 3-11.4 (FM 3-4)/MCWP 3-37.2/NTTP 3-11.27/AFTTP (I) 3-2.46.

3-119. The decontamination of an MTF consists of two parts: interior and exterior.

Interior

3-120. When conducting decontamination of the interior of an MTF, the following activities must occur:

- Secure the area or facility.
- Sample to confirm and determine the extent of the contamination.
- Evaluate the sampling results.
- Isolate the areas to prevent the spread of the contamination.
- Remove critical objects for special decontamination procedures.
- Ensure that contamination is not spread or transferred during movement.
- Decontaminate localized areas of the contamination.
- Properly manage the contaminated waste from the decontamination process.
- Continue monitoring and protecting against low-level exposure risks.
- Document and record the decontamination operations.

Medical Equipment

3-121. Moisture, dust, and corrosive decontamination materials can damage unsealed electronic equipment circuitry (such as x-ray machines, electrocardiogram, or respirators). Most field electronic equipment is watertight for environmental protection which provides good protection against CBRN contamination. Contamination will probably not penetrate gasket-equipped protective covers and sealed components on

electronic equipment; but if exposed, the contaminants may be present on the outside of cases containing the electronic equipment. The outside portions of the equipment case must be wiped down with a designated decontaminant. After decontaminating the outside, the equipment must be wiped down with water or an approved solvent to remove traces of decontaminant solutions. If equipment seals appear damaged or the penetration of CBRN contamination into the inside of the equipment is suspected, then the unit should be treated as if it was unsealed. Under no circumstances should electronic equipment be immersed in a decontaminant solution or subjected to high-pressure application of decontaminant solutions.

Optics

3-122. Optical systems are extremely vulnerable to decontamination materials that might scratch or adversely affect the lenses. Wipe optical systems with a soft, nonabrasive material such as a lens-cleaning tissue, cotton wadding, or a soft cloth dipped in hot, soapy water. Wipe the optical system with decontaminants. Do not immerse it.

Medical Supplies

3-123. Some medical supplies tend to absorb CW agents and may not be decontaminated and reused. It may be necessary to burn or bury them if they are heavily contaminated with a CW agent. When attempting to decontaminate the medical supplies, either calcium hypochlorite dry mix (mixed with dry earth) or slurry (mixed with water to form the chlorine solution) may be used. In comparison, slurry is more effective. In many cases, weathering and rinsing with soap and water may be the preferred decontamination technique if the medical supplies are sealed. If the nonexpendable medical items (such as surgical instruments) must be decontaminated, boiling for 1 hour in soapy water is the preferred decontaminant for chemical and biological contamination. Radioactive contamination can be removed by brushing and then washing. It may also be vacuumed but a high-efficiency particulate air filter is preferred, and special care should be taken when removing and disposing of the collected radioactive debris from the vacuum system. If CBRN protective covers (tarps or poncho) were used to protect the medical supplies from contamination during a CBRN incident/attack, these covers should be decontaminated, buried or destroyed after use.

Exterior

3-124. Many materials may absorb contamination and may not be completely decontaminated. The removal or sealing (painting) of these surfaces may be required to reduce the hazard. The decontaminated surfaces should be continually monitored until the detector indicates there is not more off-gassing. As temperatures rise, off-gassing of previously contaminated surfaces may occur at detectable levels. A point detection device should be used to monitor contaminated surfaces.

Structures

3-125. Wood and concrete tend to absorb liquid agents and they may give off toxic vapors for days or weeks. Building decontamination is very difficult and requires large quantities of decontaminants. Covering the contamination with plastic sheets, calcium hypochlorite slurry, sodium silicate, or other substances that cover or absorb the agent can reduce the hazard. Even though a particular part of a building is not intended for occupation, it may still need to be decontaminated to prevent the contamination from spreading.

Ramps, Roads and Helipads

3-126. Ramps, roads and helipads also absorb liquid agents and then give off toxic vapors when heated by the sun. These surfaces may need to be decontaminated several times to reduce hazards. Streets, sidewalks, or other porous surfaces are best decontaminated by weathering if the time and the situation permit.

Weathering

3-127. Weathering can increase the evaporation of liquid contamination. In a hot, sunny environment, at least 99 percent of the contamination can evaporate within a few hours. Therefore, external building wash down may not be necessary. As a result, vapor concentrations will be high but should not last long. If liquid contamination soaks into soft, porous soil (such as loose sand), evaporation is not as quick. Strong winds

also increase the evaporation rate. Low temperatures during the night have a reverse effect and tend to increase the persistency of chemical and biological contamination. The sandblasting effect of sandstorms may remove contamination from surfaces facing the storm. Sunlight and high temperatures will destroy many CB agents without additional decontamination measures if time permits. Rain can help the decontamination process by washing away contamination on exposed surfaces. Rain can also hydrolyze some agents. However, runoff may contaminate the soil.

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Chapter 4

Medical Evacuation in a Chemical, Biological, Radiological, and Nuclear Environment

GENERAL

4-1. Patient movement in combat areas is normally a Service responsibility using organic assets (personnel, ground vehicles, watercraft, and aircraft). The CCDR, with the advice of the command surgeon, is responsible for moving casualties within the theater and deciding the extent to which evacuation assets will be committed to contaminated areas. The Commander, USTRANSCOM is the DOD single manager for intertheater patient movement. The CCDRs are responsible for intratheater patient movement. The primary mission of the DOD patient movement system is to safely transport U.S. military casualties from the combat zone to fixed MTFs and/or to Role 3 MTFs rearward in or out of the combat zone, as required.

4-2. Patient movement may be conducted in conjunction with combat operations, personnel movements, or logistics movements within an AO. The JFCs should integrate and coordinate the use of evacuation resources towards the common purpose of reducing mortality while maintaining medical treatment, in support of the theater, and subordinate joint force objectives. Thus, it is critical that each Service component properly plan to operate its portion of the overall patient movement system.

4-3. The techniques and procedures that govern patient movement operations almost universally apply when operating in a CBRN environment, however, casualties contaminated with CBRN agents will normally be decontaminated prior to evacuation to an MTF. Decontamination and processing procedures must be in place to prevent the spread of CBRN agents; to ensure the appropriate protection for casualties, crew and assets, as well as receiving units.

4-4. A CBRN incident also has the potential to instantaneously produce a very large number of casualties, severely impacting the entire medical treatment and evacuation systems. The resulting casualties can be seriously ill or injured, highly contagious, and may require extensive medical support. In some cases, treating patients in place instead of evacuating them to a higher role of medical care may be the best option.

MEDICAL EVACUATION IN A CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR ENVIRONMENT

4-5. A CBRN environment forces the unit leadership to consider to what extent they will commit evacuation assets to the contaminated area. If the unit or task force is operating in a contaminated area, most of or the entire number of organic medical evacuation assets will operate there. However, efforts should be made to keep some ambulances free of contamination. For conventional patient movement operations see JP 4-02 and ATP 4-02.2.

TACTICAL AND OPERATIONAL MEDICAL EVACUATION

4-6. Once the use of CBRN weapons has been confirmed and areas of contamination identified, subordinate commanders must decide the extent to which they will commit evacuation assets not already contaminated during the attack. Depending on the situation, there may already be adequate numbers of vehicles, watercraft, and aircraft operating within the affected areas to transport the number of casualties sustained. Full use of these assets should be made while keeping the safety and operational exposure of the personnel operating them in mind. These platforms (if not otherwise damaged) can respond relatively quickly to transport the wounded to designated areas where they can undergo patient decontamination and receive medical treatment.

4-7. On the modern battlefield, land forces have three basic modes of evacuating patients (personnel [litter bearers], ground vehicles, and aircraft). Watercrafts may also be used to conduct patient evacuation for waterborne forces.

4-8. Using litter bearers to carry the patients involves a great deal of stress. Wearing cumbersome MOPP gear, combined with adverse climate conditions, harsh terrain, increased workload, and the fatigue of battle will greatly reduce personnel effectiveness. If personnel must enter a radiologically contaminated area, an operational exposure guide must be established. Once a unit or individual is exposed to radiation, exposure records are maintained by the CBRN officer/NCO and made available to the commander, staff, and command surgeon. The exposure is also entered into the individual's medical and/or dosimetry record. Based on the operational exposure guide, the commander and leaders will decide which medical evacuation assets will be sent into the contaminated area.

4-9. Every effort is made to limit the number of ground evacuation assets that are contaminated. Patient movement considerations include—

- A number of ambulances will become contaminated in the course of battle. Optimize the use of resources; use those already contaminated (medical or nonmedical [casualty evacuation]) before employing uncontaminated resources.
- Use ground ambulances instead of air ambulances in contaminated areas; they are more plentiful, are easier to decontaminate, and are easier to replace.
- Use ground vehicles to cross the line separating clean and contaminated areas. The ground ambulance proceeds to an MTF with a PDS; the patient is decontaminated and treated. If further evacuation is required, a clean ground or air ambulance is used. The routes used by ground vehicles to cross between contaminated and clean areas are considered dirty routes and should not be crossed by clean vehicles, if the mission permits. Consider the effects of wind and time upon the contaminants; some agents will remain in the area for extended periods of time.

4-10. The relative positions of the contaminated area, forward line of personnel, and threat air defense systems will determine where rotary- or fixed-wing aircraft may be used in the evacuation process. One or more rotary- or fixed-wing aircraft may be restricted to contaminated areas. Normally, contaminated vehicles (air, water and ground) will be confined to dirty environments.

4-11. Once a rotary- or fixed-wing aircraft has entered a contaminated area, it is highly unlikely that it can be spared long enough to undergo thorough decontamination or detailed equipment decontamination. However, spot or operational decontamination should be performed to the greatest extent possible. This will depend upon the contaminant, the operating tempo, and the resources available. Immediate or spot decontamination of vehicles, watercraft and aircraft is accomplished to minimize crew exposure. Spot decontamination is an immediate decontamination technique that will normally be performed on aircraft that have been recovered and will be quickly turned around for continued flight operations. Units must include decontamination procedures in their SOP. See FM 3-11.5/MCWP 3-37.3/NTTP 3-11.26/AFTTP(I) 3-2.60 for details on decontamination procedures.

4-12. Keep the rotary-wing rotor wash and the aircraft propeller blast in mind when evacuating patients, especially in a contaminated environment. The intense rotor wash and propeller blast will disturb the contaminants and further aggravate the condition. The aircraft must be allowed to land and reduce to flat pitch before patients are brought near it. Additionally, a rotary-wing aircraft must not land too close to a PDS (especially upwind) because any trace of contaminants in the rotor wash will compromise the decontamination procedure.

4-13. Evacuation of patients must continue, even in a CBRN environment. The HSS leader must recognize the constraints CBRN places on operations, then plan and train to overcome these deficiencies.

4-14. To minimize the spread of contamination inside the ground ambulance, watercraft and aircraft, plastic sheeting should be placed under the litter to catch any contaminant that drips off the patient or litter. The plastic sheeting can be removed with the patient, removing any contamination with it. When plastic sheeting is not available, placing a blanket under the litter will reduce the amount of agent that makes contact with the inside of the ground ambulance, watercraft, or aircraft.

Note. The key to mission success is detailed preplanning. A HSS plan must be prepared for each support mission. Ensure that the HSS plan is in concert with the tactical plan. Use the plan as a starting point and improve on it while providing HSS.

4-15. Patient protection during evacuation must be maintained. Patients that have been decontaminated at the MTF PDS will have had their MOPP ensemble removed. The forward deployed MTFs will not have replacement MOPP ensembles for the patients. These patients must be placed in a PPW before they are removed from the clean treatment area for evacuation. The PPW provides the same level of protection as the MOPP ensemble. The patient does not have to wear a protective mask when inside the PPW. The patient is placed inside the PPW that is on a litter. The PPW has a battery-operated blower that can provide a reduction of the body heat load and reduce the carbon dioxide level within the PPW. The PPW will provide protection for the patient for up to 6 hours and is a onetime use item. The blower is reusable and is a decontaminable patient movement item. Refer to JP 4-02, DODI 6000.11, and ATP 4-02.1 for a discussion of patient movement items.

WARNING

Do not place contaminated patients in the PPW. This will cause gas chamber effects on patient. It is for use with uncontaminated/decontaminated patients only.

STRATEGIC MEDICAL EVACUATION

4-16. Both intertheater and intratheater, AE by USAF aircraft will be severely limited until decontamination has occurred. Aerial flights from contaminated areas into uncontaminated airspace and destinations may be impossible for extended periods of time; some nations will not allow patients from contaminated areas to travel through or over their country. Therefore, patient holding onsite (or in theater) for an extended period of time must be anticipated.

4-17. If a fixed-wing aircraft becomes contaminated as a result of transporting contaminated casualties, that aircraft would have to divert to a remote or designated site for decontamination after its mission. This will place the aircraft out of service for an extended period of time. The movement of contaminated casualties or if the theater situation dictates movement of a patient who has an infectious disease, special validation from the Patient Movement Requirements Center for AE by both the theater CDR and the Commander, USTRANSCOM will be required. Evacuating contaminated casualties and/or those with infectious diseases requires approval of the destination country, overflight privileges, and approval of any country where the aircraft will land for servicing or where casualties will remain overnight. Close coordination between the CDR and the Department of State is required for such movement.

4-18. Casualties exposed to CW agents or TIM agents should be decontaminated prior to AE. Once casualties are thoroughly decontaminated, further AE decisions are based on actual or suspected clinical diagnosis and casualty medical condition. Commanders, AE elements, and medical personnel should apply specific contamination control measures.

4-19. If the decision is made to move CBRN contaminated casualties using AE resources, the AE crew will need to be in protective posture. When in protective gear, AE crews are severely limited in their ability to assess the casualty and problems can exist in trying to palpate, auscultate, or visually examine the casualty.

4-20. Normally, BW casualties will be treated in place (within the theater of operation). However, casualties suspected of having been exposed to highly contagious diseases (such as smallpox and pneumonic plague) will not be placed on AE aircraft unless properly loaded and sealed into a high-level containment such as a PIU. The PIU is a portable biocontainment unit for safe transport and care of a contagious patient and is transportable by land and air. The PIU provides up to 24 hours of containment for a patient with a highly contagious disease and should not be used for CW or TIM exposed patients. The PIU should be employed

by a Critical Care Air Transport Team, fully trained on PIU operations. The PIU is not developed for mass patient transport.

MEDICAL AIR EVACUATION UNDER HIGH-LEVEL BIOSAFETY CONTAINMENT

4-21. Air evacuation of patients with potentially lethal, contagious infections poses unique challenges and risks to air crews and medical personnel. Evacuation of such patients is relevant to military contingency operations because personnel may be placed at risk for hemorrhagic fevers and other infections during deployment to tropical environments or by adversaries' use of BW agents.

4-22. Evacuation of patients to a biocontainment facility approved by the CDC may be necessary for rapid diagnosis of an unknown pathogen. The PIU may be used to safely evacuate one or two highly contagious patients to an approved biocontainment facility.

4-23. Maximum biological containment is designed to prevent transmission of highly hazardous pathogens and is accomplished in two steps. First, the health care worker wears appropriate personal protection equipment for working in environments with respiratory hazards (respirators must be National Institute for Occupational Safety and Health-approved); second, the patient is isolated within a sealed container under negative air pressure maintained by a battery-powered high efficiency particulate air-filtered ventilation system providing five air exchanges per hour.

Aeromedical Evacuation Process

4-24. The patient must be evaluated and stabilized before transport to ensure survival en route. Only patients likely to survive transport should be evacuated. The physiologic effects of altitude, effect of confinement on patient-care delivery, and psychological effect of confinement within the PIU must be considered. Evacuation of patients with conditions requiring special in-flight management, for example, hemodynamic fluctuations and severe anemia, may also be contraindicated. For more information on aeromedical evacuation, refer to STANAG 3204.

4-25. The patient is placed inside the PIU and carried to a transfer point near the aircraft. There the PIU and team members' equipment are decontaminated with a 5 percent chlorine solution. During the decontamination procedure, the patient breathes portable oxygen from a mask and the ventilation intake port is sealed to prevent chlorine gas from entering the isolator.

4-26. The patient is transported on standard military transport aircraft (C-130 or C-17), which maintain an internal cabin atmosphere equivalent to approximately 8,000 feet above sea level while at altitude (26,000 feet to 35,000 feet). This level of air pressure is considered adequate to protect commercial airline passengers and results in an arterial blood hemoglobin oxygen saturation of approximately 90 percent in healthy persons.

Patient Isolation Unit

4-27. While *treat in place* is the primary means of caring for contagious patients, current theater evacuation policy permits the air transport of patients ill with, exposed to, or potentially exposed to an identified/known infectious agent using a contract transport service. This service may be used to move a noncritical patient when operational concerns dictate and treatment in place is not the best option. The use of the contracted service to transport DOD personnel is covered in an interagency agreement between DOD and the CDC. The AE/critical care air transport team capability to move contagious patients will only be used in extreme/rare circumstances. The movement of one or two patients ill with an infectious disease may be essential to meet critical operational objectives. For more detailed information on approval for transport of highly or potentially contagious patients, refer to Air Mobility Command Patient Isolation Unit Concept of Operations.

4-28. The contamination of mobility aircraft significantly impacts the overall air mobility mission because that aircraft will be rendered unavailable for missions until decontaminated. The decontamination method for aircraft exposed to contagious pathogens has not been developed. The emergence of possible adversary use of biological pathogens leads to a higher probability of U.S. forces exposure. The emergence of new infectious disease in the civilian sector, such as severe acute respiratory syndrome and avian flu, increases the probability of military personnel, their dependents, or government civilian personnel contracting these

diseases; and thus requiring AE to a definitive MTF. The challenge is to transport these patients without experiencing adverse consequences.

4-29. The mission of AE is fixed-wing movement of patients requiring supervision and care by AE personnel to locations offering appropriate levels of medical care. The AE system can operate as far forward as fixed-wing aircraft are able to conduct secure operations. The AE is a Total Force system prepared to support the full spectrum of military and humanitarian operations at any time, and anywhere. Aeromedical evacuation crew members are prepared to move patients on any available fixed-wing, mobility airlift platform. The PIU allows AE crew members to take advantage of transiting platforms and enhances mobility airlift platforms capable of performing the AE mission.

4-30. Contaminated or contagious patients may come from many sources. Events may be the result of a BW attack, adversary attack, or from exposure to an existing or emerging infectious disease. There may be political pressures to transport these casualties to CONUS for treatment or pressure to leave them OCONUS to avoid the spread of the infection to the general population. Diplomatic efforts may be undertaken to permit AE flights to fly in foreign air space or land for emergency repairs. The decision to move contagious casualties will be directed through USTRANSCOM and the theater CCDR.

4-31. The PIU provides a capability to move a small number of highly contagious patients through the AE system. The PIU will enhance force protection by providing medical personnel the capability to transport contagious patients without fear of contamination to caregivers, other patients, passengers, and transport vehicles. The PIU is light enough for use in the field and rugged enough to support movement through the DOD patient movement system. Evacuation of potentially contagious patients requires close coordination with multiple agencies both military and civilian (such as the Department of State, CDC, or USAMRIID). Refer to the PIU Concept of Operations for more information on the PIU. Refer to Table 4-1 for a list of some of the possible contagious diseases that require patient isolation during AE.

Table 4-1. Contagious diseases

- Arenavirus infection
 - Argentine hemorrhagic fever (Junin virus)
 - Bolivian hemorrhagic fever (Machupo virus)
 - Brazilian hemorrhagic fever (Sabiá virus)
 - Lassa fever
 - Venezuelan hemorrhagic fever (Guanarito virus)
- Avian flu
- Bunyavirus infection
 - Congo-Crimean hemorrhagic fever
- Filovirus infection
 - Ebola Virus Disease
 - Marburg Virus Disease
- Orthopoxvirus infection
 - Monkeypox
 - Variola
- Tuberculosis
- Pneumonic plague until sputum cultures are negative
- Any unknown virulent communicable disease pending diagnosis

4-32. The desired operational effects and goals of PIUs are to—

- Ensure no additional infections occur as a result of transporting contagious patients.
- Provide quality medical care to the contagious patients while they are isolated.
- Ensure the level of isolation is consistent with medical practices and disease severity.
- Minimize disruption to the aircraft's primary mission or AE patient movement system during patient transport.
- Maximize the comfort of the patient within the constraints of the AE environment.

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Chapter 5

Patient Decontamination

GENERAL

5-1. The purpose of this chapter is to describe patient decontamination from initial exposure on the battlefield to the patient's admission to the MTF whether on land or on the sea. This chapter addresses non-Service specific technical and operational principles, techniques, procedures, methods, equipment, and issues associated with the performance of patient decontamination after a CBRN incident. Patient decontamination must be in place near the MTFs at all roles of medical care.

CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR MASS CASUALTY

5-2. *Mass casualty* is any large number of casualties produced in a relatively short period of time, usually as the result of a single incident such as a military aircraft accident, hurricane, flood, earthquake, or armed attack that exceeds local logistic support capabilities (JP 4-02).

5-3. With the employment of CBRN weapons/agents, a mass casualty situation can present itself at any time and at any role of care. Treatment is often limited to life- or limb-saving care and triage must be conducted within strict guidelines. It is important that all patients be decontaminated before they are admitted into an uncontaminated area.

5-4. The roles of military units and organizations need to be defined for a successful preparation, planning, and execution of decontamination operations.

INDIVIDUAL RESPONSIBILITY

5-5. When a Service member becomes contaminated from a CBRN attack, immediate decontamination is carried out to prevent the Service member from becoming a casualty. This includes the following:

- Skin decontamination is a basic survival skill and should be performed immediately by the individual or a buddy upon being contaminated.
- Personal equipment wipe down should be performed as soon as possible (preferably within 15 minutes of contamination). This is done to remove contamination from individual equipment. Use detector paper or a chemical agent detector/monitor to locate the agent. Use a radiological detector to locate radiological contamination and then brush, wipe, or shake it off.

Self-Aid

5-6. Self-aid consists of measures that Service members can apply in helping themselves. These include self-administration of antidotes (only for nerve agent exposure) and assumption of the appropriate MOPP level.

Buddy Aid

5-7. Buddy aid consists of emergency actions to restore or maintain vital body functions in a casualty who cannot administer self-aid. Mental confusion, muscular incoordination, physical collapse, unconsciousness, and cessation of breathing may occur so rapidly that the individual is incapable of providing self-aid. These actions include—

- Decontaminating the casualty.
- Putting the remaining protective clothing on the casualty to preclude further absorption of contamination through any exposed skin.

- Evacuating the casualty as soon as possible.
- Administer appropriate antidotes (use the casualty's own antidotes).

CONTAMINATED UNIT RESPONSIBILITIES

5-8. Operational and thorough personnel decontamination is carried out by contaminated units (with possible assistance from a decontamination team/unit). This may include individual decontamination beyond the scope of immediate decontamination, decontamination of mission-essential equipment, and limited terrain decontamination. Operational and thorough decontamination reduces the level of contamination, thus lessening the chance of spread and transfer. When combined with weathering, MOPP levels may be reduced without further decontamination, depending on the surface or material being decontaminated and the agent. See FM 3-11.4/MCWP 3-37.2/NTTP 3-11.27/AFTTP (I) 3-2.46 for more information on the decontamination of specific surfaces.

5-9. The contaminated unit is responsible for setting up, operating, manning, and closing the detailed equipment decontamination, detailed aircraft decontamination, and detailed troop decontamination (DTD) area at the operational and thorough-decontamination site.

5-10. The higher headquarters of the contaminated unit (battalion, brigade, division or corps) will coordinate and provide nonmedical personnel *augmentees* to support the medical unit/facility with patient decontamination. The USAF coordinates with their higher headquarters for support only when not supported by an expeditionary medical decontamination team (EMDT).

Note. The Chemical Corps decontamination platoons support operational decontamination if there are no other assets within the battalion headquarters (for example, power-driven decontaminating equipment and operators). The Chemical Corps conducts detailed equipment decontamination but the contaminated unit is responsible for set up, running, and shutdown of the DTD site.

CHEMICAL DECONTAMINATION UNIT RESPONSIBILITIES

5-11. Chemical, biological, radiological, and nuclear units (battalion crew, decontamination platoon) assist the contaminated unit with operational and thorough personnel decontamination. The CBRN unit determines the general location of the DTD within the decontamination site and provides technical advice on setting up, operating, and closing the DTD area. The supported unit is required to keep on-hand supplies to conduct a DTD; however, the CBRN unit may supply the majority of the equipment and supplies expended to conduct a DTD. The CBRN unit will be responsible for submitting a complete CBRN 5 report after the site is closed.

5-12. A supporting CBRN unit performs the detailed equipment decontamination or detailed aircraft decontamination. The detailed equipment and aircraft decontamination operations are conducted as part of a reconstitution effort during breaks in combat operations. These operations require immense logistical support and are manpower-intensive. The detailed equipment and aircraft decontamination restore items so that they can be used without protective equipment. As a safety measure, some Services require the use of protective gloves until clearance decontamination has been completed. These operations require support from a CBRN decontamination unit or element.

MORTUARY AFFAIRS RESPONSIBILITIES

5-13. Mortuary affairs personnel are responsible for coordinating the disposition of contaminated HR. This includes the decontamination of remains when required. The joint mortuary affairs office acts as the theater central point of contact for coordination for the mortuary affairs contaminated remains mitigation site (MACRMS). Refer to JP 4-06 for more information on the handling of contaminated HR.

5-14. Combatant commanders are responsible for searching, recovering, tentatively identifying, and evacuating remains from their areas of responsibility. Commanders are responsible for providing or arranging for mortuary affairs support for their personnel. Subordinate commanders at all levels are responsible for the initial search for recovery, tentative identification, and evacuation of all deceased unit personnel within their AO (see JP 4-06). If the threat of CBRN is suspected or present, commanders will request MACRMS support to perform recovery operations.

5-15. Mortuary affairs responsibilities include—

- Ensuring that contaminated HR are placed in a CB HR pouch before movement, to minimize the spread of contamination.
- Establishing and operating the MACRMS and adhering to the procedures such as ensuring adequate rest cycles are in place as outlined in JP 4-06.
- Coordinating to pick up contaminated remains from PDS, MTFs, and personnel DTD location for transport to MACRMS.

5-16. Personnel support may be required after completing the evacuation mission to the MACRMS. The MACRMS site will also require support from a decontamination unit for a complete DTD.

5-17. When remains arrive at the MACRMS without the DD Form 1380 (Tactical Combat Casualty Care [TCCC] Card) (used to be the field medical card) or if it has not been reviewed and signed by a medical officer, the MACRMS will coordinate with the supporting medical company or the nearest MTF. A certified medical officer will pronounce death and complete DD Form 2064 (Certificate of Death Overseas) or appropriate documents for transport of HR back to Dover AFB. The disposition of contaminated remains will be determined by higher headquarters for either interment in theater or back to CONUS. The Armed Forces Medical Examiner usually signs the DD Form 2064; however, current procedure in theater requires the medical officer to sign the *draft* DD Form 2064 and the cause of death will be listed as *pending Armed Forces Medical Examiner determination*. The Armed Forces Medical Examiner is currently located at Dover Air Force Base instead of in theater.

Note. In the U.S. Army, U.S. Navy, and U.S. Marine Corps, transportation and handling of HR is a logistics function and not a medical function.

MEDICAL UNIT RESPONSIBILITIES

5-18. Patient treatment, patient evacuation, and protecting its medical staff from exposure to CBRN are the core mission of the medical personnel during a CBRN incident.

5-19. Medical personnel supervise the patient decontamination operations. For those MTFs not supported by an EMDT, augmentees from the supported units are usually required to assist in the decontamination process and perform patient lifting and washing. Medically trained personnel are located at the triage area, dirty side EMT areas, litter and ambulatory decontamination areas, clean side of the hot line, and clean treatment area.

5-20. When a CBRN incident is expected, higher headquarters must plan, prepare, and coordinate to augment the medical units with nonmedical personnel in support of patient decontamination operations. Additional personnel should be considered to allow for a work-rest rotation of workers. These personnel are split into two categories to assist with either ambulatory and litter decontamination.

5-21. The MTFs are not staffed to simultaneously perform patient decontamination without degrading medical capabilities and capacities. Roles 1 and 2 medical units capable of conducting split-based operations may collocate with CBRN decontamination units prior to an expected CBRN attack. This allows the use of experienced CBRN defense personnel to augment patient decontamination operations prior to the arrival of units conducting operational or thorough decontamination. In the U.S. Army, the minimum number of personnel required for basic PDS operation at Roles 1 and 2 MTFs is eight nonmedical personnel and 20 nonmedical personnel at a Role 3 facility.

5-22. Larger Role 3 MTFs have more equipment and staff to handle larger numbers of patients evacuated to them from smaller, forward MTFs. Larger MTFs will require greater numbers of personnel as they will need to process greater numbers of patients.

MEDICAL SUPPORT IN TROOP/PERSONNEL DECONTAMINATION OPERATIONS

5-23. Assigned medical units/personnel support the contaminated unit during operational and thorough troop/personnel decontamination or DTD by providing medical support to the site. The brigade level or equivalent is the lowest level that the DTD operation can be effectively planned. However, decontamination

support for other unique operational organizations (for example, special operations forces) may require execution at a lower level. The operation requires close coordination between the CBRN officer, logistics officer, command surgeon, and medical commander. See Table 5-1 for personnel decontamination information and Table 5-2 for patient decontamination information.

Table 5-1. Personnel decontamination levels and responsible element

Levels	Tasks¹	Responsible
Immediate	Skin decontamination	Individual/buddy
	Personal wipe down	Individual/crew
	Operator wipe down	Individual/crew
	Spot decontamination	Individual/crew
Operational	MOPP gear exchange and/or CCA ²	Unit
	Vehicle wash down	Battalion crew or chemical, biological, radiological, and nuclear element
Thorough	DED/DAD and/or DTD	Contaminated unit with assistance from chemical, biological, radiological, and nuclear unit
	Detailed equipment/aircraft decontamination	Decontamination platoon(s)
Clearance	Unrestricted use of resources; dispose of and replace the contaminated item, equipment or material	Supporting strategic resources (military commanders, subject matter experts, and other stakeholders)
Notes: ¹ The tasks become less effective the longer the delay. ² The United States Air Force will use CCA procedures in lieu of MOPP gear exchange procedures. Legend: CCA contamination control area DAD detailed aircraft decontamination DED detailed equipment decontamination DTD detailed troop decontamination MOPP mission-oriented protective posture		

Table 5-2. Patient decontamination levels and responsible unit

Levels	Techniques	Responsible
Immediate (patient)	Complete decontamination of contaminated areas of patient's mission-oriented protective posture gear prior to evacuation or return to duty, without removing mission-oriented protective posture gear.	Individual/buddy aid or care
Operational/Thorough (patient)	Decontamination at a patient decontamination site and treatment of conventional and chemical injuries at a medical treatment facility prior to ground, water, or air evacuation.	Augmentees supervised by medical unit/personnel

5-24. The placement of the DTD or PDS depends upon the situation. The best scenario is to collocate medical patient decontamination and nonmedical DTD side-by-side or in close proximity from each other for easy coordination (preferably near a MTF). Personnel who are not requiring patient treatment will proceed through the DTD site. Personnel who have been injured and who need patient treatment will be decontaminated at the PDS. Patient thorough decontamination involves decontamination procedures for litter and ambulatory patients. This encompasses a series of specific steps for patient medical stabilization, the removal of clothing, wash down, and mask removal before entry into the MTF.

PATIENT DECONTAMINATION PRINCIPLES

5-25. The principles and processes of patient decontamination are generally identical throughout the Services, with some variances based on the situation. Common aspects will be emphasized in this chapter. Suggested patient decontamination procedures are noted in this chapter but are not Service-specific. They are based on the available equipment as follows:

- Patient decontamination with minimal equipment (for example, litter stands, buckets).
- Patient decontamination using plumbed tentage, showers, and roller systems.
- Patient decontamination on a water vessel.

5-26. Contaminated patients potentially create increased hazard to first responders, casualty evacuation/medical evacuation teams, medical personnel, and medical facilities. The three key purposes of patient decontamination are to—

- Protect the MTF staff and material.
- Protect evacuation team and equipment along the evacuation route.
- Remove contamination from the patient to reduce agent exposure.

5-27. In some CBRN scenarios, little or no decontamination may be necessary to process a patient especially if lifesaving measures are time critical. The extent to which a patient requires decontamination is dependent on various factors—

- Agent (chemical, biological, radiological) and its characteristics (for example, persistent versus relatively nonstable agents, overall severity of effects).
- Conditions of the release and resulting exposure (for example, liquid versus vapor only).

5-28. Patient decontamination is different from troop or personnel decontamination as patients going through decontamination also have medical conditions that must be managed. With the exception of the Air Force and some ship-based units, which deploy trained medical decontamination teams composed of medical personnel, the patient decontamination process is carried out by nonmedical augmentees who are supervised by trained medical personnel. These nonmedical augmentees are designated by the supported unit commander.

5-29. Patients who present themselves for decontamination may suffer from the effects of exposure to a CBRN agent or a TIM. They can also have conventional wounds, psychological stress reactions, or COSR,

worried well, and malingerers; or any combination of these. In addition, patients may have heat injuries induced by extended time spent in MOPP Level 4. It is important to quickly determine whether there is potential for residual contamination on a patient or in bodily fluids for certain infectious biological agent that may pose a continued hazard to the patient or a cross contamination to responders/MTF personnel. While not all CBRN agents/scenarios require decontamination (see Table 5-1, on page 5-4), when in doubt utilize most protective personal protection and decontamination actions feasible.

5-30. The protective ensemble is worn in a military combat situation where there is an expected CBRN threat. Casualties wearing the ensemble are protected from CBRN threats and hazards in either dry solid, liquid, vapor, or gas form. Removing a contaminated uniform or protective ensemble will remove approximately 95 percent or more of the agent. Foreign objects in wounds (for example, shrapnel) or torn ensemble will cause a breach in the protective ensemble, allowing agents to reach and contaminate the tissues. Individuals not wearing a protective ensemble will have little or no protection when exposed to an agent. Regular clothing can absorb liquid agent, allowing it to touch the skin. Fabric weave can also hold chemical vapors or aerosolized biological agents. In general however, external clothing removal and rinsing of exposed skin and hair with water or soap and water is generally considered adequate decontamination for most chemical vapor only exposures or biological aerosols. Refer to Table 5-1, on page 5-4 and Table 5-2, on page 5-5.

5-31. While these guidelines apply specifically to the wartime battlefield scenario, the same principles and techniques can be readily applied to a homeland, garrison/installation, or civilian setting.

WARNING

Cross contamination of patients by decontamination personnel can result in further injury to the patient. Decontamination personnel handling patients must be cleaned or be thoroughly decontaminated prior to handling patients. Chlorine solution requires contact time with agent for complete neutralization dependent on the ambient temperature. Ensure decontamination personnel have waited a sufficient amount of time before handling patients to allow for this contact time to neutralize agent.

LEVELS OF DECONTAMINATION

5-32. The levels of decontamination used for patients are similar to those levels used for the decontamination of personnel and equipment. There are three levels of decontamination used during decontamination operations for patients as follows:

- *Immediate decontamination*—decontamination carried out by individuals immediately upon becoming contaminated to save lives, minimize casualties, and limit the spread of contamination (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 (JP 3-11).
- *Thorough decontamination*—decontamination carried out by a unit 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 IPE and to maintain operations with minimum degradation (JP 3-11).

IMMEDIATE DECONTAMINATION

5-33. Patient decontamination begins at the time of exposure. To significantly reduce agent absorption and the damaging effects of an agent, decontamination should be performed before one minute after exposure, though later decontamination still has benefits. Decontamination also reduces the possibility of cross

contamination from the exposed Service member's garments to equipment or other persons. The contaminated Service member performs immediate personal decontamination using the appropriate decontaminant. Contaminated areas on the protective ensemble and exposed intact skin are decontaminated. If Service members are not able to decontaminate themselves due to injury or incapacitation then a buddy performs this function.

OPERATIONAL (GROSS) DECONTAMINATION

5-34. This is performed at the unit level to reduce gross contamination on designated in-theater evacuation assets. It is done prior to loading the patient on a vehicle for evacuation within the tactical area. The patient remains in protective ensemble and mask. Any liquid or solid hazard on the ensemble and skin are decontaminated so that the spread of contamination within the evacuation vehicle is minimized.

THOROUGH DECONTAMINATION

5-35. This is the final level of patient decontamination. It generally involves at least removal of all outer garments and removal of residual agents on skin or in hair. Table 5-3 on page 5-8 provides some guidance to what degree of decontamination may be necessary to achieve thorough decontamination for different types and forms of agents. Equipment and technical decontamination where a fourth level of decontamination called clearance decontamination is doctrinally described in FM 3-11.5/MCWP 3-37.3/NTTP 3-11.26/AFTTP(I) 3-2.60 for verification that all residual hazard has been mitigated to levels acceptable for unprotected personnel. While it is critical to prevent exposure to medical staff, excessive decontamination procedures should be avoided to prevent delays to medical treatment. This process ensures that the patient has been properly decontaminated and all necessary records regarding decontamination, monitoring results, type and duration of exposure and location of incident are properly recorded to facilitate future medical surveillance and ensure the safety of all personnel after the patient's release or transfer to a medical facility location outside the CBRN environment. This level of decontamination is performed by augmentees who are closely supervised by medical personnel or, in the Air Force and some Navy ship-based units, by trained decontamination teams of medical personnel. Much of this chapter is devoted to discussing various ways to conduct a patient thorough decontamination.

THE IMPORTANCE OF EARLY CONTAMINANT REMOVAL AND MEDICAL MONITORING OF PATIENTS

5-36. Many liquid chemical agents (such as liquid nerve, blister, and cyanide) can sequester in the skin if not promptly removed from the patient through patient decontamination. In liquid form these agents take time to be absorbed through exposed skin and get into the blood stream to cause systemic effects. The systemic effects from liquid chemical agent on the skin or solid agent on sweaty skin may not be seen for minutes to hours after exposure depending on the toxicity of the agent and amount of agent contacted. Even after patient decontamination, a patient exposed to a dry or liquid agent may continue to show worsening symptoms. With these types of exposures, patients must continue to be treated after decontamination.

5-37. All patients need close medical monitoring and medical treatment before, during, and after patient decontamination at the medical facility.

Table 5-3. General recommended decontamination actions by type and category of agent

Minimal decontamination for contaminated dust/solid agents of any type (chemical, biological, radiological)		Carefully cut off and roll back outer garments to contain dust particles. May need to remove inner garments (upwind) if covered in contaminated dust. High-efficiency particulate vacuum can be used on garments or garments misted with water prior to garment removal to minimize reaerosolization. Wet towels may be laid over garments first to minimize reaerosolization during misting. Note. Before brushing/shaking, ensure to wear respiratory protection.	
Additional decontamination guidance by hazard type:			
Chemical		Biological	Nuclear/Radiological
Liquid chemical warfare agents	– Remove all clothing and equipment. – Physically remove mass agent from skin, mask. – Thoroughly wash with soap and water, Reactive Skin Decontamination Lotion or use chlorine solution. – Air monitoring (detection device).	– Outer wear removal. – Thorough soap and water rinse. Note 1: No monitoring equipment is available to “clear.” Note 2: The external decontamination measures will not address hazards associated with <i>internal</i> sources such as bodily fluids and so forth that for certain highly infectious and communicable (transmissible) disease organisms (for example, Ebola, Marburg, and various hemorrhagic fevers) are of greatest concern and must be managed appropriately.	– Minimize reaerosolization – Dry brush/shake any contaminants from protective equipment prior to removing. <i>Additional precautions if feasible/time allows:</i> – Soap and water rinse.
Vapor persistent agents (for example, HD, VX) and Liquid toxic industrial chemicals (for example, liquid chlorine)	– Remove all clothing and equipment. – Wash with soap and water or water rinse or Reactive Skin Decontamination Lotion. <i>Additional precautions for patient thorough decontamination:</i> – Air monitoring (detection device) for chemical warfare agent.		
Vapor nonpersistent agents (sarin)	– Remove all clothing and equipment. <i>Additional precautions for patient thorough decontamination:</i> – Wash with soap and water or water rinse hair and exposed skin. – Air monitoring (detection device) for chemical warfare agent.		
Vapor toxic industrial chemicals (for example, chlorine gas)	– No decontamination needed. <i>Additional precautions for patient thorough decontamination:</i> – Outer wear removal. – Wash with soap and water or water rinse hair and exposed skin.		
Note: Wastewater from decontamination that involves solution (soap and water; water; chlorine solution) should be collected and disposed of properly.			

ZONES OF CONTAMINATION

5-38. In interagency operations, a contaminated area is divided into zones of contamination modified following the guidelines prescribed in the Environmental Protection Agency Standard Operating Safety Guidelines and the OSHA Act (Section 1910.120, Part 1910, Title 29, Code of Federal Regulations [29 CFR 1910.120]). To more effectively manage the contaminated area, a variety of control lines and points are designated depending upon the level of contamination. These same areas hold true in the battlefield.

HOT ZONE

5-39. The hot zone is also called *exclusion zone*, *red zone*, or *restricted zone*. This is the area that is directly contaminated by CBRN agents. In combat, this is the contaminated battlefield or TIM release. Casualties usually undergo immediate (gross) decontamination in the hot zone or near it. The MOPP Level 4 posture will provide protection against CW agents (for example, chlorine, phosgene, mustard, nerve agents, and cyanide) in an open battlefield environment where the vapor is dispersed by the wind currents. The military protective ensemble is not intended for oxygen-depleted areas or for long-term use in confined spaces with high concentrations of TIC. In a confined space or where nonbattlefield TIC (for example, ammonia or carbon monoxide) are used, a self-contained breathing apparatus, or special filters that will protect against the specific TIC must be used. Refer to Figure 5-1 below.

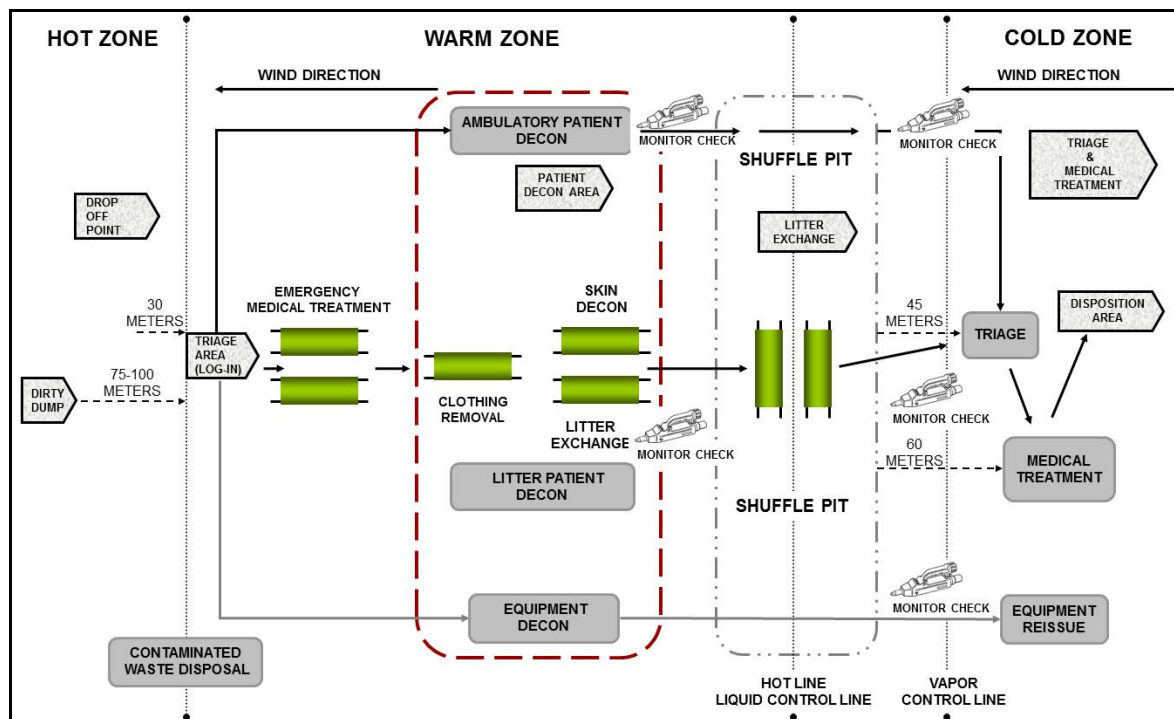


Figure 5-1. Patient decontamination site layout

WARM ZONE

5-40. This is an area where low levels of dry, liquid, and vapor contamination can be expected once contaminated individuals enter this area. The contamination hazard is essentially the agent that remains on the patients that are brought into this zone (for example, the primary hazard comes from liquid or dry agent on clothing or the off gassing of vapors from liquid contaminated garments and equipment). While the direct hazards to workers is much reduced compared to those working in the hot zone, the protective ensemble must be worn by decontamination team members as vapors and particles, even in small amounts, can pose a hazard to those working directly with the patients. The warm zone is located outside of the hot zone. In this zone,

immediate (gross), patient operational, and patient thorough decontamination take place upwind of the hot zone incident location. The PDS is initially set up in an area free of contamination. This area becomes part of the warm zone once contaminated casualties begin to arrive. This zone includes control points in and out of the patient decontamination area so that contamination spread is controlled. Refer to Table 5-4 for general CBRN decontaminants/hazard mitigation techniques and applications at the PDS. Protective ensemble at MOPP Level 4 or OSHA Level C provides adequate protection in the warm zone. The evacuation corridor is within the warm zone. This includes land evacuation routes for casualties who may still be contaminated. The PDS is located in that corridor. All patients are routed through this corridor toward the MTF. In some instances patients who have only undergone immediate (gross) and patient operational decontamination may be *dirty evacuated* over or through a clean area for thorough decontamination at a larger MTF. In this case, a separate *warm area* would be created at the vehicle drop-off point and decontamination area at the destination MTF. Refer to Figure 5-1 on page 5-9.

COLD ZONE

5-41. The cold zone is an area free from liquid and vapor contamination. The PDS and MTF are initially set up in the cold zone. All personnel and patient's entering this zone have been decontaminated. Protective ensemble and mask are usually not required for personnel downwind of the cold zone unless the area becomes contaminated or the patient demonstrates symptoms of a respiratory communicable disease. Standard precautions must be practiced if a patient is infected with an infectious BW agent. Refer to Figure 5-1 on page 5-9.

Table 5-4. General chemical, biological, radiological, and nuclear decontaminants/hazard mitigation techniques and applications

Type of application	Type of contaminant					
	Chemical		Biological		Nuclear/radiological	
	Personnel: (immediate and time critical)	Surface/ material/area	Personnel: (not time critical)	Surface/ material/area	Personnel: (less time critical)	Surface/ material/ area
Decontaminants/techniques						
Misting hair/clothes	minimize reaerosolization		minimize reaerosolization		minimize reaerosolization	
Physical removal	remove outer garments		remove outer garments		dry brushing/shaking	dry brushing/shaking
Water only	X	X	X			
Soap and water	X	X	X	X	X	X
Weathering		X		X		X
Reactive skin decontamination lotion	X		X			
Individual equipment decontamination kit		equipment		equipment		
Calcium hypochlorite		X [*]		X [*]		
M100 SDS reactive powder		X [*]		X [*]		X
Household bleach solution (5% sodium hypochlorite)		X [*]		X [*]		
Dilute bleach solution (0.5% sodium hypochlorite)	^	X	^	X		
Absorbents (earth/soil, sawdust, ashes, rags)		for liquid decon				
Sealants/physical covers (concrete, asphalt, paint, soil)		X		X		X
Steam		§		X		X
Heat/fire/incineration		X		X		

^{*} These particularly corrosive decontaminants are specifically not to be used on certain aircraft and other equipment (soap and water alternative is doctrinally mandated). See FM 3-11.5/MCWP 3-37.3/NTTP 3-11.26/AFTTP(I) 3-2.60 for more details.

[^] While military doctrine allows this for decon of persons, federal guidance stipulates that only water or soap and water should be used for personnel/mass decon. See *Best Practices and Guidelines for CBR Mass Personnel Decontamination Training Support Package*, 2nd Edition, Sep 2004.

[§] Steam, as well as certain vaporized gases (ammonia, hydrogen peroxide, chlorine dioxide) may be used for the decontamination of interior buildings/heating, ventilation, and air conditioning. These can be logistically involved operations. See hazard chapters of above-mentioned guidelines for specific subject matter expert support.

PERSONAL PROTECTIVE EQUIPMENT WORN BY DECONTAMINATION OPERATORS

5-42. Solid, liquid, and vapor hazards can be present in contaminated patient clothing, skin, and hair. In the PDS, hazardous CBRN agents are typically not present in the large quantities seen in the hot zone. The PDS team members assume MOPP Level 4 or OSHA Level C. Higher OSHA Levels of protection (for example, OSHA Levels A and B) are not usually indicated at the PDS as these levels place undue heat stress and strain on decontamination workers. However, personnel may still need to have them (if available) depending upon the hazards present.

5-43. The PDS team members using dry decontaminants, water, soap and water, or other liquid decontaminants must keep their protective ensemble dry and contamination free by wearing a butyl rubber toxicological agent protective (TAP) apron. An alternative is to wear a chemical resistant, splash protective garment. The TAP aprons and other water resistant materials can be easily wiped down prior to performing patient lifts. Standard military protective ensemble, such as the joint service lightweight integrated suit technology, cannot be adequately wiped down and exposure to significant moisture will reduce its protective ability.

5-44. The standard military M40 or new M50 mask can be worn by decontamination team members. An alternative is to wear a powered air purifying respirator which has a blower motor that pulls air through the filters and into the mask hood. The circulated air blown into the mask hood keeps the decontamination team member cooler, requires no effort from the wearer to pull air through the filter, and reduces carbon dioxide buildup in the mask during heavy work. Masks of this type should be National Institute for Occupational

Safety and Health-approved and must have an assigned protection factor of 1,000 per OSHA first receiver guidance and take standard military filters or higher grade filters that also protect against TIC. When working with soap and water and other liquids, the powered air purifying respirator blower motor and filters can be worn under the TAP apron or to the rear of the body to keep the filters from getting wet.

Special Equipment

5-45. Patient decontamination is a complex operation and labor intensive that requires special equipment to complete the mission.

Litters, Backboards, and Wheeled Carriers

5-46. Only decontaminable litters, which have a mesh material that can be readily decontaminated, are to be used for transporting the patient into the PDS. If no decontaminable litters are available then plastic sheeting must be placed on canvas litters to reduce their cross contamination by liquid or solid contaminants. Cloth litters will rapidly break down when decontaminated with chlorine solution for longer periods of time. Backboards and wheeled carriers can be decontaminated with calcium solution between patients but must be rinsed thoroughly with soap and water. The use of wheeled litter carriers in the PDS makes it easy to transport patients between zones.

Voice Amplifiers

5-47. These should be made available for medical personnel and decontamination team members. This will allow the staff to better communicate while wearing military protective masks such as the M40. Other amplifiers are also available for the M50 mask.

Radios

5-48. Radios should be made available for the decontamination team officer in charge (OIC) or NCO in charge (NCOIC) and leaders for the ECP, drop-off point, triage area, dirty EMT area, decontamination line, hot line, and MTF. This will significantly improve communications which is vital to the smooth operation of the PDS. If handheld radios are used, they can be wrapped inside clear plastic bags and taped if contamination is a concern.

Night Operations

5-49. Chemical lights and 4-inch wide engineering marking or police yellow tape can be used to designate areas in the PDS. These are primarily needed for night operations.

Toxicological Agent Protective Aprons

5-50. These aprons are essential to keep the decontamination team member's protective ensemble dry and to allow for patient thorough decontamination of the team member's ensemble before lifting patients. They are not needed if a waterproof protective ensemble is worn that can be adequately decontaminated between patients.

Chemical Agent Monitor

5-51. The chemical agent detector/monitor or other chemical detection device should be used to monitor residual contamination or determine if decontamination was successful after the patient has gone through the PDS.

Decontamination Materials

5-52. Physical removal of contaminants is the primary method of decontamination for personnel. Physical removal includes washing and wiping, but never vigorous scrubbing that could abrade the skin. Skin abrasions whether through rubbing or harmful chemical reaction (for example, when a 5 percent chlorine solution is mistakenly used as a decontamination solution on the skin instead of a 0.5 percent), allow agents to move more rapidly through the skin barrier.

5-53. To help reduce the amount of human calculation errors, an automated tool was created by the USAF. The Automated Decontaminant Calculator is a user-friendly database that allows the Service member to make a predetermined percentage concentration of chlorine solution without dealing with complicated chemical formulas. This tool can determine the volume of water needed for a set amount of decontaminant and vice versa. In addition, the user will be able to choose from the most standard chlorine-based decontaminants (for example, calcium hypochlorite and sodium hypochlorite). To use the online automated decontaminant calculator, go to the USAMRICD Automated Decontaminant Calculator Web site found in the reference section.

Reactive Skin Decontamination Lotion

5-54. The RSDL is a liquid decontaminant dispensed on a sponge. The Food and Drug Administration has cleared RSDL for use by the U.S. military intended to remove or neutralize CW agents and T-2 fungal toxin from the skin. It washes away chemical agent contamination and also neutralizes the effects of many agents. The RSDL can be used for the decontamination of intact skin around wounds, but is not approved for the decontamination of wounds. The RSDL should remain in contact with the skin for at least two (2) minutes and then be removed with soap and water when conditions permit. The RSDL is a Class VIII item with a basis of allocation of one packet per individual. For more information regarding RSDL, refer to ATP 4-02.85/NTRP 4-02.22/AFTTP(I) 3-2.69.

Note. The best results when decontaminating *nerve agents* with RSDL will be obtained by following the packet instructions, then reapplying RSDL, and leaving it on the skin. New study shows that the RSDL is safe to be left on the skin for up to 24 hours.

Soap and Water

5-55. This is the most preferred method. This is a low cost material that removes agents by washing them away. It is effective for removing chemical, biological, and radiological contaminants. It does not kill biological agents or neutralize radiological agents. Water runoff must be collected and treated before disposal. Liquid soap attracts the chemical agent and loosens it so that the action of the water can wash it away. Liquid soaps such as baby shampoo, handwashing soap, or soft soap are much more effective than liquid or powder detergents. Detergents tend to dry the skin and should not be used. Soap and water is best used during patient thorough decontamination, but can also be used for immediate (gross) and operational patient decontamination if available and practical. It is not practical to use soap and water on the joint service lightweight integrated suit technology or similar protective garment as it will dampen the garment and reduce its protective abilities. It is also not advisable to use hot water for skin decontamination since it will open skin pores allowing chemical agents to easily penetrate and absorb into the skin. For better results, use tepid or lukewarm water with soap.

The 0.5 Percent Chlorine Solution

5-56. This is the least preferred and only used as an alternative skin decontaminant where there is limited water and dry decontaminants are not available. It can be used for washing off chemical, biological, and radiological agents. This may offer some neutralization of the chemical and biological agents, but not for radiological agents. A 0.5 percent chlorine solution poses little risk of causing skin damage if mixed correctly in 9 parts water to 1 part chlorine solution however it may cause skin irritation and opens skin pores. To work effectively, it should be applied on the contaminated areas of the skin with gentle wiping of those areas so that contamination is not spread. It can then be left on the skin for several minutes and later rinsed with clean water (several seconds to minutes later). Its oxidation effects are limited and its protective ratio is not significantly different than soap and water. Using copious amounts of soap and water is preferred and will better loosen the agent and help lift it off of the skin with washing. The 0.5 percent chlorine solution is used for skin decontaminant as a last resort.

CAUTION

Do not confuse 0.5 percent chlorine solution with 5 percent chlorine solution. Although the least preferred, 0.5 percent is used for skin decontamination while 5 percent chlorine solution is used for equipment decontamination.

Other Locally Available Absorbent Material

5-57. Any material that can absorb a liquid and then be brushed or scraped from the skin without abrading it, can be used as an effective skin or equipment decontaminant to remove liquid agents. Clean sawdust, clay dirt, baking powder, fuller's earth, baby wipes, can be put on the agent found on the skin or equipment, allowed to absorb it, and then carefully wiped away. Large quantities of thickened liquid agent can be removed from clothing and skin by initially scraping it off with an uncontaminated stick or similar device. Clean sand can be used on equipment but it is not advisable to be used on skin since it might be too abrasive and may cause the skin pores to open thus absorbing the chemical agent.

Wounds

5-58. Clean or sterile water (such as an IV bag of saline) is the most appropriate material for the irrigation of the eyes and contaminated open wounds. Soft tissue closed wounds can be irrigated with clean water, IV saline, or soap and water. Deeper wounds, such as contaminated abdominal or thoracic cavity wounds or contaminated open intracranial (head) injuries should not be irrigated in the field.

5-59. Wound irrigation does not necessarily completely decontaminate the wound, but can help dislodge foreign material (such as pieces of clothing or metal which could hold agent) for recovery by aspiration with a large bore sucker, forceps, or other *no touch* technique.

Equipment

5-60. The equipment decontamination solutions/kit is discussed below.

The 5 Percent Chlorine Solution

5-61. This is effective for decontaminating equipment contaminated by CW agents or biological agents. It is not necessary to use this type of solution for radiological contamination as water or soap and water is best for this. The 5 percent chlorine solution works by rinsing away the agent while causing an oxidative, burning, chemical reaction with the agent which will neutralize chemical agent toxicity and kill biological agents. This solution should never be allowed to touch the skin as its alkalinity will redden, burn, and damage skin. Damaged skin will lose its protective qualities and will allow chemical agent to travel through it more rapidly and in greater amounts. To effectively neutralize a chemical agent, the 5 percent chlorine solution must be in contact with it for at least 10 minutes to 30 minutes. Equipment decontaminated with chlorine solution should be thoroughly rinsed with water or soap and water before use. It is important that the chlorine solution not be used on sensitive electronic equipment as it will cause oxidation and rust the equipment. Because of its highly reactive, very strong base, high pH level, and oxidative characteristic, this solution may react with some TIC.

CAUTION

Five percent chlorine solution is highly reactive and oxidative. It should NEVER be used on skin. It can damage sensitive electrical equipment. Equipment decontaminated with chlorine solution must be thoroughly rinsed with clean water or soap and water before use.

Soap and Water

5-62. Generous amounts of soap and water work well to decontaminate equipment contaminated by CBRN contaminants. Soap and water dilute most chemical agents but do not neutralize them. It removes biological agents, but will not destroy anthrax spores. Runoff should be collected and decontaminated with a chlorine solution or sporicides. Soap and water will remove radiological particles, but runoff must be contained as it contains particles that remain radioactive.

Note. Soap and water does not destroy biological or radiological contamination. Water runoff should be collected.

M295 Equipment Decontamination Kit

5-63. This can be used on equipment contaminated by liquid chemical agent. The Equipment Decontamination Kit is not effective for dry agents such as biological spores, radioactive particles, or dry chemical agents. See Table 5-5 on page 5-16 for more information.

Buckets

5-64. During the decontamination of chemically contaminated patients, cutting tools should be placed in buckets of 5 percent chlorine solution. It is critical that these buckets be well marked (color coded, and labeled) so that the 5 percent chlorine solution is not used on the skin. Darker colored buckets such as red or orange can be used for this solution. Lighter colored buckets can be used for soap and water or 0.5 percent chlorine solutions if used when soap is not available. Calcium hypochlorite and sodium hypochlorite in solutions above 0.5 percent will cause skin alkaline burns that damage the skin and increase agent absorption.

Table 5-5. Summary of appropriate uses for decontaminants

<i>Decontaminant</i>	<i>Type of patient decontamination site</i>	<i>When and where used</i>
Soap and water.	Used at all patient decontamination site and is most preferred. Note: This is the primary decontaminant that is used for patient decontamination site with plumbed tentage and on water vessels.	Used for— • Skin (copious amounts). • Equipment (copious amounts). • Best for washing away chemical, biological, and radiological agents. Does not neutralize or kill these. • Used to wash down toxicological agents protective aprons of decontamination team members and rinse decontamination team member gloves washed with 5 percent chlorine solution.
Reactive skin decontamination lotion.	Any patient decontamination site.	Used for skin and equipment for all types of agents to wipe the contaminant away. Can neutralize some chemical agents and biological toxins.
0.5 percent chlorine solution.	Patient decontamination site with minimal equipment.	On skin. This is the least preferred and used as the last resort. If used, not for full body wash.
M295.	All types of patient decontamination site with limited water or freezing temperature conditions.	For dry decontamination of liquid chemical agents only, used on equipment.
5 percent chlorine solution.	Patient decontamination site with minimal equipment: patient mask hood; decontamination team member gloves. Decontamination equipment (10 to 30 minutes contact time then rinse). All patient decontamination site: Soak cutting tools (chemical and biological agents only); for radiation use soap and water.	Used only on equipment, NOT on skin. Not used with radiological agents. Used for chemical and biological agents to— • Wipe down rubber mask hoods. • Wash decontamination team's gloves (then rinse with fresh water). • Fill/pail/bucket for cutting tools. • Decontaminate litters (then rinse with fresh water). • Wipe down equipment (wait for 10 to 30 minute contact time and then rinse).
Locally available absorbent material— • Clean sand. • Baking powder. • Fuller's earth. • Baby wipes. • Flour or bread. • Other dry, nontoxic, absorbent items.	Any patient decontamination site.	For dry decontamination of liquid chemical agents only on skin and equipment; used if water and reactive skin decontamination lotion (skin/equipment) or M295 (equipment only) are not available or ambient temperature is freezing.

DETECTION DEVICES USED DURING PATIENT DECONTAMINATION

5-65. Detectors can be used at the drop-off point, to assess which patients require decontamination or after the decontamination process to check for thoroughness of decontamination. Their use is dictated by unit operating plans and specific Service tactics, techniques, and procedures, and CONOPS.

5-66. There are currently no handheld detectors for biological agents that would be appropriate for patient decontamination operations.

5-67. There are a variety of handheld survey equipment/detectors appropriate for radiological patient decontamination operations. Handheld survey equipment/detectors used for this purpose should measure alpha, beta, and gamma radiation and should have a pancake-head probe. In the event of radiological contamination, these can be deployed at the same locations as the chemical monitors. They can be used to screen for radiologically contaminated casualties and equipment at the ECP and to verify the effectiveness of decontamination.

5-68. Currently fielded CW agent detection/monitoring equipment does not identify all possible CW agents or TICs. Operators of chemical agent detection/monitoring equipment should be familiar with equipment limitations and limits of detection.

Chemical Detector Paper

5-69. Chemical detector paper (such as M8 paper) detects liquid G nerve agents but does not differentiate between them. It identifies liquid V nerve agent. Detects liquid H blister (vesicants) agents but does not differentiate between them. It does not detect vapors. This could be used by decontamination personnel to help detect liquid agent residue on a patient before or after decontamination.

Chemical Detector Tape

5-70. Detects liquid H, G, and V agents but does not differentiate between them. It does not detect vapors but can detect aerosol sprays. This is typically worn on protective gear and can be checked by decontamination teams before the individual's protective ensemble is removed. It is normally not used as a detector during the decontamination process but examining the patient's detector tape can help to determine if the individual was exposed to liquid and aerosol forms of a chemical agent.

Chemical Agent Detectors

5-71. This device monitors levels of nerve and blister (vesicants) agents vapors in the air (but only one agent at a time). It does not monitor liquid, except for the vapors that a liquid agent might give off. It is typically used after the presence of nerve or blister (vesicants) agents has been established to pinpoint contaminated areas on clothing and protective ensemble. The chemical agent detector/monitor may be used at the ECP to assist in determining if decontamination is required and at the end of the decontamination process to verify the effectiveness of decontamination. It may also be used within airlocks on chemically protected MTFs to verify decontamination of individuals inside the airlock entry way. The chemical detector can be deployed in pairs, with one on G (nerve agent) mode and one on H (vesicant) mode, or individually if the threat is known and medical signs and symptoms give an indication of the type of agent exposure (for example, the patients present with reddened skin or blisters then the hazard is likely mustard (H), but if the patients are sweating profusely, have difficulty breathing, are vomiting, and have muscle twitches, then it is likely nerve agent). There are similar commercial off-the-shelf equivalents that can detect vapor hazards. These must first be approved for military field use.

Note. The chemical detectors employed in the decontamination station must be operated frequently and calibrated to manufacturer's specifications to maintain acceptable performance. Refer to chemical detectors technical manual for guidance. This regular operation should be achieved using the alternating current power supply and with the detector battery. Batteries should be checked/replaced at regular intervals.

Chemical Agent Alarm

5-72. This is not used to detect agent on a patient, but is used to monitor an area for possible air contamination in clean areas (the cold zone) and areas upwind of the decontamination area and MTF. It can be used as a monitor to establish a vapor control line (VCL) between the hot line and the MTF.

SAFETY, HEAT INJURY PREVENTION, AND WATER CONSUMPTION

5-73. Of greatest concern to decontamination team members is heat injury and musculoskeletal injury from performing moderate to heavy (patient triage and treatment) and heavy work (carrying litter patient and decontaminating patients) while wearing the protective ensemble. The frequency of accidents, in general, appears to be higher in hot environments than in more moderate environmental conditions. One reason is that working in a hot environment lowers the mental alertness and physical performance of an individual. Increased body temperature and physical discomfort promote irritability, anger, and other emotional stresses which sometime cause workers to overlook safety procedures or divert their attention from hazardous tasks. It is critical that these issues be addressed throughout PDS operations.

5-74. A safety officer must be appointed for PDS operations. This can be the PDS NCOIC or appointed individual selected by the commander. The primary duty of this individual is to conduct an initial and ongoing risk assessment prior to setting up the PDS and to personally monitor the status of decontamination team members working on the warm side of the hot line at all stations from the ECP to the hot line. This individual must not be involved in PDS tasks such as triage, treatment, litter carry, or patient decontamination. They must be free to move around the warm zone. In addition to personally checking with decontamination team members and observing them closely for signs of heat or musculoskeletal injury, this individual also manages work/rest cycles, monitors temperature and wet bulb heat category conditions, ensures adequate fluids are available for decontamination team members, and enforces safe patient lifting techniques.

5-75. Worker musculoskeletal injury can easily occur from long periods of patient lifting and litter carrying or injuries caused by falls while wearing protective ensemble. To reduce these injuries the following strategies can be implemented:

- Clear routes within the PDS to reduce tripping hazards.
- Establish multiple decontamination lanes far enough apart to reduce cluttered work areas.
- Ensure that garbage bags containing contaminated waste material are moved from the decontamination lanes to the dirty dump on a regular basis to reduce tripping hazards in the decontamination area.
- Ensure that litter teams move litter patients at a safe speed and walk when transporting patients.
- Reduce distances that litters need to be transported by litter teams.
- Mark triage areas and litter transport lanes for all operations.
- Enforce proper lifting and litter carry techniques throughout PDS operations.
- Ensure that personnel performing litter carries and patient lifting are fit for the demands of the task.
- Enforce frequent rest breaks.
- Use equipment that assists with patient lifting (for example, roller systems, litter stands, or NATO litter carriers) when available.

HEAT INJURY

5-76. Wearing the protective ensemble can bring about a variety of heat-induced disorders or heat injuries, including heat exhaustion, heat cramps, and heat stroke, especially when working in a warm or hot work environment. The chemical protective ensembles make it difficult for the body to cool itself as the ensemble prevents sweat from readily making contact with the air to help cool the skin. This inhibits heat transfer from the body. A previous history of heat injury can increase a person's risk for another heat injury. Taking certain medications, especially medications with anticholinergic effects, such as atropine and pseudoephedrine, can interfere with sweating mechanisms and increase the risk of heat injuries.

5-77. Heat cramps, heat exhaustion, and heat stroke are not separate conditions, but can be a continuum of increasingly more serious medical conditions as a person continues to be exposed to the hot work environment. Without effective and appropriate interventions, an individual can rapidly progress to the most serious heat injury, heat stroke, which can result in serious morbidity or death.

Heat Stroke

5-78. This is a life-threatening medical condition associated with working in hot environments. It occurs when the body's temperature regulatory system fails and sweating becomes inadequate. The body's only effective means of removing excess heat is compromised with little warning to the victim that a crisis stage has been reached.

DANGER
Unless the heat stroke victim receives quick and appropriate medical treatment, death can occur.

Heat Exhaustion

5-79. This includes several clinical disorders having symptoms which may resemble the early symptoms of heat stroke. Heat exhaustion is caused by the loss of large amounts of fluid by sweating, sometimes with excessive loss of salt.

Heat Cramps

5-80. Heat cramps are painful spasms of the muscles that occur among those who sweat profusely in the heat and who drink large quantities of water but do not adequately replace the body's salt loss.

5-81. Humans are, to a large extent, capable of adjusting or acclimatizing to a hot environment. This acclimation to heat, under normal circumstances, usually takes about 5 to 7 days, during which time the body will undergo a series of physiological changes that will make continued exposure to heat more endurable. Measures that can be taken to reduce heat load on the individual include—

- Ensure that work/rest cycles are enforced and that manning is adequate to accomplish this.
- Provide shaded areas for rest on the warm side of the hot line.
- Provide shaded covering (for example, camouflage netting or open tentage) over decontamination and warm side triage and treatment areas.
- Reduce MOPP level when appropriate.
- Maintain adequate supplies of drinking potable water for decontamination team members.

5-82. It is critical that the decontamination teams be properly staffed and the decontamination workload of the teams be distributed among the members so that proper work/rest cycles can be maintained and workers do not keep working to the point of heat or musculoskeletal injury. In a high operating tempo, team members may disregard this important guidance. Not enforcing appropriate work/rest cycles will increase the risk for decontamination team member injury and will deplete the manpower pool. Properly managed work/rest cycles ensure the team members have the opportunity to rest, hydrate, cool down, and recover from the effects of fatigue.

5-83. According to TB MED 507/AFPAM 48-152, the following example activities are considered *easy work*: weapon maintenance, marksmanship training, drill and ceremony, manual of arms, and walking on hard surface at 2.5 miles per hour with less than 30 pounds of load. The following example activities are considered *moderate work*: calisthenics, patrolling, individual movement techniques (low or high crawl), defensive position construction, walking on loose sand at 2.5 miles per hour with no load, or walking on hard surface at 3.5 miles per hour with less than 40 pounds of load. The following example activities are considered *hard work*: field assaults, walking on hard surface at 3.5 miles per hour with more than 40 pounds of load, or walking on loose sand at 2.5 miles per hour with any kind of load. Refer to Table 5-6 for work/rest

cycles and water consumption information. This table applies to average sized, heat-acclimated Service member wearing their duty uniform.

Table 5-6. Work/rest cycles and water consumption

Heat category	WBGT index degrees F	Easy work		Moderate work		Hard work	
		Work/rest min	Water intake qt/hr	Work/rest min	Water intake qt/hr	Work/rest min	Water intake qt/hr
1 (WHITE)	78 to 81.9	NL	½	NL	¾	40/20	¾
2 (GREEN)	82 to 84.9	NL	½	50/10	¾	30/30	1
3 (YELLOW)	85 to 87.9	NL	¾	40/20	¾	30/30	1
4 (RED)	88 to 89.9	NL	¾	30/30	¾	20/40	1
5 (BLACK)	>90	50/10	1	20/40	1	10/50	1
The work/rest times and fluid replacement volumes will sustain performance and hydration for at least 4 hours of work in the specified heat category. Fluid needs can vary based on individual differences ($\pm \frac{1}{4}$ qt/hr) and exposure to full sun or full shade ($\pm \frac{1}{4}$ qt/hr). - Hourly fluid intake should not exceed 1½ quarts and daily fluid intake should not exceed 12 quarts. - NL= No limit to work time per hour (hr). - Rest means minimal physical activity while sitting or standing, accomplished in the shade if possible. Legend: hr hour NL no limit qt quarts WBGT wet bulb globe temperature							

CAUTION

The TAP apron adds an additional 10 degrees to the wet bulb globe temperature index.

Wearing protective overgarments adds 10°F (5.6°C) to the wet bulb globe temperature index and if conducting moderate or hard work and wearing protective overgarments, add 20°F (10.2°C) to wet bulb globe temperature index.

Wearing body armor increases this by another 5°F (2.8°C).

A worker may produce as much as 2 to 3 gallons of sweat in the course of a day's work. Because many heat disorders/injuries involve excessive dehydration of the body, it is essential that water intake during the workday be about equal to the amount of sweat produced.

5-84. Most workers exposed to hot conditions drink less fluid than needed because of an insufficient thirst drive. A worker should not depend on thirst to indicate when and how much to drink. Thirst is a poor or late indicator of dehydration, so most workers exposed to hot conditions drink fewer fluids than needed to replace lost fluids. Five to seven ounces of liquid should be consumed every 15 to 20 minutes to replenish the necessary fluids in the body. Water intake should not exceed 1 ½ quart per hour or 12 quarts per day, as excessive water consumption (overhydration or hyponatremia) can dilute the salt content of the blood to the

point where it interferes with brain, heart, and muscle function. This *water intoxication* can result in confusion, nausea, vomiting, seizures and/or death.

CAUTION

Hourly fluid intake should not exceed 1½ quarts (one and one half canteen) and daily fluid intake should not exceed 12 quarts (12 canteens).

5-85. Heat acclimated workers lose much less salt in their sweat than do workers who are not adjusted to the heat. The average Service member's diet contains sufficient salt for acclimatized workers even when sweat production is high. If for some reason, salt replacement is required, the best way to compensate for the loss is to add a little extra salt to the food. Salt tablets should not be used unless directed by a physician.

5-86. Persons with heart problems or those on *low sodium* diets who work in hot environments should consult a physician about what to do under these conditions.

CORE COMPONENTS OF THE PATIENT DECONTAMINATION SITE AND PATIENT FLOW

5-87. All military services and all roles of medical care use a similar patient flow during patient decontamination operations. Each Service may use different types of equipment and procedures. This section provides an overview of core components that are found in all PDSs, whether they are set up using minimal resources, plumbed tentage with showers and roller systems, or on board ship.

5-88. When establishing a PDS, all component areas noted in this section should be considered and addressed. Refer to Figure 5-2 for more information on component areas.

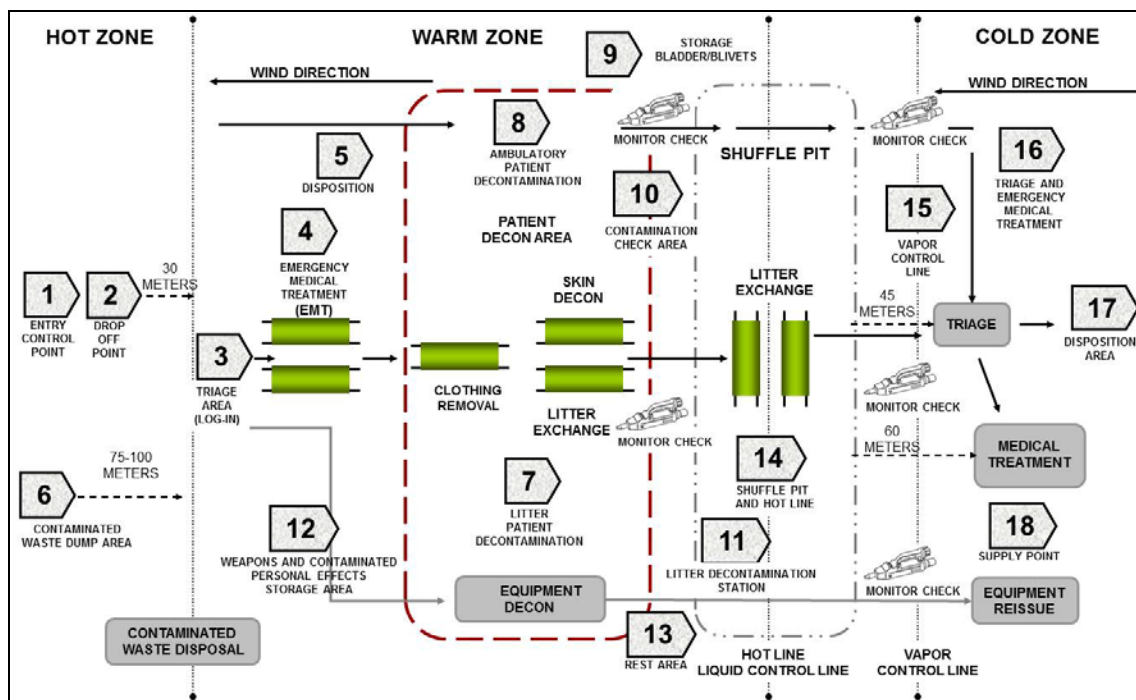


Figure 5-2. Patient decontamination site component areas

Entry Control Point and Drop-off Point (1 and 2)

5-89. Entry control point and drop-off point is an area downwind from the triage and decontamination areas. This is where patients arrive at the PDS. On land, this incorporates road access for evacuation vehicles as well as medical evacuation rotary-wing landing areas. Rotary-wing landing zone is located 150 to 200 feet away from the ECP to protect patients and decontamination personnel from small objects propelled by the rotor blade upon landing. These avenues must be organized so that smooth traffic flow occurs during patient drop-off. On a water vessel this area would consist of the flight deck or area where aircraft and water landing craft discharge patients to the ship.

Entry Control Point (1)

5-90. Entry control point when on land, is located along an access road to the drop-off point. Security must be provided to control access to the PDS. Security personnel must meet vehicles upon arrival, quickly interview drivers/escorts, and get information from the drivers/escorts as to the number of patients, types of injuries, and types of contamination. They relay this information by radio to the drop-off point and PDS OIC/NCOIC. On watercraft, the ECP might be located at the transport air or watercraft loading area on land.

Drop-off Point (2)

5-91. The drop-off point is where patients are off loaded from vehicles and brought to the triage area. The drop-off point is staffed by augmentees who direct traffic flow, unload vehicles and move patients to the triage area, remove patient weapons and equipment and perform quick pat down searches of patients.

5-92. If adequate chemical and radiological monitoring devices and trained staff are available, a monitoring station can be set up at the drop-off point to determine who are contaminated and require decontamination. Personnel at the ECP and drop-off point assume MOPP Level 4 or equivalent OSHA Level C when contaminated casualties are expected.

Warm Zone (Dirty Side) Triage Area (3)

5-93. The triage area is located near the drop-off point in the PDS warm zone. Patients are moved to this area from the drop-off point.

5-94. Casualties are simultaneously triaged as to their need for medical care, their priority for patient thorough decontamination, and their priority for evacuation to the next role of care. One patient may be medically triaged as immediate, but not have priority for decontamination until they are medically stable. Another may have priority for medical evacuation, but requires decontamination. The purpose of triage is to effectively allocate the medical resources available.

5-95. This area should initially be large enough to allow for an influx of many patients. The triage area is located adjacent to or can be collocated with the warm side (dirty side) EMT area.

5-96. Within the triage area, casualties are moved to either the immediate (warm side, dirty, EMT), delayed, minimal, or expectant treatment areas. A patient is retriaged as his condition changes. The following is suggested as a placement for specific treatment areas to improve patient flow through the PDS:

- The immediate category patients are moved to the warm (dirty side) EMT area. This area is located between patient triage (closer to triage area to minimize the time it takes to move from triage area to dirty EMT) and the entrance to the litter patient decontamination lanes. This way they can be moved to litter decontamination without interfering with the traffic flow from other patient categories.
- The delayed patient area should be positioned near the entrance to both the litter and ambulatory decontamination lines. This way delayed patients can be processed through either the litter or ambulatory lanes when the lanes become available.
- The minimal category patients should be positioned near the ambulatory patient area so that if medical care on the clean side of the hot line is needed they can process through the ambulatory lane when it becomes available and will not interfere with the flow to the litter lanes.
- The expectant category patients should be located near the EMT area, but farther away from the decontamination lanes, so that they can be retriaged and stabilized for decontamination if the EMT

area no longer has patients in it. The expectant patient should not be abandoned, but should be separated from the view of other casualties.

5-97. Casualties are retriaged as they progress through the EMT and decontamination process.

5-98. Personnel in the triage area wear MOPP Level 4 or equivalent OSHA Level C. One triage officer, but preferably two or more (if available), is assigned to this area. The triage officer should be trained in triage. These are typically experienced medical personnel. A discussion of medical triage and treatment protocols for CBRN casualties can be found in ATP 4-02.85/NTRP 4-02.22/AFTTP(I) 3-2.69; ATP 4-02.84/MCRP 4-11.1C/NTRP 4-02.23/AFMAN 44-156_IP; and ATP 4-02.83/ MCRP 4-11.1B/NTRP 4-02.21/AFMAN 44-161(I).

Warm Side (Dirty Side) Emergency Treatment Area (4)

5-99. Patients triaged as Immediate for medical treatment are sent to the warm side dirty EMT until their condition is stabilized for patient thorough decontamination or stabilized for dirty evacuation to another MTF. It is suggested that this area be located between the patient triage and the entrance to the litter decontamination lanes.

5-100. An initial quantity of medical supplies is located in this area and procedures for resupply must be established. It is important to only put enough supplies here for the anticipated number of patients so that unused supplies are not in danger of becoming contaminated.

5-101. The warm side EMT area should be large enough to expand and handle an influx of patients.

5-102. Personnel in the warm side EMT area assume MOPP Level 4 or equivalent OSHA Level C. Two or more trained medical personnel are assigned to this area to retriage patients and provide lifesaving medical care while wearing protective ensemble. Staffing should consist of trained and experienced medical personnel (combat medic/corpsmen/Air Force medics/medical personnel), nurses, or physician's assistants.

Warm Side Disposition (Dirty Evacuation) (5)

5-103. This is an area located in the vicinity of the warm side EMT area.

5-104. Patients who require rapid evacuation to another MTF and who have undergone operational decontamination are medically stabilized, and staged for pick up and transport by designated *dirty* evacuation assets (ground, water, or rotary-wing aircraft) are located here.

5-105. Gross contamination is removed from their protective ensemble before being loaded onto the designated *dirty* evacuation vehicle.

Contaminated Waste Dump Area (6)

5-106. This area is located away from the decontamination area and clean areas. On land, it is at least 75 meters downwind from the drop-off point. On ship, it is at the aft of a ship and away from air intake areas. Bags of contaminated clothing and bandages are taken to this area.

5-107. On land, contaminated waste are buried and marked with the appropriate hazard markers. The locations are marked on maps and communicated to headquarters so that the waste can be picked up and properly disposed of. These locations should be guarded to prevent looting of hazardous waste materials by locals who are not aware of the hazards. This may not be possible on the fluid battlefield.

5-108. On a water vessel, these items are contained until they can be disposed of by proper removal or disposed of in the ships incinerators.

Litter Patient Decontamination Line (7)

5-109. This is an area located between the warm side EMT and the hot line.

- Patients must be medically stable enough to undergo decontamination before they are brought to the litter patient decontamination area.
- Litter patient decontamination lanes are established in this area. Ideally, more than one litter patient decontamination lane should be established depending on the number of patients expected.
- Personnel assigned to this area assume MOPP Level 4 or equivalent OSHA Level C. Those performing decontamination also wear a TAP apron over their protective ensemble to keep their protective ensemble dry and to allow them to decontaminate their aprons before conducting patient transfers. With the exception of the USAF, and some USN units who have trained medical teams throughout the decontamination process, this area is manned by augmentees who are closely supervised by medical personnel.

Ambulatory Patient Decontamination Line (8)

5-110. This area is usually located parallel to the litter patient decontamination line—

- Ambulatory patients who need to see the physicians at the MTF are processed through this area.
- Patients who can be treated in the warm side EMT area and then sent back to their unit should not go through ambulatory patient decontamination.
- Ambulatory individuals who do not have medical complaints should be processed through troop decontamination lanes and not through the medical ambulatory decontamination lane.
- Medical and decontamination team members can be processed to the clean side through this area or processed through troop decontamination, if it is collocated.
- Personnel assigned to this area assume MOPP Level 4 or equivalent OSHA Level C. Those performing decontamination also wear a TAP apron to keep their protective ensemble dry. This area is usually manned by augmentees and at least one medical personnel if available to supervise ambulatory patients as they process through the line and assist one another.

Clean and Wastewater Storage Bladders (9)

5-111. These are only used for a PDS with plumbed tentage and shower systems. The bladders are located in the proximity of the decontamination tent. The PDS must be located in areas where the bladders can easily be accessed by vehicles to fill the clean bladder and pump out or pick up and transport the wastewater bladder. The clean and wastewater bladders must not be located next to each other, but ideally should be on opposite sides of the tent. The wastewater bladder must be located farther away from the tent if possible.

Contamination Check Area (10)

5-112. This area is located between the decontamination lines and the hot line. Here, thoroughness of decontamination is checked for chemically and radiologically contaminated patients using the appropriate monitoring devices. Self-sealing plastic bags containing the patient's personal items can also be unzipped and the monitors used to check for contamination of the items inside them. If the items are contaminated they can be decontaminated and placed in a new bag once they are determined to be free of contamination or contaminated items can be bagged and sent to a secure holding area for later disposition.

5-113. The station can be set up between the litter patient and ambulatory patient decontamination lines if detectors and those trained to use them are in limited supply.

5-114. For shipboard decontamination, this often takes place in the second decontamination compartment (vapor hazard area) of the ship before patients or decontamination team members are allowed inside the ship.

5-115. The decontamination check area may not be used in some instances such as with the USAF's small shelter patient decontamination system. This system supplies ample amounts of soap and water for patient thorough decontamination rendering the need for a contamination check unnecessary due to the completeness of the process.

5-116. Locating this station inside a plumbed decontamination tent may pose challenges as the spray inside these tents will often create some aerosolization of agent causing the detector alarm to activate.

Litter Decontamination Station (11)

5-117. For the decontamination operation with minimal resources, this is located on the dirty side of the hot line. It is located where warm side litters are washed and readied for use by new patients. Buckets and sponges with 5 percent chlorine solution are available, as well as water to rinse the litters. With a shower/roller system litter decontamination may only entail sending the litter back through the decontamination station for a wash.

Weapons and Contaminated Personal Effects Storage Area (12)

5-118. This is a guarded area where weapons and patient personal effects are secured and inventoried. This is located on the warm side of the hot line. Items from this area are moved through the contamination check area and decontaminated as needed before being moved across the hot line. If personnel are limited, this area may need to be well-organized and under the observation of personnel serving as security augmentees.

Warm (Dirty) Side Rest Area (13)

5-119. This area is located on the warm side of the hot line. This should be a shaded area (for example, trees, a building, or tentage). The PDS team members can rest and drink water in this area while remaining in their protective ensemble. The warm side water point is located here. Water that will be used for decontamination can be stored here so that it is out of the way of the areas of greatest contamination (drop-off point, dump, and decontamination lines) but still accessible to decontamination team members.

Hot Line and Shuffle Pit (14)

5-120. This is the line that separates the PDS warm zone (dirty side) from the cold zone (clean side) where the MTF is located. No liquid or solid contamination crosses the hot line. The line must be indicated in some way (such as by a barrier, tape line, or airlock) so that all personnel know not to cross the line unless they are properly decontaminated. It is best to indicate this area with a specific barrier such as concertina wire to protect the MTF.

5-121. A shuffle pit or boot rinse is located at the hot line to ensure that footwear worn by individuals working in the shuffle pit area is decontaminated. A shuffle pit with a sand hypochlorite mixture is only used for a PDS with minimal equipment and is only useful when chemical or biological contamination is evident. A boot rinse can be used on a water vessel or with a plumbed decontamination tent with sprayers. The hot line may also be referred to as the liquid control line.

5-122. At the hot line, information on the patient's TCCC card is transferred to a clean card and litter patients are transferred to a clean litter to ensure that contaminated TCCC card or litters do not cross the hot line. Litters used on warm side of the hot line will stay on the warm side and those used on the cold side of the hot line stay on the cold side.

5-123. Team members on the warm side of the hot line are the decontamination team members who have decontaminated the patient. They will bring the patient to the hot line from the warm side. They are still wearing their protective ensemble with TAP aprons. The patient is received on the clean side of the hot line by a team of at least one medical personnel and two augmentees. They take the patient from the decontamination team while trying to avoid physical contact with the warm side decontamination team members. Those assigned to the clean side of the hot line should be at MOPP Level 4 or OSHA Level C but do not require TAP aprons.

Vapor Control Line (15)

5-124. This is a line that encompasses the warm zone and is also located between the hot line and the clean side triage area and MTF. It is typically just upwind of the hot line by 10 meters. Patients and PDS team members remain masked until they cross this line. This line can be established using chemical vapor

detectors. A VCL is not needed for a radiological and biological agent hazard as there are no hazardous vapors from these agents.

Triage/Emergency Medical Treatment Area (Cold Zone) (16)

5-125. This is an area beyond the hot line and VCL, where patients are retriaged and treated before entry or movement to the MTF. All patients entering this area are free of contamination. With large numbers of patients, this can be a holding and staging area for admission to an MTF or for clean evacuation to another MTF or for ambulance transport from a collocated decontamination area for a nearby MTF. Personnel assigned to this area do not need to wear protective equipment. The staff should protect themselves from infectious patients by practicing standard precautions and wearing appropriate respiratory protection to protect against infectious particles from coughing or sneezing patients.

Disposition (Cold Zone/Clean Evacuation) (17)

5-126. This is an area adjacent to the cold zone triage/EMT area. Patients who have been decontaminated and stabilized can be staged for transport to another treatment facility. Personnel assigned to this area do not need to wear protective equipment unless standard precautions are required to protect them from infectious biological hazards however, periodic monitoring for hazards still need to occur.

Clean Side Supply Point (18)

5-127. This is located on the clean side of the hot line, outside of the VCL. The PDS supplies are kept here and are handed across the hot line to the warm side when needed. This provides protection to PDS supplies and limits exposure to possible contamination. This area should be covered from the elements and protected in the event of CBRN attack or a wind shift from the battle area. Clean side water storage can also be located here for easy movement in water cans across the hot line.

Temporary Morgue (19)

5-128. Currently, this is not depicted in Figure 5-2 on page 5-21. Temporary morgues are located on the dirty and clean sides of the PDS for patients who died of wounds while going through the decontamination process at the PDS. Supported units do not bring their dead to this area. This is only for the temporary storage of the remains of those who died of wounds. This should be in a cool shaded area away from the triage area (dirty and/or clean triage areas). The following steps should be taken:

- Service members' assigned unit should be notified as soon as the contaminated HR are placed in the temporarily established morgue.
- Tag the contaminated HR with TCCC card.
- Secure the contaminated HR by placing them in a contaminated HR pouch. If the contaminated HR pouch is not available at the PDS, contact the battalion logistics staff officer/the medical logistics section to acquire it.
- The contaminated HR will remain in the temporary morgue and handled according to theater policy until they are retrieved by the Service members' unit or mortuary affairs personnel to be transported to the MACRMS.

5-129. Decontamination of HR while less time critical than that of patients is still a real-time process that can be facilitated by proper assessment of the potential residual hazard (contamination). Human remains inherently pose some level of disease risk for which established standard precautions and IPE/PPE are designed to mitigate. Refer to JP 4-06 for more information. This does not mean they are *contaminated*. Human remains are considered *contaminated* if a residual CBRN agent is present and poses a known or plausible hazard to personnel beyond those addressed by routine precautions used to handle HR. For many CBRN agents and scenarios, it will not be necessary to classify remains as contaminated. The determination of whether remains are contaminated and what associated procedures will depend on many factors to include the type of CBRN agent and its characteristics and the conditions of the release and its environment.

Biological Hazards

5-130. Human remains inherently have the potential to release transmissible disease agents that may be released in a viable form in blood, body fluids, feces, or gastrointestinal contents. Established procedures and PPE are designed to mitigate such risks. However, additional safety precautions and PPE for potentially released internal fluids are especially necessary for certain highly infectious, easily transmissible pathogens for which effective treatment and preventive measures are not usually available (such as certain hemorrhagic fevers, Ebola, Marburg). For a complete list of such agents; refer to the World Health Organization Risk Group IV agents (you can find this list at the CDC Web site). Certain CBRN scenarios that involve the intentional release of a persistent aerosolized biological agent may have the added consideration of the external biological hazard on clothing or skin. This may be a concern particularly if there is concern of reaerosolization—for example, in the event of an aerosol release of anthrax spores or toxins.

Chemical Hazards

5-131. The hazards associated with chemical releases are primarily associated with the potential for residual external contamination (for example, on clothing, skin, and hair). This is primarily a concern for chemical agents that are considered persistent (such as chemical agents that have low volatility and can remain present at hazardous levels for several hours or days). Examples include blister (vesicants) agents (such as sulfur and mustard), and nerve agent (VX). Nonpersistent agents are typically released as a vapor and dissipate/volatilize quickly so the hazard is mitigated without the need for decontamination or verification. Examples include many high vapor pressure TICs of military concern (for example, chlorine gas) as well as highly volatile CW agents such as sarin. Remains removed from a CBRN environment involved in the release of nonpersistent chemical release generally should not be considered *contaminated* unless unique circumstances warrant specific precautions (such as extremely concentrated exposures including liquid contact, and/or cold temperatures that may slow down the volatilization processes).

Radiological Hazards

5-132. Determination of the degree of contamination risk, appropriate personal protective measures, and other control measures depend on radiation type, dose and dose rates. These determinations should be verified through use of appropriate radiation instrumentation, dosimetry, and technical subject matter experts whenever possible. Internal radiation exposure (generally caused by inhalation or ingestion) will likely pose little health risk to persons exposed to the remains. External contamination can be mitigated by removing clothing and washing the skin.

COLLOCATING A LAND-BASED PATIENT DECONTAMINATION OPERATION WITH TROOP DECONTAMINATION OPERATIONS

5-133. If personnel and material resources allow, it is ideal to collocate the PDS with troop decontamination so that manpower assets can be shared. Patient and troop decontamination lanes can be near to or parallel to one another, but must not be in the same lanes. Troop decontamination must not interfere with patient decontamination operations as timeliness of patient movement through decontamination once the patient is stabilized, is critical.

5-134. If a CW agent is used, the contaminated unit and the medical unit are collocated for decontamination, it is critical that there is ample room to establish a dirty side triage area just forward of the patient decontamination lanes as ongoing medical stabilization of patients throughout the decontamination process.

5-135. There must be adequate medical staff to man both the PDS areas (for example, conduct triage, supervise patient decontamination and provide EMT during decontamination) and also the supported MTF. An MTF will typically lack the medical personnel to staff both a collocated DTD site and another separate PDS immediately adjacent to the MTF. For more information on roles and responsibilities during DTD and patient decontamination, refer to Chapter 3.

5-136. This collocated decontamination area must be close enough to the supported MTF so that the decontaminated patients can be easily transported to the MTF by designated clean ambulances or other vehicles.

LITTER PATIENT MASK, PROTECTIVE ENSEMBLE, AND CLOTHING REMOVAL PROCEDURES

5-137. The steps to remove litter patient's protective ensemble are outlined here. The same procedures are used whether decontamination takes place using minimal equipment, a plumbed tent and roller system, or on a watercraft. Services differ slightly on how to cut overgarments (all are noted here), however, the focus is to contain any contamination in and on the protective ensemble so that it does not spread and contaminate the patient.

Note. The steps discussed here are not inclusive and may be modified depending on the situation, weather, and Services' SOP.

Mask Decontamination

5-138. Wipe/sponge down the voicemitter, eyelets and outserts of the mask with the M295 or 5 percent chlorine solution. While wiping down the filter, cover the inlet of the filter canister with a hand or gauze momentarily to keep liquid out of the inside of the canister where it could wet the charcoal, reduce filter efficiency, and clog the filter. When using M295 to decontaminate the mask hold the voicemitter to avoid breaking the seal. Rinse the sponge well or replace the sponge if needed.

5-139. If the mask has an attached rubber hood, then wipe down the hood using the M295 or 5 percent chlorine solution. Do this by starting at the top of the head and wiping down towards the litter and shoulders. Rinse the sponge well or replace the sponge if needed.

Remove the Hood

5-140. For integral hoods that are part of the overgarment, the hood is removed by cutting it starting from the top center and cutting toward the rear of the hood. In the case of the litter patient, the material of the cut hood will lie flat on the litter. No decontamination of this hood is necessary. See Figure 5-3 below.



Figure 5-3. Cutline for hoods integral to overgarments

Decontaminate Head

5-141. After the hood is laying flat on the litter under the patient's head, decontaminate any exposed areas of the patient's head, hair, back of the ears, and neck that were not protected by the hood. The mask remains on the patient. This exposed skin is decontaminated using either the RSDL, soap and water, or 0.5 percent chlorine solution (least preferred). Do not use 5 percent chlorine solution on skin.

Remove the Tactical Combat Casualty Care Card

5-142. The medical personnel at the litter patient decontamination area should view the TCCC card prior to removal.

5-143. Cut the patient's TCCC card tie wire, allowing the TCCC card to fall into a self-sealing plastic bag. Seal the plastic bag and decontaminate the outside of the bag with the M295 or rinse the outside of the bag with a 0.5 percent chlorine solution or soap and water for radioactive contaminants. Place the plastic bag with the TCCC card under the back of the protective mask head harness straps. The TCCC card will remain with the patient until at the hot line where it will be transcribed on to a clean TCCC card.

Remove Patient's Personal Effects from Overgarment

5-144. Remove all items from the protective overgarment pockets and place them in a self-sealing plastic bag. Label the bag with the patient's identification and seal the bag. Survey the items. If the articles are not contaminated, place them in a separate bag from suspected contaminated items. Wipe down the outside of the bag with the M295 or dip it in a bucket of 5 percent chlorine solution. Dip in soap and water if the contamination is radiological. The bags are sent on the litter with the patient and checked for contamination at the contamination check area.

Note. The patient's identification tags stay around the patient's neck throughout the decontamination process. They are decontaminated with soap and water or 0.5 percent chlorine solution.

Cut the Patient's Overgarment

5-145. The overgarment jacket and trousers may be cut simultaneously. Two persons may be cutting clothing at the same time.

5-146. Cutting is performed using sharp bandage scissors or long-handled seat belt cutters (for example, medical strap cutter). Three or more cutting tools are needed for each team member who is cutting off patient clothing, as the tools typically become dull after cutting off the garments of 5 patients.

5-147. Cut around bandages, tourniquets, and splints, leaving them in place. Only medical personnel remove bandages, tourniquets, and splints.

Note. Put the cutting device in a bucket of 5 percent chlorine solution after each complete line of cut and get another cutting tool, which has been sitting in the chlorine solution bucket, for the next cut. *Example:* Cutting the sleeve from the cuff to the jacket collar is one cut. If a bucket of 5 percent chlorine solution is not available then the cutting tools must be scrubbed using the M295 or RSDL between each cut or rinsed thoroughly in running soapy water.

CAUTION

Bandages may have been applied to control severe bleeding and are treated like tourniquets. Only medical personnel remove bandages, tourniquets, and splints.

Remove Overgarment Jacket

5-148. Unfasten or cut the hook and pile closures at the wrists.

5-149. Make a cut, one up each sleeve from the wrist to the shoulder and then to the collar. Keep the cuts close to the insides of the arms so that most of the sleeve material is folded outward. An alternative is to start at the collar and cut down the sleeve to the wrist. See Figure 5-4 below.

Note. It is essential that cutting tools be replaced as soon as they become dull. Dull tools make cutting difficult and can aerosolize dried agent particles as material is tugged by the cutting tool. A new cutting tool blade will be needed about every 5 patients.

5-150. Cut the jacket drawstring at the bottom of the jacket and unfasten the hook and pile closures, moving from the waist to the neck and then unzip the jacket. If the jacket will not unzip then make a cut parallel to the zipper.

5-151. Carefully fold the sleeves of the overgarment away from the patient's arms, exposing only the black liner. Avoid aerosolizing any dust particles on the garment or allowing the outside of the garment to touch the patient.

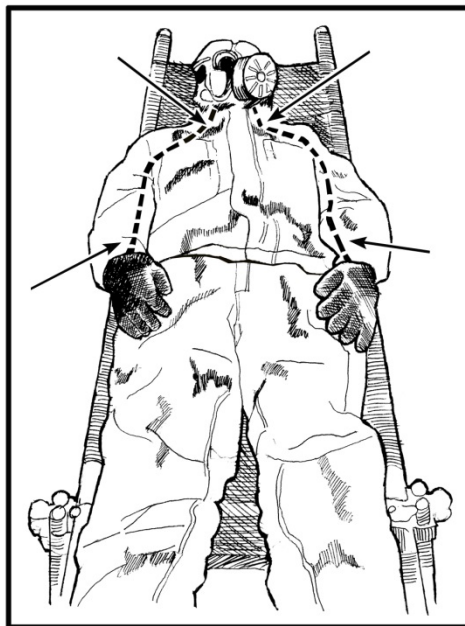


Figure 5-4. Cutline for overgarment jacket

Note. To reduce aerosolization of dry agent on the protective overgarment, the overgarment can be lightly misted with water from an insect sprayer bottle before the patient's mask hood is removed or cutting begins. This will dampen the dry agent which can reduce its aerosolization. The spray from the mister must be very light so that it does not blow the dry agent into the air.

5-152. Instruct the patient to keep his hands to the sides, away from the pieces of overgarment that are lying on his chest. If the patient is unable to lift his arms then one decontamination team member will hold the patient's gloved hand and perform this action. Another team member then carefully folds the chest sections over the outside of the litter. The patient's arms are then lowered to the sides, keeping the arms away from the area where the overgarment has been removed.

Remove Overgarment Trousers

5-153. Cut the trouser suspenders.

5-154. Cut the leg closure cord and hook and pile fasteners at the ankle cuff.

5-155. Using the cutting tool, cut from the ankle along the inseam of the left trouser leg until the crotch area is reached, and then cut across the zipper. An alternative is to start at the waist and cut from the waist, along the inseam of the trousers, to the ankle cuff.

5-156. Allow the trouser halves to drape over the sides of the litter. Carefully roll and tuck the remaining cloth (at the crotch and on the inside of the legs) in on itself ensuring that only the black liner of the cloth is showing. Contain any dust or liquid that may be on the outside of the garment as you roll it. See Figure 5-5 below.

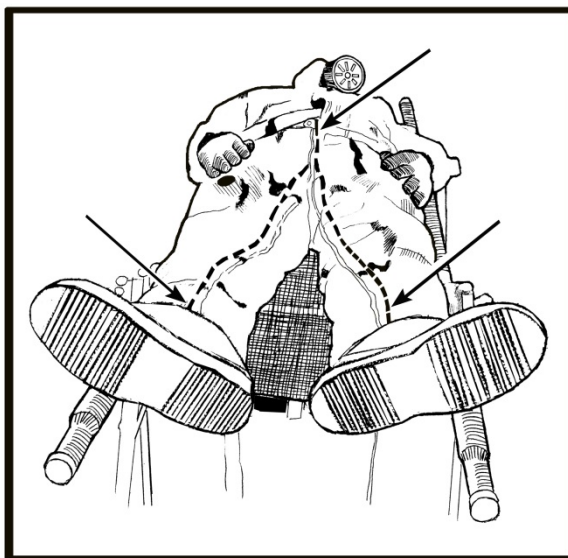


Figure 5-5. Cutline for overgarment trousers

Remove Outer Gloves

5-157. This procedure can be done with one person on each side of the patient working simultaneously. Do not remove the patient's inner gloves (glove inserts) during this step.

- The decontamination team members will decontaminate their gloves with the M295 or dipping them in a 5 percent chlorine solution or soap and water for radiological contamination.
- Next, decontaminate the patient's gloves with the M295, a 5 percent chlorine solution or soap and water for radiological contamination.
- Instruct the patient to hold his arms away from the litter and upper body or, if he is not able to do this then hold the patient's gloves at the fingers.

Note. Always remove the patient's gloves over the sides of the litter.

- Grasp the cuff of the rubber glove, turning the glove inside out, and remove it. See Figure 5-6 on page 5-32.

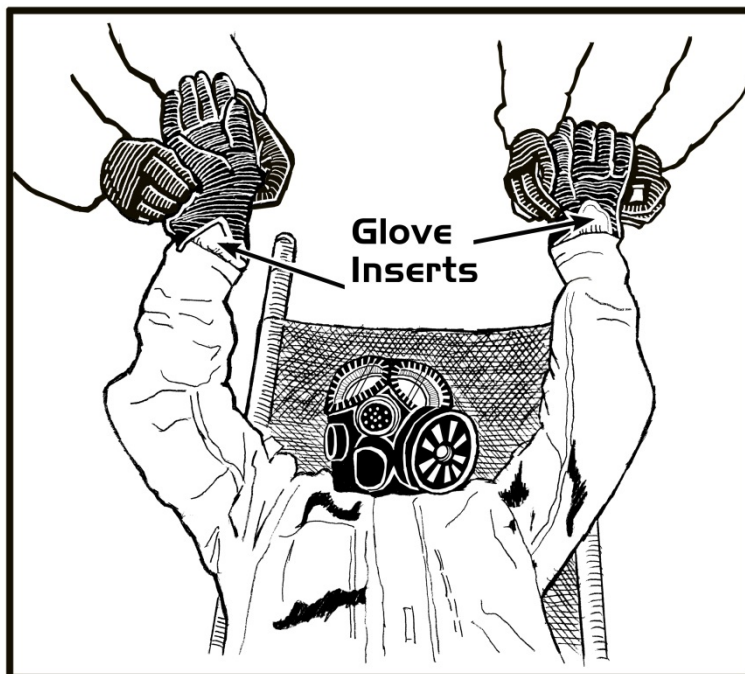


Figure 5-6. Outer gloves removal

- Carefully lower the patient's arms across his chest as each glove is removed. Avoid touching the patient's cloth glove liner or arm with your rubber glove.

CAUTION

Do not allow the patient's arms to contact the exterior (camouflage) side of the overgarment.

- Dispose of the contaminated rubber gloves by placing them in the designated contaminated trash bag.
- Decontamination team members then decontaminate their own gloves with the M295, or dipping them in a 5 percent chlorine solution, or use soap and water for radiological contamination.

Remove Overboots

5-158. Unfasten the boot closures.

5-159. If the overboot will not come off, cut the boot from top to bottom along the centerline of the boot or along the inside of the boot. Fold the overboot down and gently pull on the heel until the boot is removed.

5-160. If the older laced overboot is worn, then cut the overboot laces and fold the lacing eyelets flat outwards, and then remove the boot as noted above.

5-161. Remove the two overboots simultaneously. This reduces the likelihood of contaminating one of the combat boots. While holding the heels off the litter, have a decontamination team member wipe the end of the litter with the M295 or 5 percent chlorine solution to neutralize any liquid chemical contamination that was transferred to the litter from the overboots. Soap and water can be used for radiological contamination.

Lower the Patient's Heels onto the Decontaminated Litter

5-162. Place the overboots in the contaminated trash.

5-163. Decontamination personnel dip their gloves in the 5 percent chlorine solution.

Remove the Patient's Personal Effects From the Overgarment or Other Work/Duty Uniform Pockets

5-164. Place personal effects in a self-sealing plastic bag. This can be the same bag used for items taken from the overgarment pockets if they were not contaminated, otherwise place these items in a separate bag. Seal the bag. A card with the patient's name and identification number must be placed inside the bag. Decontaminate the outside of the bag. Keep the bag with the patient or send it to a contaminated item holding area where the items in it can be decontaminated or properly inventoried and disposed of.

5-165. Remove combat boots by cutting the bootlaces along the tongue. Remove the boots by pulling them towards you. Place the boots in the designated contaminated waste bag. Do not touch the patient's skin with contaminated gloves when removing his boots.

5-166. Remove inner clothing as follows:

- Decontamination team members decontaminate their gloves and cutting tools.
- Cut or unbuckle the uniform belt.
- Cut the uniform jacket and trousers (such as work uniform) worn under the protective overgarment in the same manner as described above for the protective overgarment. Roll the jacket and trousers as described for the protective overgarment.

Note. For litter patient decontamination in a PDS, removal of inner clothing immediately follows removal of overgarment and both take place before the first patient lift. For shipboard decontamination the inner clothing is not removed until the patient enters the ship's first compartment. Once in the first compartment the same clothing cut-off procedures noted above are used.

Remove Undergarments

5-167. Remove the patient's T-shirt by dipping the cutting device in the 5 percent chlorine solution between each cut. Cut both sleeves from the inside, starting at the elbow, up to the armpit. Continue cutting across the shoulder to the collar. Cut around bandages or splints, leaving them in place. Next, peel the T-shirt away from the body to avoid spreading contamination.

5-168. If the patient is wearing a brassiere, cut it between the cups. Cut both shoulder straps where they attach to the cups and lay them back off of the shoulders.

CAUTION

The cutting tools must be decontaminated frequently (after each cut) to keep any contamination from contacting the patient's bare skin.

5-169. Remove the patient's undershorts/panties by cutting from the lower side of the hip to the waist on both sides. Fold the front flap of the shorts/panties down between the patient's legs onto the litter. Do not allow the outside of the garment to touch the patient's skin.

5-170. Remove the socks and cotton glove liners.

5-171. Remove the patient's inner cotton gloves. Keep the patient's arms crossed over the chest if possible.

5-172. Do not remove the patient's identification tags. These stay with the patient at all times. If not yet decontaminated then decontaminate the tags with RSDL or soap and water.

AMBULATORY PATIENT MASK, PROTECTIVE ENSEMBLE AND CLOTHING REMOVAL PROCEDURES

5-173. The step-by-step procedure outlined below describes the process for removing the clothing of the ambulatory patient. By using this method the correct and essential steps are not omitted. The focus is to carefully remove the overgarment so that cross contamination from the protective ensemble to the patient's skin does not occur. This same clothing cut-off procedure is used in all types of ambulatory patient decontamination settings. Monitoring for contamination may differ depending on the agent and the decontamination assets/equipment available. Bandages, splints, and tourniquets are only removed by medical personnel (combat medic/corpsmen/Air Force medics, physician, nurse, and physician assistant). A buddy or augmentee will cut around bandaged areas. One or more litter stands or chairs will be needed in the ambulatory decontamination area to help the patients steady themselves while having their clothing cut off (these are not used on deck during shipboard patient decontamination as they can cause a safety hazard).

Note. The forward deployed MTFs will not have replacement MOPP ensembles/duty uniforms for the patients. Once the MOPP ensembles/duty uniforms are removed from these patients, they are now considered litter patients. These patients can be covered with blankets (if available) to keep them warm while waiting for treatment. These patients must be placed in a PPW for protection during evacuation.

Decontaminate the Mask and Hood

5-174. Wipe/sponge down the voicemitter, eyelets and outserts with the M295 or 5 percent chlorine solution.

5-175. While wiping around the filter, cover the inlet of the filter canister with a hand or gauze momentarily to keep liquid out of the inside of the canister where it could wet the charcoal, reduce filter efficiency, and clog the filter.

5-176. For integral hoods that are part of the overgarment, no decontamination of the hood is necessary.

5-177. Remove the hood as follows:

- Dip the cutting device in a bucket of 5 percent chlorine solution or decontaminate/scrub the cutting tool with the M295.
- Cut the hood starting at the front center and continue cutting across the top of the head toward the back.
- Fold the left and right sides of the hood away from the head and place on the shoulders. With an ambulatory patient the hood will lie on the shoulders of the individual.

Note. To cut the hood and the overgarment use sharp bandage scissors or a long handled seat belt cutter. Replace the cutter blades and scissors when they no longer make a smooth cut. Typically after cutting 5 complete uniforms/protective clothing, blades or scissors will need to be replaced. This is evident when the blades snag on the clothing and do not cut smoothly. After every complete segmental cut, decontaminate the scissors and long handled seat belt cutter along with the gloved hands of the Service member doing the cutting. This is done by dipping gloved hands and cutting tools in a bucket of 5 percent chlorine solution. If water is limited, scrub the tools with the M295. Use soap and water for radioactive contamination.

Decontaminate Head

5-178. Use soap and water, RSDL, or 0.5 percent chlorine solution (least preferred). Soap and water is appropriate for radioactive contamination.

5-179. Cover inlet port of filter canister to prevent wetting or congesting it. The patient continues to wear their mask until they cross the VCL.

- 5-180. Wipe any exposed areas of the patient's face that were not protected by the hood. This include the—
- Chin.
 - Neck.
 - Back of ears.

Note. After completing the hood removal, instruct the patient to move to the next station for the following steps. This station should be 10 to 20 meters upwind from the hood removal station for field decontamination with minimal resources. For plumbed tent systems all mask hood and clothing removal takes place in the clothing cut-off area. On ship, this takes place on the deck before movement into the first compartment.

Remove the Tactical Combat Casualty Care Card

- 5-181. The medical personnel at the ambulatory patient decontamination area should view the TCCC card prior to removal. See removal steps below:
- Cut TCCC card tie wire.
 - Allow the TCCC card to fall into a self-sealing plastic bag.
 - Seal the plastic bag and decontaminate the outside of the bag.
 - Place the plastic bag under the back of the patient's mask head harness straps.

Remove Personal Articles From Pockets of the Overgarment

- 5-182. Have the patient remove all items from the overgarment jacket and trousers and place them in a self-sealing plastic bag.
- 5-183. Mark the bag with a name and identifying number and then move it with the patient to the next step in the ambulatory decontamination line.
- 5-184. The patient must decontaminate their gloves before and after handling the bag.

Removal of Patient's Overgarment Jacket

- 5-185. The patient is standing and can hold on to a support such as a chair or litter stand (except for on the deck of a ship where these extra items are not permitted).
- 5-186. The individual with a cutting tool stands in front of the patient and cuts the patient's protective ensemble.
- 5-187. First, cut around all bandages and tourniquets. The augmentee, will supervise the patients to cut one another's overgarments.
- 5-188. Cut the hook and pile wrist closures.
- 5-189. Cut the joint service lightweight integrated suit technology draw-cord at the jacket bottom.
- 5-190. Cut the overgarment jacket starting at the waist and cut toward the collar in a line parallel to the zipper or unfasten the hook and pile and unzip the zipper. If cutting the front is not possible, continue the cut from the hood down the back and center of the jacket. This is best done using a long handled seat belt cutter.
- 5-191. To help pull off the jacket, the augmentee moves behind the patient if the jacket is unzipped or cut at the front. If the jacket is cut down the back then the augmentee moves to the front of the patient.
- 5-192. If the jacket was unzipped or cut at the front, instruct the patient to clench his fists and stand with his arms held down and extended backward at about a 30-degree angle. If the jacket was cut along the rear have the patient extend his arms forward at about a 30-degree angle.
- 5-193. The patient positions his feet shoulder width apart.
- 5-194. Grasp the jacket collar at the sides of the neck.

5-195. Peel his jacket off the shoulders in a down and away motion, smoothly pulling the jacket inside out over the patient's fists.

5-196. Place the overgarment jacket on the ground with the black side up.

Note. The patient's identification tags stay around the patient's neck throughout the decontamination process. They are decontaminated with soap and water, RSDL, M295, or 0.5 percent chlorine solution.

Remove the Trousers by Cutting

5-197. One augmentee should stand behind the patient and, if available, another at the front of the patient. The patient should have an object to help steady himself such as a chair or litter stand.

Note. Do not cut the trouser suspenders until the end of the process so that the trousers do not fall during cutting and get in the way of the cutter.

5-198. The easiest way to cut the pants is from the front as follows:

- Keep the pants zipped.
- Unfasten hook and pile ankle fasteners and begin cutting at the ankle. Cut along the inseam moving up toward the waist of the trousers.
- After cutting both trouser legs from ankle to waist, cut each suspender and allow the trousers to fall to the ground.
- Take the trousers and lay them on the ground, black side up, next to the patient.
- Later the patient will step onto this as he removes his overboots.

5-199. An alternate method is to cut the trousers from the rear as follows:

- In this case, first unfasten the hook and pile waist tabs.
- Start the cut at the ankle and move to the waist.
- Once the cuts on both legs are complete from ankle to waist, cut the suspenders below the suspender cross points and then above the cross points allowing the trousers to fall to the ground.
- Lay the trousers on the ground, black side up, next to the patient.

Remove the Overboots

5-200. Unfasten all boot closures.

5-201. Step on the heel of the boot and have the patient step out of the overboot and step onto the black side of the cut trousers and overgarment top that are lying on the ground.

5-202. Repeat this process for both boots. These overboots can be decontaminated and issued to other individuals.

5-203. If the overboot will not come off, cut the boot from top to bottom along the centerline of the boot until the boot comes off.

Remove Outer Gloves

5-204. Decontamination team member decontaminate their gloves with the M295 or 5 percent chlorine solution.

5-205. The patient's gloves are decontaminated with the RSDL or 5 percent chlorine solution.

5-206. Instruct the patient to hold his arms up, if possible, and away from his upper body. If the patient cannot do this, then hold his gloves at the fingers.

5-207. Grasp the cuff of the glove.

5-208. Pull the cuff over the fingers, turning the glove inside out.

5-209. Dispose of the contaminated gloves by placing them in the designated trash bag.

5-210. Decontamination team members then decontaminate their own gloves again with the M295, RSDL, or 5 percent chlorine solution.

Remove Inner Gloves (Glove Liners)

5-211. The patient should remove the liners to reduce the possibility of spreading contamination. The decontamination team member instructs the patient to remove the white glove inner liner using the following guidance:

- Grasp the heel of glove liner without touching exposed skin.
- Peel liner downward and off.
- Drop it into the designated trash bag.
- Remove the remaining liner in the same manner.
- Drop it into the designated trash bag.
- The patient then moves to the monitoring station.

Remove Personal Effects From Work/Duty Uniform

5-212. Have the patient remove all items from his work/duty uniform and deposit them into a self-sealing plastic bag.

5-213. Check for contamination. If not contaminated, the personal items remain with the patient. If contaminated they are moved to a contaminated item holding area.

Remove Inner Clothing/Work/Duty Uniform

5-214. Cut or unbuckle belt.

5-215. Cut the work/duty uniform pants following the same procedures as for the overgarment trousers.

5-216. Cut the work/duty uniform jacket following the same procedures as for the overgarment jacket.

Remove Undergarments (Contaminated)

5-217. Remove the patient's T-shirt.

- Dip cutting devices in 5 percent chlorine solution, scrub them with the M295, or wash thoroughly with soap and water between each cut.
- Cut around bandages or splints, leaving them in place.
- Cut up the front (or back) of the patient's T-shirt from the waist up to the collar.
- Cut both sleeves from the elbow to the shoulder and then to the collar.
- Next, peel the T-shirt away from the body to avoid spreading contamination.

5-218. Remove the patient's brassiere.

- Cut it between the cups.
- Cut both shoulder straps where they attach to the cups and remove the brassiere.

5-219. Remove the patient's under shorts/panties.

- Cut from the lower side of the hip to the waist on both sides.
- The decontamination team member places the undergarments into the contaminated trash bag, along with the overgarments and other contaminated items from the patient.

Wound Decontamination

5-220. Only trained medical personnel will change or remove patient bandages, tourniquets, and splints.

5-221. During decontamination, the clothing around bandages, tourniquets, and splints is cut and, if possible, tourniquets and splints are left in place. If the patient is intubated, care should be taken to ensure that this is not dislodged and that respiratory care is assisted during the decontamination process.

5-222. Cloth or other debris in the wound can hold contaminants. If contaminated, irrigate large wounds with sterile water or IV saline solution to dislodge debris and wash out contaminants. Remove the debris using forceps (using *no touch* technique) or butyl rubber gloves. Preferably, it would be safer to use only instrument to remove objects from wounds. Sharp objects could potentially puncture or tear gloves. Then cover the wounds with a large dressing and plastic if there is a fear of additional contamination getting into the wound.

Trauma Management During Decontamination

5-223. Contaminated tourniquet is replaced only by the medical personnel. The new tourniquets are placed one inch proximal to the original tourniquet and then the old, contaminated tourniquet is removed and put in the contaminated waste bag.

5-224. Chemically contaminated splints remain in place and are saturated to the skin with soapy water or 0.5 percent chlorine solution to include the padding and cravats. This can be performed by a decontamination team member if supervised by medical personnel. If the splint cannot be saturated (air splint or canvas splint), it must be removed or replaced by a physician or by other medical personnel under the supervision of a physician to enable everything under it to be decontaminated.

WARNING

DO NOT apply RSDL or irrigate wounds in the abdominal and thoracic cavities or intracranial (head) injuries. DO NOT remove splints unless permitted by a physician or other medical personnel under the supervision of a physician.

5-225. Removal of IV bags and tubing during decontamination is at the discretion of the medical officer supervising decontamination operations. The IV bags can be wiped down with soap and water if there is a concern about their contamination. If necessary, the bags may be discarded and exchanged. The IV lines should be protected during the decontamination process and during patient litter transfer.

5-226. In severe cases, intubation may be required to ensure patient airway, improve oxygenation, and aid in removal of secretions. Endotracheal tube can be wiped down with soap and water if there is a concern about their contamination. The endotracheal tube should only be removed by medical personnel. If necessary, the bag valve mask/manual resuscitator may be discarded and exchanged.

ESTABLISHING A PATIENT DECONTAMINATION SITE

5-227. The establishment of a PDS should be one of the first priorities once an MTF is established in an area where the threat of CBRN weapons is imminent.

Patient Thorough Decontamination (Minimal Equipment)

5-228. The following guidelines should be followed for patient decontamination when minimal decontamination equipment is available. These procedures are most applicable to mobile hospital units who have limited transport capability for carrying decontamination tents and roller systems.

Note. Standard Army chemical treatment MES is designed to treat 30 casualties. One patient decontamination MES has enough supplies to decontaminate 60 personnel.

5-229. The PDS can be collocated with a troop decontamination unit if adequate medical transportation assets and medical staffing are available.

5-230. The PDS can also be located adjacent to the MTF and not collocated with a troop decontamination unit. In this instance the PDS must be located 30 meters or more away from the MTF as wastewater runoff can potentially contaminate the area. If there is an adequate means to collect wastewater runoff, such as the use of a plastic water collection berm and pumps to remove the water, then the PDS facility can be located closer to the MTF.

Patient Thorough Decontamination (Roller System)

5-231. These procedures are most applicable to stationary hospital units who have an ample water supply. This procedure can be used by mobile units if there is a capability to transport water such as the use of a water tanker and a decontamination roller system if available.

5-232. These systems allow for more complete decontamination of patients and help to reduce injury and conserve manpower of decontamination team personnel.

Note. This document does not supersede USAF CONOPS for In-Place Patient Decontamination Capability or other specific Service guidance or equipment manufacturer's guidance. It provides supplemental instruction to help streamline processes when this type of equipment is used.

Selecting and Preparing the Site Prior to Patient Arrival

5-233. The PDS is initially set up in an uncontaminated (clean) area. It only becomes a warm hazard area once contaminated patients begin to arrive. The greatest threats to decontamination team members are from liquid or dry agents on a patient's protective ensemble and from chemical agent vapor that is trapped in clothing and hair or coming from liquid on clothing.

Note. Planning and preparation for the establishment of a PDS must take place long before it is to be employed.

5-234. Select a site that has the following characteristics:

- Access to a road network for easy movement of patients to and from the PDS and for trucks to maneuver dropping off or refilling water bladders, if used.
- Ground that is downhill or slopes away from the MTF or clean side, if possible, for PDS with minimal equipment. For PDS with a roller system, ground is preferably level for tent set-up. The use of water bladders eliminates the need to locate the decontamination system downhill from the MTF.
- Downwind (prevailing winds) from the MTF or clean side.
- In an area where wastewater runoff will not contaminate existing water resources or ground near the MTF.
- Offers adequate security for decontamination personnel.
- Has adequate space to establish a drop-off point with associated warm side triage and treatment areas that can be quickly and easily expanded to handle more than the anticipated number of casualties.
- Large areas, one on the clean side and the other on the dirty, for the staging of dirty and clean patients for evacuation.

Staffing of the Patient Decontamination Site with Minimal Equipment

5-235. The following is the staffing required for one work cycle. More individuals are needed to ensure adequate work/rest cycle rotation. Refer to Table 5-7 for suggested information on minimal staffing for one work cycle.

Table 5-7. Suggested minimal staffing for one work cycle

<i>Duty</i>	<i>Minimal</i>	<i>Roller System</i>
Command and Control Cell		
Officer in charge.	1	1
Senior combat medic/corpsmen/Air Force medics (may also serve as safety officer or another individual can be designated).	1	1
Entry Control Point		
Entry control point security detail.	2 (optional)	
Augmentees to unload litter patients (2 teams of 4).	8	8 (4 if NATO litter carriers are used)
Security personnel to guard arrival point and perform pat-down search.	2 (optional)	2 (optional)
Road guides and lookouts (night operations).	3 (optional)	3 (optional)
Augmentee trained to use various contamination check tools.		1 (optional)
Triage and Emergency Medical Treatment Area (Warm Side)		
Senior combat medic/corpsmen/Air Force medics or other primary triage officer (physician assistant, nurse).	1	1
Combat medic/corpsmen/Air Force medics to administer treatment.	1	1
Augmentees to serve as litter bearers (2 teams of 4 personnel).	8	
Litter Decontamination Area (Per Litter Lane)		
Augmentees who decontaminate the casualties and perform patient lifts. They wear TAP apron.	4	
Medical personnel.	1	1
Augmentee to clean litters.	1 (optional)	
Clothing removal area of roller system.		2
Body wash area of roller system.		2
Final check area of roller system.		1
Ambulatory Decontamination Area (Per Lane)		
Augmentee to assist patients.	1 (optional)	1 (optional)
Medical personnel.	1	1
Contamination Check Area		
Augmentee trained to use various contamination check tools.	1	
Hot Line Patient Reception (Members on the Clean Side of the Hot Line)		
Augmentees on clean side of the hot line who move litter patient across hot line.	2	2 (1 if NATO litter carriers are used)
Combat medic/corpsmen/Air Force medics on clean side of hot line.	1	1
Total medical	5	5
Total augmentees/others	25–34	14–23
Total personnel for one work cycle	30–39	19–28
NOTE: This minimal staffing does not include medical treatment facility security detail.		

Note. At a very small Role 1 MTF, patient decontamination requires a minimum of eight nonmedical personnel (augmentees) from the supported unit. A dramatically reduced decontamination operation less than the recommendation above, may be necessary. In this instance it is critical to have one or two individuals who can adequately triage, stabilize, and evacuate dirty casualties who cannot be cared for at that facility. Those who can be seen there must have their clothing carefully removed by a team of four augmentees, supervised by medical personnel. This must be performed before the patient is moved across an improvised hot line. At the hot line, the patient is received by another set of augmentees and a medical personnel wearing MOPP Level 4. Only then is the patient moved inside a clean area where medical staff are not wearing protective ensemble. The key here will be for the small Role 1 MTF to reroute contaminated patients to other facilities if they are overwhelmed.

Establishing a Patient Decontamination Site

5-236. Mark off areas for dirty dump, drop-off point, triage, dirty EMT, litter lane, ambulatory lane, contamination check, hot line, dirty litter decontamination, dirty side shaded rest area, clean side supply, clean side triage and treatment, clean side transport area to MTF, temporary morgue holding area, and patient weapons storage area. The environmental control units, water heater, power source, water bladders in a PDS with plumbed tentage can also be marked.

5-237. Set up the PDS so that it can be easily marked with chemical lights and negotiated in night conditions. Remove debris along the routes between the drop-off point, triage and treatment areas, and decontamination lanes. When conducting triage—

- The *immediate* category patients are moved to the warm (dirty) side EMT. This area is located between patient triage (closer to triage to minimize the time it takes to move from triage to dirty EMT) and the entrance to the litter decontamination lanes. This way they can be moved to litter decontamination without interfering with the traffic flow from other patient groups.
- The *delayed* category patient area should be positioned nearer to the entrance to both the litter and ambulatory decontamination lines. This way *delayed* patients can be processed through either the litter or ambulatory lanes when the lanes become available.
- *Minimal* category patients should be positioned near the ambulatory patient area so that if medical care on the clean side of the hot line is needed they can process through the ambulatory lane when it becomes available and will not interfere with the flow to the litter lanes.
- *Expectant* category patients should be located near the EMT area, but farther away from the decontamination lanes, so that they can be retriaged and stabilized for decontamination if the EMT area no longer has patients in it.

Note. More than one patient litter decontamination lane is needed, especially for larger MTFs, as the process takes time and is labor intensive.

Establish a Security Perimeter Around the Patient Decontamination Site

5-238. This should be done by erecting barriers such as concertina wire. Using vehicles as barriers may not be appropriate if access to these vehicles will be required during patient decontamination operations and the vehicles will be located in the potential warm area of the PDS. These measures will be dictated by situation.

5-239. Dig a dirty dump at least 75 meters downwind from the arrival point. The dump should be at least 6 feet deep and large enough to accommodate large numbers of filled contaminated trash bags (one for every two decontaminated patients). The dump should be deep enough so that bags can be covered once the PDS is evacuated or closed down. Commanders should ensure that proper local regulations, host nation regulations, and/or licensing mandates are followed for storing and/or burying CBRN waste.

Note. Preparing a dirty dump while the area is uncontaminated is much easier as workers will not have to assume MOPP Level 4. Once contaminated material is placed in the dump then any expansion of the dump will have to be performed by individuals digging the dump while at MOPP Level 4. It is best to coordinate this with an engineer unit so they can use their earth-moving equipment to dig the holes for dirty dump and construction of wastewater diversion gullies.

5-240. Dig water runoff gullies (approximately one foot deep) or berms (approximately one foot high) around the litter and ambulatory decontamination areas to trap any water flow and route it away from the decontamination area if plastic berms are not available. These should direct water to a larger pit where wastewater can be collected and if it is a chemical or biological hazard neutralized it with 5 percent chlorine solution.

Note. A hard surface area is ideal for the location of a decontamination area as it allows for water runoff without creating a muddy surface; however, these materials (concrete or asphalt) will hold some agents for hours to days. Because of this, a PDS should not be set up on a hard surface road that will be needed later for vehicle movement.

5-241. Shuffle pits are *not* prepared when using a plumbed tent system. With these systems, decontamination team members remain inside the tent during operations so they do not track in contamination from the triage areas. Their boots can also be easily decontaminated inside the tent using the handheld sprayers if necessary.

5-242. A PDS with minimal equipment must prepare a shuffle pit at the hot line at the litter patient decontamination line, and another at the ambulatory patient decontamination line or one shuffle pit can be made for both litter and ambulatory lanes. See considerations below with regard to shuffle pit:

- Both shuffle pits are located at and should straddle the hot line.
- The litter patient shuffle pit must be large enough to accommodate one litter and four personnel with enough space for them to move around the litter when placed on litter stands located inside the pit.
- The ambulatory shuffle pit must be large enough to accommodate two standing individuals.
- Each pit is dug to a depth of 6 inches. The soil is then returned to the pit and mixed with calcium hypochlorite at a ratio of 3 parts soil to 2 parts calcium hypochlorite. Personnel preparing the calcium hypochlorite/soil mixture must assume MOPP Level 4.
- If a boot rinse is used instead of a shuffle pit, then a plastic berm that can contain water is used. It is filled to at least 5 inches deep with a 5 percent chlorine solution. It should be replenished every 5 to 10 patients. It should be large enough for decontamination team members to enter and place a litter patient on a pair of litter stands inside the boot rinse area and perform a litter transfer.
- Concertina wire or another barrier should be placed along areas of the hot line that do not include the shuffle pits. The shuffle pits should be the only areas along the hot line where it can be crossed. This will ensure that movement across the hot line is controlled.

5-243. It is suggested that only a portion of one MES needs to be moved to the triage area to meet the needs of the number of expected casualties. During operations, additional medical supplies can be moved across the hot line from the clean side supply area as needed. This will reduce the possibility of unused supply items becoming contaminated resulting in their waste.

5-244. In a PDS with minimal equipment, the rest area is establish in a shaded area on the warm side of the hot line so PDS workers on the warm side of the hot line can rest, while at MOPP Level 4, without having to process across the hot line.

5-245. It is recommended that some type of marking system be incorporated to identify PDS workers. One suggestion is that all decontamination team members have their protective overgarments marked with wide masking tape with their name and team member position clearly marked on their uniform so that they can be readily identified (for example, arrival, triage, security, medical, or decontamination). Instead of tape this can also be done by writing directly on the overgarment if it can be easily seen. Another recommendation is for medical personnel to wear an armband or have a tape cross on the arm of their overgarment.

5-246. Locate water resources, water cans, water buffalo, water bladder, or water tanker with easy access to the decontamination lanes.

5-247. In a PDS with minimal equipment, ideal location is to have containers of water that will be used for decontamination located near the warm side rest area. This will reduce any contamination of these containers. Other supplies can be located on the clean side of the hot line in the supply area. Ensure wastewater runoff from the decontamination lanes does not flow toward the water resource area or the medical treatment areas. Water usage can be roughly calculated as follows:

- One patient will require (on the average) 1.5 gallons of soapy water (or 0.5 chlorine solution, if used), 1.5 gallons of rinse water, and 2 gallons of water with 5 percent chlorine mixture for equipment and decontamination team glove wipe down.
- One patient will require 5 gallons of water (18.92 liters).
- Twenty patients will require 100 gallons (379 liters) of water.

Note. When decontamination pails/buckets (12-16 quarts) are filled this is roughly enough liquid for two patients. With every second patient, the liquid that remains in the pails/buckets will be emptied into the garbage bag that contains the cut off garments of the second patient. The pails/buckets are then refilled.

5-248. In a PDS with roller systems, there must be adequate water pressure to operate the water sprayer. Adequate water pressure can only be obtained through the use of water pumps which typically need some type of power source.

5-249. Set up the water collection system, tentage, and plumbing as dictated by the manufacturer's instructions. Ensure that there is an adequate way to dispose of wastewater run-off, such as a water bladder, so that it does not contaminate the ground around the decontamination system. A water run-off gully (approximately 1 foot deep) or berm (approximately 1 foot high) can be constructed around wastewater bladders to contain spills. If the run-off water poses a chemical or biological hazard it can be neutralized with 5 percent chlorine solution.

Note. Pumps, water flow, soap mixers, water and air heaters should be tested to ensure they are operational.

5-250. To reduce cross contamination, fresh water and wastewater bladders must *not* be positioned next to one another. Ideally they should be on opposite sides of the decontamination tent, with the wastewater bladder downhill from the fresh water bladder and decontamination tent. It is critical that there is an easy access route for a water pumper truck to fill the clean water bladder and a route for a vehicle to pump out the contents of the wastewater bladder or for a forklift to move a specially designed transportable wastewater bladder (if used) to the back of a truck for movement out of the PDS.

5-251. Systems that incorporate water sprayers require a large water supply. The supply must provide enough pressure to operate the system. Water pumps are usually required and these require water sources. Ample water supplies are needed for expected number of casualties. A 2,000 gallon water storage container such as a tanker truck or water bladder, will allow the decontamination of approximately 200 patients. It is estimated that on the average 10 gallons of water is used per patient with these plumbed systems.

5-252. Operators must be aware of the importance of conserving water while still providing adequate decontamination. This will ensure that water supplies are not depleted and wastewater collection systems are not overwhelmed. Water can best be controlled by using handheld sprayers that will allow water flow to be turned off when not in use. Water flow should be adjusted to have moderate-to-low pressure with high flow for brief periods when the sprayer handle is pressed.

5-253. Ideally units should incorporate a water heater to increase water temperature and reduce the incidence of patient hypothermia for those undergoing decontamination. Soap mixers can also be added which make dispensing soap from the sprayer possible. This is usually easier than using buckets of soap in the small confines of most tent systems. These heating and soap dispensing units, along with the water pumps, also require a power source.

5-254. Collection of contaminated wastewater is critical, especially for biological sporulating agents (anthrax) and radioactive particles. Wastewater collection is also important to limit runoff and ground contamination in the decontamination area, especially if the decontamination tent is close to the MTF. A wastewater bladder is used to collect the runoff. Wastewater is pumped from the collection area of the tent and into the bladder. In cold climates the water and wastewater bladder must be heated to prevent freezing. It is critical that the wastewater bladder be the same size, or larger, than the water storage source. For every patient decontaminated, calculate 10 gallons of wastewater runoff. Wastewater, once collected, is treated with 5 percent chlorine solution until chemical hazards are neutralized or biological spores are killed. Radioactive waste cannot be diluted in this way. One gallon of water weighs 8 pounds, so a filled 2,000 gallon water bladder will weigh 16,000 pounds (8 tons).

Note. Premixed chlorine and soap solutions should be prepared in advance during site preparations and should be in sealed containers and clearly marked as to their contents. Five gallon covered water cans or larger Jerry Cans are ideal for this as they can be carried to a position near the decontamination line and used to refill pails/buckets.

CAUTION

Chlorine solution and soap solutions prepared in storage containers **MUST** be clearly marked as to their contents so that they are not mistaken for drinking water and 5 percent hypochlorite solutions are not confused with soap or water solutions.

5-255. Open NATO litter carriers if available. These two wheeled carriers allow two individual to easily move a litter patient. They work well on hard ground but may pose difficulty in sand. Several should be positioned at the drop-off point and at least two at the clean side of the hot line (in the final check area).

5-256. When not setting up the decontamination site, augmentees can receive additional just-in-time training on such topics as: basic medical signs and symptoms of chemical agents; safe patient litter transfer techniques; roles and responsibilities; the use of detection devices, the importance of work rest cycles; and prevention of heat injuries.

5-257. The allocation of decontamination equipment resources is suggested in Tables 5-8 through 5-10 on pages 5-45 and 5-46.

Table 5-8. Equipment and supplies needed for a decontamination lane

<i>Equipment and supplies</i>	<i>Nonambulatory</i>	<i>Ambulatory</i>
Large trash bags for contaminated waste.	1 box as needed	1 box as needed
Pail/bucket of decontamination, 5 percent chlorine solution.	1	1
Pail/bucket of decontamination, soap and water solution (0.5 chlorine solution [least preferred]).	1	1
Bandage scissors or long-handle seat belt cutter with blade replacements (minimum, more are needed as they dull).	4 +	4 +
Self-sealing plastic bags for tactical combat casualty care cards and for personal effects found in outer and inner garments.	1 box of 50	1 box of 50
Sponges.	2+	2+
Decontamination toxicological agents protective apron.	4	2
One decontaminable litter for exchange (per patient expected).	2+	
Reactive skin decontamination lotion (1 to 3 kits per patient).	1 box	1 box
M295 (1 per patient).	1 box	1 box
Liquid soap (mix in water storage area).	As needed	
Litter stands (pair).	1	1 to steady patients
Supplies to replace bandages, tourniquets, and splints (if necessary).	As anticipated	As anticipated
Optional items not found in decontamination equipment set, but useful.		
Trash can to hold large garbage bags (if transport and storage space available).	1	1
Pail/bucket of rinse water.	1	1
Additional canteens of water for decontamination team members.	4+	4+
3 x 5-inch card and pen (to mark personal effects per patient) or permanent markers to mark outside of personal affects self-sealing plastic bags.	1 box	1 box
Chairs to steady patients while standing.		2
NOTE: Additional quantities of soap and chlorine decontamination solutions must be prepared and stored in sealed containers to refill pails/buckets.		

Table 5-9. Equipment and supplies required for the contamination check area at a patient decontamination site with minimal equipment

<i>Equipment and supplies</i>	<i>Per lane</i>
Chemical agent detectors with batteries	2
Spare lithium batteries	8
Detection paper	1 book
Reactive skin decontamination lotion for decontamination of small areas	1 box
Bucket of soap and water for small area decontamination	1
Sponge	2

Table 5-10. Equipment and supplies required for the hot line at a patient decontamination site with minimal equipment

<i>Equipment and sales</i>	<i>Per lane</i>
Large trash bags for contaminated waste	1 box
Book of tactical combat casualty care cards (on clean side of hot line)	1 book
Large plastic bag for patient's mask once removed at vapor control line	1 box
Ballpoint pen (preferably black) to fill out clean tactical combat casualty care card	As needed
Calcium hypochlorite to replenish shuffle pit	1 container
Optional items not found in decontamination equipment set, but useful	
Blankets (on clean side of hot line)	1 per patient
Trash can to hold large garbage bags (if transport and storage space available)	1

Actions to Take Upon Notification of Patient Arrival

5-258. Immediately upon notification that contaminated patients are to be received, the decontamination team leader or NCOIC will alert the team members.

5-259. Patient decontamination site OIC/NCOIC will assign augmentees decontamination team their duties and responsibilities at the PDS.

5-260. All triage, EMT, and decontamination team members assume MOPP Level 2 when the arrival of contaminated casualties is expected, as dictated by the commander. They then assume MOPP Level 4 prior to patient arrival at the ECP. Those who will be decontaminating patients will don their TAP aprons. Mask carriers can be worn or clearly marked with the decontamination team member's name and stored in an organized fashion at the rest area or another location designated by the OIC/NCOIC. Mark protective overgarments with some type of marking system to easily identify PDS workers.

Turn on the Chemical Agent Detectors

5-261. Once the alarm detectors are warmed up, perform confidence checks on each detector per the technical manual. Activate the chemical alarm detector system if available. It should be positioned at the VCL.

5-262. All decontamination team members on the warm, (dirty) side of the hot line, as well as those receiving patients on the clean side of the hot line, keep their protective masks on until all patients are decontaminated and the PDS area is determined to be free from hazardous vapors.

Actions to Take When Contaminated Patients Arrive

5-263. Security personnel in MOPP Level 4, at the ECP meet transport vehicles and quickly ask the driver as to the numbers and types of casualties and the types of contamination if known. They relay this information by radio to the drop-off point and to PDS OIC/NCIOC. They then direct the vehicle to the drop-off point.

5-264. Patients are unloaded and whether ambulatory or litter, are given a quick but thorough pat-down search for any ordnance or other explosive devices. The inside of mask carrier can also be checked. Weapons are removed and stored in an area on the dirty side of the hot line. These procedures can be performed by augmentees designated as drop-off point security or by the augmentees who are serving as litter bearers. Suggested pat down steps include—

- Remove the patient's weapons and load bearing equipment/load carrying equipment web gear.
- Check inside the patient's mask carrier for any munitions.
- Try to keep the mask carrier with the patient for triage so that unused antidotes can be administered if nerve agent exposure is suspected or if the patient displays signs and symptoms of nerve agent poisoning.
- Move your hands down the patient's torso while feeling through the overgarment pockets for anything that could be ordnance. If ordnance (ammunition, grenades, magazines, claymore mines) are found, remove them or alert the OIC/NCIOC.
- Do *NOT* remove the patient's protective mask, the patient's personal items at this point, nor remove the patient's identification tags at any time while the patient is in the PDS.
- The contaminated patient is then brought to the warm (dirty) side triage area.

5-265. At the triage area, the patient is triaged and moved to a treatment area (*immediate, minimal, delayed, expectant*, dirty evacuation) designated by the triage officer. All immediate patients are brought to the dirty EMT area for stabilization.

5-266. Those patients who need to see the medical providers inside the MTF and are stable enough for decontamination are moved to the decontamination lanes by litter teams or, if ambulatory, directed by an augmentee. The triage officer or EMT officer will direct patient priority for decontamination as follows:

- Patients requiring *minimal* care should remain on the dirty side of the hot line, remain in their protective ensemble, be treated there, and then returned to their unit without going through patient thorough decontamination and crossing the hot line.
- Only those patients needing care at this MTF should go through patient thorough decontamination.
- Patients with physical injury (that prevents them from going through the ambulatory lane) or that are mentally impaired (COSR) are automatically considered litter patients.
- For more information on triage see Chapter 3.

MOVING A LITTER PATIENT THROUGH A PATIENT DECONTAMINATION SITE

5-267. Decontamination of contaminated patients is essential before allowing them into a MTF.

Prior to Litter Patient Decontamination

5-268. Any time gross contamination is noted, it needs to be removed as soon as possible. Use any stiff material (such as stick, cardboard, plastic strip, or metal banding strap) to physically remove gross chemical contamination from the patient's protective ensemble. Much of the CW agent contamination can be removed through physical means.

5-269. Contaminated dust or dry chemical, biological, and radiological contamination should be carefully dusted or vacuumed (using a vacuum with high efficiency particulate air filter) from the overgarment. The patient is then moved out of this *dust off* area while still in the protective ensemble. The dust off area must be far downwind from the drop-off point so that dust that might be blown into the air does not contaminate other areas of the PDS. If an insect sprayer or mister is available, garments can be lightly misted with water to reduce particle aerosolization prior to protective ensemble removal. Caution must be used in this process

to not aerosolize the agent with a direct flow of air or water when misting the dry material. Every effort should be made to keep aerosolized dust to a minimum.

5-270. The patient is then triaged and moved by litter team to the warm side EMT area. The patient is then medically stabilized (if necessary) by the medical personnel in the area.

5-271. Once stable for decontamination, a decontamination team moves the patient to the pair of litter stands in the decontamination area (minimal equipment) or to the ambulatory and nonambulatory patient lane (roller system) decontamination tent.

TRANSFERRING A PATIENT TO A LITTER

5-272. The patient's litter is placed on the litter stands. Decontamination team members carefully remove the patient's protective ensemble and clothing so that contamination is contained in and on the protective ensemble.

Minimal Equipment

5-273. After the patient's clothing has been cut away, he is transferred to a clean litter. This is either a decontaminable litter or a canvas litter with a plastic sheeting cover.

CAUTION

Workers must decontaminate each other's toxicological agents protective aprons with the RSDL, M295, soap and water, or 0.5 percent chlorine solution before any patient lifting. Workers must dip their gloves in the 5 percent chlorine solution and rinse them with water. This is done as team members stand with arms spread out to the sides, allowing the other team member to get into all the folds of the TAP apron front and sleeves.

5-274. The decontamination team members and a dirty side medical personnel decontaminate their gloves and aprons with the appropriate decontamination solution.

5-275. One decontamination team member moves to one side of the patient. The medical personnel, if present, moves to the head of the litter. The other three team members move to the other side of the patient. The decontamination team members are wearing butyl rubber TAP aprons or a garment that can be adequately wiped down during patient lifts.

5-276. The litter decontamination team members log roll the patient to his side, toward the lone decontamination team member. This technique may need to be modified based on the patient's injuries. Stabilizing the head and neck is particularly critical if some type of spinal injury is suspected. This is done by the following steps:

- The individual at the patient's head (preferably the dirty side medical personnel), ensures that his gloves are decontaminated, and places his hands on both sides of the patient's head, with the palms over the ears and fingers to support the patient's jaw to stabilize the patient's head.
- The lone decontamination team member crosses the patient's leg, the one that will be on the top when the patient is lying on his side after the log roll. The decontamination team member then places one hand on the patient's shoulder and the other on the patient's hip.
- Throughout the log roll, the lone decontamination team member is positioned against the litter to ensure that the patient does not roll forward too far and roll off the litter.
- The other three team members help to roll the patient toward the lone member in a controlled, slow manner.
- The individual holding the patient's head ensures that the patient's head is turned slightly during the roll, so that it stays in a straight line with the spine.

5-277. Once the patient has been log rolled to the side lying position, the three decontamination team members place their forearms on the litter in a *forklift* fashion, each at a different part of the body. Steps are as follows:

- First team member places his forearms to support the patient's shoulders and the waist.
- Second team member places his forearms to support the patient's hip and thighs.
- Third team member places his forearms to support the patient's knees and ankles.
- The lone decontamination team member then slowly rolls the patient back onto the three decontamination team members forearms. The medical personnel provides supervision and will provide head and neck stabilization.
- The decontamination team members lift the patient. Before and during the lift, the individual at the patient's head explains to the patient exactly what is going to happen. The team member who is stabilizing the patient's head gives the command *prepare to lift*. When the three decontamination team members are ready they respond *ready*. If all team members report that they are ready, the individual at the patient's head then gives the command *LIFT*. On that command, the patient is lifted off of the litter by the three decontamination team members while they roll the patient slightly inwards, against their chests. This lift technique helps to make holding up the patient less of an effort and it best supports the patient. During the lift, the decontamination team members should ensure that they bend at their knees, not at their hips, and try to keep their backs straight and perpendicular to the ground. This will reduce back strain for the lifters.

5-278. The lone team member, who is not involved in lifting the patient, takes the dirty litter and the contaminated clothing on it from the litter stands and puts it to the side. He then takes a clean decontaminable litter and places it on the litter stands. If decontaminable litters are not available use plastic sheeting on a clean canvas litter.

5-279. The decontamination team member at the patient's head then gives the command *prepare to lower*. If ready, the three team members holding the patient respond *ready*. The command *lower* is then given and the patient is slowly lowered onto the clean litter.

5-280. The cut overgarments and undergarments are placed in the designated contaminated trash bag with the other waste (for example, contaminated bandages) from the patient.

5-281. The dirty litter is sent to the litter decontamination area and decontaminated with an M295 or 5 percent chlorine solution, allowed to sit for 10 minutes, and then rinsed with clean water. The litter remains on the warm (dirty) side of the hot line and does not cross the hot line, but instead is rotated between the drop-off point and the hot line.

Note. Contaminated material from two litter patients can be placed into one 35-gallon trash bag. The remaining 5 percent chlorine solution and soapy water (if used) can be poured into the bags. The bag must be tightly secured and transported to the dirty dump.

Roller System

5-282. Some roller systems are designed to accommodate a standard decontaminable litter or designed to accommodate only a backboard.

5-283. If the roller system will accommodate a decontaminable litter, the litter can be placed directly on the roller system. It will be decontaminated as it travels with the patient.

5-284. The patient must be transferred to another litter at the end of the decontamination line to ensure that no contamination that could be on the bottom of the litter enters the MTF. The litter is then rotated back through the roller system and washed before used again on the warm side.

5-285. If the roller system only accommodates a backboard, the patient must be transferred from his litter to the backboard for movement down the roller system.

5-286. The easiest way to transfer the patient from the litter to the backboard involves the following steps:

- Position the litter outside the entrance to the decontamination roller system.
- Remove the patient's load bearing equipment, mask carrier, and helmet if worn.
- Log roll the patient to their side on the litter.
- Place the backboard along the back of the patient.
- Roll the patient back onto the backboard.
- Lift the patient on the backboard and hand the backboard, now containing the patient, to the decontamination personnel at the head of the roller system.

Note. When lifting a plastic backboard ensure that the staff are holding on to the center handles to keep the backboard from bowing which could cause the patient to fall off.

5-287. If another transfer technique is used, then it must be one that is easy for the decontamination team members even with the heaviest of patients and one that will not cause further harm to the patient.

Note. All transfer techniques should be practiced by the decontamination team using personnel or sandbags. These techniques will have to be modified based on the injuries of the patient.

CLOTHING REMOVAL STATION

5-288. Once on a litter or the roller system, the patient's mask is decontaminated and clothing is removed.

Note. The patient's mask filter must be covered while undergoing decontamination, especially when using water sprayers. This can be done with a lightly cupped hand or gauze that does not block air flow. Other improvised devices, such as cylindrical containers (for example, compact disk 50 disk canisters) can be placed over the filter as long as they do not block air flow.

5-289. Once protective ensemble, boots, clothing, and underwear have been cut off of the patient, the patient is rolled to his side. The garments are rolled up to the patient's back. All garments **MUST** be rolled inward so that only the black filter side of the protective ensemble is next to the patient's skin. The patient is then rolled in the opposite direction and the garments are rolled inward and then carefully folded to hold in any contamination. The garments are then passed toward the dirty end of the roller system tent where they are placed in a contaminated trash bag.

5-290. The decontamination team members who removed the patient's clothing roll the patient along the roller system and then decontaminate their aprons and gloves with soap and water or 0.5 chlorine solution.

Note. If plumbing and an ample water supply are not available, then the procedures and decontaminants used for field decontamination should be followed as the patient is moved along the roller system. In this case, buckets of soap and water or RSDL are used.

DECONTAMINATE THE PATIENT

5-291. This section discusses procedures on how to decontaminate a patient at the PDS.

Minimal Equipment

5-292. The patient is now decontaminated with soap and water, RSDL, or 0.5 percent chlorine solution (least preferred).

5-293. If the patient is in full protective ensemble, the best method is to decontaminate only those skin areas where there was a break in the ensemble (for example, around wounds, areas where the underlying uniform is wet with agent, or where there is a tear in the overgarment).

5-294. If the patient is not wearing protective ensemble or had significant uniform tears, or underlying uniform is damaged, an alternate method is to decontaminate the entire skin surface by wiping the skin with a sponge copious amounts of soapy water with a water rinse.

5-295. In the case of a full body wash (litter patient), begin washing the patient from the midline outward, constantly washing, making sure not to place a dirty sponge back on a clean area without first rinsing the sponge. The complete topside of the patient is washed in this manner, paying particular attention to hairy areas of the body (groin and auxiliary regions) and sweaty areas (belt-line, just above the boots, the crease of the buttocks, and wrists).

Note. When using 0.5 percent chlorine solution (least preferred), do not do a full body wash. Only decontaminate contaminated areas.

5-296. Then log roll the patient to his side. With the patient lying on his side, wash the backside of the patient working from the higher areas of the backside and washing down toward the litter. Ensure not to miss any areas. The side of the litter that the patient was rolled away from is then decontaminated prior to rolling the patient onto their back on the litter.

CAUTION

Log rolling and washing the back of some patients may be difficult and dangerous for the patients depending on their injuries. Procedures will need to be modified in these cases. The supervising medical personnel should be consulted in these cases and should guide the decontamination of these patients closely.

5-297. The patient is then moved to their back and now log rolled to their opposite side. Wash the opposite side of the patient in exactly the same manner as above. Decontaminate the litter as above before rolling the patient onto their back on the litter.

5-298. After the patient is decontaminated, the medical personnel removes the dressings and replaces them if dressings are suspected or found to be contaminated with agent.

CAUTION

Review guidance for cold weather operations if the ambient temperature is 65°F (18°C) or below.

5-299. Superficial wounds are deconned and flushed with soapy water.

Roller System

5-300. After the patient's clothing has been cut away, he is moved down the roller system to the area where the shower hoses dispensing warm soapy water are located. This area is manned by two individuals who spray the patient's body with soapy water and wipe the body using cloths or sponges. They must wipe toward the backboard.

5-301. The patient is washed from head-to-toe and then turned on the side so that the patient's back can be washed as well as the top of the litter/backboard.

5-302. The patient is then moved along the roller system to the rinse area where the soap is rinsed off of the patient moving from head to toe. The patient is rolled to the side and the patient's back and backboard are rinsed.

Note. Water should be conserved as much as possible to reduce the need to refill water storage and reduce the frequency that the wastewater bladder must be emptied.

5-303. Decontamination team members wash their aprons, gloves, and sponges thoroughly between patients.

5-304. Decontamination team members working in these areas should protect their mask filters from moisture as much as possible. Additional filters should be on hand for the staff to change out damp filters. Team members wearing powered air purifying respirator can keep their filters dry by wearing the blower motor and filters under waterproof aprons to keep filter units dry.

5-305. Once the patient is washed and rinsed, the patient is then moved to the clean end of the roller system where they are checked for contamination and then dried.

Note. Bandages, splints, and tourniquets are only changed by medical personnel.

5-306. Occupational, environmental, and incident exposure data must be documented, recorded, and archived. Reports from OEH or CBRN exposure incidents that result in an acute illness or that have the potential to cause latent illness will be included in the patient records of those individuals affected or possibly exposed. Refer to DODI 6490.03 for more information.

CHECK PATIENT FOR COMPLETENESS OF DECONTAMINATION

5-307. After decontamination, the patient is brought to the contamination check area. The patient is checked with the chemical agent detector/monitor or with the detector paper (if patient is fully dry) for completeness of decontamination and checked with appropriate handheld survey equipment/detector (preferably one that can detect small areas of alpha and beta contamination) on the body if radioactive contamination is suspected. Other approved monitoring devices may be used when available. There is no detector currently available to measure the completeness of decontamination for biological agents.

Note. Decontamination is typically not indicated for biological agents if the person has bathed in the days since initial exposure. If the individual has been exposed to anthrax spores, and has not bathed, then thorough decontamination is important. In this instance, clothing should be carefully removed to reduce the spread of the spores. The skin should be washed with soap and water and run-off water collected/neutralized.

5-308. Dispose of contaminated bandages and coverings by placing them in a designated contaminated waste bag with the contaminated overgarments. Seal the bag and place it in the contaminated dirty dump.

MOVEMENT OF THE PATIENT TO THE HOT LINE

5-309. This section will discuss movement of the patient in the hot line.

Minimal Equipment

5-310. Decontamination team members rinse or wipe down their TAP aprons and gloves with the 0.5 percent chlorine solution for chemical and biological agents and soap and water for radiological agents. They then move the patient on the litter to the hot line.

5-311. The shuffle pit containing calcium hypochlorite is only necessary for chemical agents and sporulating biological agents such as anthrax. They are not necessary for radiological agents although a hot line is still indicated.

5-312. At the hot line, a pair of litter stands is positioned inside the shuffle pit. At this point, the patient's clothing has already been cut away; his skin and splints have been decontaminated and contaminated bandages have been replaced. Now the decontamination team members place the patient and litter on the

litter stands inside the shuffle pit. The shuffle pit should be wide enough to allow decontamination team members to move around the pit to position the litter inside the pit.

5-313. The decontamination team members who brought the patient to the shuffle pit position themselves in the pit around the litter patient on the litter stands. They are still wearing their butyl rubber TAP aprons. If available, the medical personnel from the dirty side accompany the patient to the hot line. Staffing on the clean side of the hot line is made up of at least three reception team members. One of these clean side reception team members must be a medical personnel (combat medic/corpsmen/Air Force medics/medical personnel) and the other two can be augmentees. These members assume MOPP Level 4 but are not wearing TAP aprons.

5-314. A member of the decontamination team removes the bagged TCCC card and holds it so that a medical person on the clean side of the hot line can read it and transfer the information to a clean TCCC card. After transcribing the information, the clean side medical person attaches the new TCCC card using the card wire to the patient's mask harness before the patient crosses the hot line to the clean area. The old TCCC card is disposed of in a trash bag on the dirty side of the hot line.

Note. Direct physical contact between the decontamination team and receiving team should be minimized to reduce any risk of cross contamination.

5-315. A second litter transfer is performed at the hot line to ensure that no contamination on the litter passes the hot line. Decontamination team members must ensure that they have properly decontaminated their gloves and aprons prior to performing any litter transfer procedures.

5-316. The clean side team members stand outside the shuffle pit. The decontamination team members from the dirty side of the hot line position themselves around the patient as they did at the litter patient decontamination area. Two suggested techniques are described below:

- The litter transfer can occur as previously described at the litter patient decontamination area. Important points are—
 - The clean litter would be provided by staff on the clean side of the hot line and the dirty litter would remain on the dirty side of the hot line and brought to the dirty side litter cleaning area, once it is removed.
 - As the patient is lifted, a member of the clean side team places a blanket, if available, on the litter.
 - The patient is then laid on the blanket and wrapped in it. The blanket is used to warm the patient.
- Once the litter transfer is completed by the decontamination team, they step out of the shuffle pit. Then members from the receiving team, on the clean side of the hot line, step in to the shuffle pit and move the patient and litter to the clean side triage area or into the MTF. Now that their job is done, the decontamination team members drink water from their canteens (while remaining in MOPP Level 4) and move back to the litter lane. If a rest break is indicated they do not go across the hot line to the clean side, but instead they report to the warm side rest area and remain in full ensemble. Once rested, the decontamination team members are rotated back to the litter decontamination area.

CAUTION

Before decontaminating another patient, each decontamination team member drinks approximately one-half quart of water. The exact amount of water consumed is increased or decreased according to the temperature but should not exceed 12 quarts a day.

Roller System

5-317. Once decontaminated, the patient is transferred from the roller system litter or backboard to a clean litter at the hot line. The roller system litter is then sent back through the decontamination tent and washed down. Once on the clean litter, the patient is moved to the MTF or to a clean ambulance.

Note. Potentially contaminated backboards and litters must be rotated on the dirty side of the hot line. Clean litters are rotated and remain on the clean side of the hot line.

MOVEMENT OF THE PATIENT ON THE CLEAN SIDE OF THE HOT LINE

5-318. This section discusses movement procedures of patients in the clean side of the hot line.

Minimal Equipment

5-319. The patient's mask remains on the patient until he crosses the VCL where there is no vapor hazard.

5-320. The patient is moved by the reception team to the treatment and triage area on the clean side of the hot line. They are then moved to a clean ambulance for transport to the MTF or carried directly into the MTF if the decontamination line is collocated with the MTF.

5-321. A litter decontamination area is established on the dirty side of the hot line. Dirty litters are rotated for use on the dirty side only and are not brought across the hot line to the clean side. Clean side litters do not need to be decontaminated as they are only rotated on the clean side of the hot line.

5-322. In the event of CW or BW agent contamination, augmentees decontaminate decontaminable (plastic mesh) litters by scrubbing with a 5 percent chlorine solution over the entire surface of the litter including the handles. They then should allow the litter to dry for 10 minutes and then rinse it with water. This wait time will allow the solution to neutralize any chemical agent on the litter.

5-323. If canvas litters are used, the augmentees will remove any barrier materials (plastic sheeting) used to protect the wooden handles and canvas cover and place these materials in a contaminated trash bag. If the barrier material is in short supply, the plastic sheeting can be scrubbed with 5 percent chlorine solution, allowed to dry for 10 minutes, and then rinsed with water. The canvas litter handles will be wiped with a 5 percent chlorine solution. Do not use the chlorine solution directly on the canvas as it will destroy the material. Contaminated canvas litters cannot be thoroughly decontaminated as the wood and canvas will absorb chemical agents.

5-324. When not decontaminating a litter, two of the augmentees will transport the contaminated waste to the dirty dump.

Roller System

5-325. Once the decontamination process is complete and the patient is transferred to a clean litter, the patient is then moved across the hot line. The hot line is located at or near the clean end of the roller system.

5-326. A shuffle pit is NOT required for a roller system as team members remain at their roller system stations and are not traveling from the triage area to the hot line.

Note. The decontamination team members assume MOPP Level 4 or OSHA Level C with protective aprons to keep the protective ensemble dry during decontamination. They remain on the dirty side of the hot line and do not cross to the clean side of the hot line unless their protective overgarments are removed. The receiving team members also wear MOPP Level 4 or OSHA Level C but they do not wear protective aprons. Direct physical contact between the decontamination team and receiving team should be minimized to further reduce any risk of cross contamination.

MOVING AN AMBULATORY PATIENT THROUGH PATIENT DECONTAMINATION

5-327. The step-by-step procedure outlined below is the prescribed procedures for decontaminating an ambulatory patient, but it is by no means the only method. Following this procedure ensures that the correct steps are not omitted. The focus must be to carefully remove the overgarment so that any cross contamination from the protective ensemble to the patient's skin is prevented.

Minimal Equipment

5-328. The RSDL or soap and water solution are used for chemical decontamination on the skin. The least desired alternative for skin decontamination is 0.5 percent chlorine solution. The 0.5 percent chlorine solution if used for skin decontamination, will irritate and burn the skin, allowing agents to enter the skin more rapidly.

5-329. The M295 Equipment Decontamination Kit is used to remove obvious contamination from the protective ensemble and equipment and to help control the spread of contamination from it to other areas. If it is not available, then either soap and water solution, 5 percent chlorine solution or a field-expedient adsorbent material, such as clean dry earth or flour, can be substituted.

Roller System

5-330. Soap and water is the decontaminant used in a shower based decontamination system. The M295 or 5 percent chlorine solution can be used to decontaminate the mask prior to overgarment removal.

5-331. The shower line is composed of three stations—

- Undressing area.
- Shower area.
- Final check area (contamination levels can be checked depending on particular Service policy). In this area, the patient dries himself and dons a disposable garment, blanket, or sheet.

5-332. Minimal staffing is required for the ambulatory patient line as the patients can usually assist one another. A minimum of one medical person is needed to help those with medical conditions and an augmentee to direct traffic flow.

5-333. Patients are directed through the process and are observed by the medical personnel or augmentee to ensure that they wash from the head down, cleaning all areas of their body, and spending approximately 2 to 5 minutes washing.

5-334. Patient time in the showers should be limited to 5 minutes to conserve water and limit wastewater volume as it must be collected in the wastewater bladder.

Prior to Ambulatory Patient Decontamination

5-335. Physically remove gross contamination as follows:

- Use any stiff material (such as stick, cardboard, plastic strip, or metal banding strap) to physically remove gross chemical contamination from the patient's protective ensemble. Much of the CW agent contamination can be removed through physical means.
- Contaminated dust and dry biological and radiological contamination should carefully be dusted or vacuumed (using a vacuum with a high efficiency particulate air filter, if available) from the overgarment. The patient is then moved out of this *dust off* area while still in the protective ensemble. The *dust off* area must be far downwind from the drop-off point so that dust that might be blown into the air does not contaminate other areas of the PDS. Every effort should be made to keep aerosolized dust to a minimum.

5-336. The patient is then directed to the triage area where triage is performed.

5-337. From the triage area, the patient is directed to the appropriate warm-side medical treatment area. Once treated the patient may be returned to his unit without undergoing decontamination, moved to the dirty evacuation area, or directed to the ambulatory lane of the PDS/decontamination tent if further treatment is

required on the clean side of the hot line at this particular MTF. If directed to the ambulatory lane the patient will move to that lane and await clothing removal and decontamination.

PROCESSING THROUGH THE AMBULATORY DECONTAMINATION LINE

5-338. This section discusses procedures for processing patients through the ambulatory decontamination line.

Minimal Equipment

5-339. Remove mask hood, overgarment, and overboots.

5-340. Replace any contaminated bandages and tourniquets. This is only performed by medical personnel (combat medic/corpsmen/Air Force medics or medical provider).

5-341. At this time (the patient is only wearing combat boots and protective mask), the patient is monitored for contamination. Use chemical agent detector/monitor or detector paper to monitor for chemical agents and a handheld survey equipment/detector for radiological contaminants. Check all areas of the patient's body, mask, and combat boots. Pay particular attention to—

- Combat boots.
- Protective mask.
- Bandages and splints.
- Hair and neck area.
- Wrist and ankle areas.

5-342. If no contamination is found then send the patient to the hot line.

5-343. If contaminated skin areas are found then decontaminate using RSDL or soap and water.

5-344. Check all personal items that were removed from the patient and placed in a self-sealing plastic bag by using the appropriate detector inside the bag opening. If the items are not contaminated, have the patient bring them through the decontamination line. If they are contaminated, then ensure that the bag is marked with the patient's name and the bag and its contents are placed in a secure holding area for decontamination or proper disposal.

Note. The patient remains in his protective mask until he cross the VCL.

Movement Across the Hot Line

5-345. Process the patient as quickly as possible across the hot line.

5-346. The augmentee instructs the patient to move across the shuffle pit/hot line.

5-347. The patient shuffles/moves through the shuffle pit wearing his combat boots.

Note. The ambulatory patient shuffle pit should be wide enough for the ambulatory patient and one augmentee.

5-348. An augmentee from the clean side meets the patient and opens a blanket or other covering for the patient (appropriate for the environmental conditions). Once across the VCL, the ambulatory patient removes his mask.

5-349. In the clean treatment area, the patient is retriaged, treated, and evacuated.

Note. In a hot climate, the patient will probably be significantly dehydrated; the rehydration process must begin immediately.

5-350. Overhead cover should be provided for casualties in the clean side holding area.

Roller System

5-351. The actions in the undressing, shower, and final check areas are discussed in this section.

Actions in the Undressing Area

5-352. Patient undressing can be performed just outside the ambulatory lane of the shower tent if adequate room is not available inside the tent as follows:

- The patient's mask is decontaminated, but remains on the patient. The filter inlet should be covered lightly to prevent moisture from entering the filter canister.
- The patient's overgarments (to include boots) and undergarments are cut off or removed and placed in a contaminated trash bag located near the entrance to the tent.
- Once nude but still masked, the patient is directed to the shower area.

Actions in the Shower Area

5-353. The patient enters the shower area with no clothes or boots/shoes on.

5-354. The patient is given a maximum of 5 minutes to thoroughly wash and rinse his body.

5-355. The patient is directed to soap up their body, starting with the hair. The decontamination team member must bend the patient's head backwards so that run-off water from his hair does not get in the eyes. They then soap and wash the patient quickly from head to foot (approximately 3 minutes) including skin folds such as the arm pits and groin. If available they should be given a paper wash cloth or sponge to help scrub the body.

5-356. The patient is then directed to rinse (approximately 2 minutes).

Note. Replacement of any contaminated bandages and tourniquets is only performed by medical personnel.

Actions in the Final Check Area

5-357. After washing and rinsing, the patient moves to the final check area in the tent. Depending on the particular Service CONOPS/SOP, the patient can be checked for thoroughness of decontamination using a chemical agent detector/monitor or detector paper for chemical exposure or a handheld survey equipment/detector for radioactive particle exposure.

5-358. Once washed and rinsed, the patient is given assistance to dry if they are having difficulty. They can then don a disposable garment, blanket, or sheet.

5-359. If time allows, check all personal items that were removed from the patient and placed in a self-sealing plastic bag. This is performed by using the appropriate detector inside the bag opening. If the items are not contaminated, have the patient bring them through the decontamination line. If they are contaminated, ensure that the bag is marked with the patient's name and they are placed in a secure holding area for decontamination or proper disposal.

5-360. A member of the decontamination team removes the bagged TCCC card and holds it so that a medical person on the clean side of the hot line can read it and transfer the information to a clean TCCC card. Information such as type of injury, treatment given, or time/type of exposure must be transcribed to the clean TCCC card. After transcribing the information, the clean side medical personnel attaches the new TCCC card using the card wire to the patient's mask harness before the patient crosses the hot line to the clean area. The old TCCC card is disposed of in a contaminated trash bag on the dirty side of the hot line.

Note. The patient remains in their protective mask until they cross the VCL which is located outside of the decontamination tent and beyond the hot line.

5-361. A decontamination team member instructs the patient to move out of the tent and across the hot line (which is located at the immediate rear of the tent). With a shower system, a shuffle pit is not needed as contamination is contained within the tent.

PROCEDURES FOR CLOSING DOWN A PATIENT DECONTAMINATION SITE

5-362. Once all patients have been processed through the PDS, the OIC will direct the team members to close down the PDS or disestablish it if it needs to be moved to a new location. The closure of the PDS will pose challenges due, in large part, to the fatigued condition of the PDS personnel. During PDS closure, it is critical that PDS personnel maintain adequate water intake so that workers do not become dehydrated.

5-363. Medical team members from the triage area will begin PDS closure procedures first, as their portion of the process ends first. They consolidate unused, but uncontaminated, medical supplies and place them in their appropriate containers/boxes. These must be checked with the appropriate monitoring device before consolidation so that other supplies are not cross contaminated. All waste materials are placed in contaminated trash bags and sealed by double knotting the necks of the bags. The bags are then transported to the dirty dump. The drop-off point personnel will also assist with this effort. Any contaminated medical supplies that cannot be decontaminated will be placed in the contaminated trash bags and discarded in the dirty dump.

5-364. Supplies and equipment that can be decontaminated will be sent through the decontamination line either on a backboard or litter. If the PDS is not going to be relocated, these items can be stored in the shade on the warm side of the hot line after they have been decontaminated.

5-365. All cutting devices are allowed to sit in a bucket of 5 percent chlorine solution (if chemical or biological agents were encountered) for 30 minutes and then rinsed thoroughly if they are to be reused. If radiological contamination was encountered, cutting tools only need to be rinsed thoroughly. Blades are then replaced if they are to be reused. Dull bandage scissors or other cutting devices are bagged with other waste and sent to the dirty dump.

5-366. Any weapons or patient personal affects which have not been decontaminated by this time are decontaminated, checked for contamination, and passed across the hot line. Personal effects that cannot be decontaminated, such as paper items, are also placed in the contaminated trash bags and disposed of in the dirty dump.

5-367. Once all supplies and equipment have been stored and washed then the inside walls of the roller system decontamination tent should be sprayed down with soapy water and then rinsed.

5-368. Arrangements are made to have the water containers topped off and the wastewater containment neutralized and emptied or properly disposed of.

5-369. See Table 5-11 for equipment needed for the closure of a PDS.

Table 5-11. Equipment and supplies required for the closure/disestablishment of a patient decontamination site

<i>Equipment and supplies</i>	<i>Per lane</i>	<i>Per lane</i>
	<i>Minimal</i>	<i>Roller system</i>
Large trash bags for contaminated waste	As needed	As needed
A slurry mixture of hypochlorite or a 5 percent chlorine solution (in buckets) (See Appendix B of this publication.)	As needed	
Pails/buckets for hypochlorite slurry or chlorine solution	2 to 4	2 to 4
Pails/buckets for rinse water	2 to 4	
Sponges or rags	2 or more as needed	
Butyl rubber toxicological agents protective aprons	As needed	
Entrenching tools	2 to 4	

EQUIPMENT AND SUPPLY RECOVERY

5-370. If the agent was chemical or biological, prepare the slurry mixture or 5 percent chlorine solution and place them in pails/buckets. The calcium hypochlorite is prepared with one part calcium hypochlorite to two parts water. If the agent was radiological then a soap and water mixture is more appropriate. For more information on calcium hypochlorite (68 percent) calculation, refer to Table 5-12.

Table 5-12. Calcium hypochlorite (68 percent) calculation to make 5 percent available chlorine solution

<i>Gallon(s) of Water</i>	<i>Calcium hypochlorite (pounds)</i>
1	0.612
2	1.225
3	1.837
4	2.449
5	3.062
6	3.674
7	4.286
8	4.899
9	5.511
10	6.123

5-371. If the PDS is to be disestablished and moved to another area, then move all large equipment to an equipment decontamination area about 50 meters to the side of the decontamination lanes.

5-372. If the PDS is to remain in the same place, then keep equipment except for high value items such as the chemical agent detector/monitor and medical supplies in place and scrub them down in place. They must also be checked to ensure they are free from contamination.

5-373. The 5 percent chlorine solution is allowed to remain in contact with the equipment for 30 minutes. After 30 minutes the items are then flushed with clean water. For radiological contamination no wait time is required and soap and water is used.

5-374. After each item has been scrubbed and flushed, then it is checked carefully with the appropriate monitoring device. No detector is yet available that will give rapid enough results so that the site can be closed within a short amount of time. The surface of these items should be monitored with special attention to cracks, joints and seams, bolts, porous material, and any openings in the equipment.

5-375. While waiting for the 30 minute contact time to occur, do the following tasks:

- All waste items (for example, contaminated medical supplies, dirty bandages, garments cut off the patients, patient mask carriers, used sponges, dull scissors and cutting blades) are placed in contaminated trash bags and taken to the dirty dump.
- Unused, uncontaminated, medical supplies are monitored for contamination and if clean are placed into a covered or metal container. The outside of the container is decontaminated and rinsed. These are then positioned for movement across the hot line when determined to be free of contamination.
- Any items in the weapons and contaminated personal effects storage area are decontaminated and moved across the hot line. Personal effects that cannot be decontaminated, such as paper items, are disposed of in the dirty dump.
- In the PDS with minimal equipment, the shuffle pits are camouflaged and covered with dirt.
- The dirty dump is backfilled with dirt. A small section of the dump is left open for disposal of bagged PDS personnel overgarments. The dump is marked with the NATO CBRN marking set.
- Personnel conduct a thorough police call of the PDS area.

Note. A thorough police call, camouflage, and cleanup is conducted to reduce hazards.

5-376. Any equipment or supply item that is to be passed across the hot line to the clean side must be checked for contamination using the appropriate monitors.

DECONTAMINATION TEAM PERSONNEL RECOVERY (TECHNICAL DECONTAMINATION)

5-377. Technical decontamination refers to the deliberate decontamination of responders/PDS personnel and their equipment. Technical decontamination is conducted with the emphasis on deactivation/neutralization of the agent with speed not being a factor. Terms that are commonly associated with technical decontamination are detailed, deliberate, and responder decontamination.

5-378. Once equipment and supply recovery is accomplished, then all PDS personnel will conduct technical decontamination, except for two individuals.

Note. It is strongly suggested that the remaining two individuals be detailed from those who have been working on the clean side of the hot line.

5-379. The PDS NCOIC/OIC will select a technical decontamination location/station.

5-380. All PDS detailed personnel will perform technical decontamination and the two remaining personnel will put all discarded protective overgarments, gloves, liners, and boots into designated contaminated trash bags and place them in the dirty dump. If possible, boots should be decontaminated and reused.

5-381. Once items have been placed in the dirty dump, the two remaining individuals will complete back fill or complete camouflage of the dirty dump and complete marking of the dirty dump with the NATO CBRN marking set. They will then move back to the hot line and perform technical decontamination. Their sets of protective ensemble are placed in contaminated trash bags and left in place and camouflaged. If the site is to be used later, then the next team to operate it can place these two discarded protective ensembles in the dirty dump.

5-382. Higher headquarters must be notified of the location of the dirty dump. This can be done through a CBRN 5 report. Every effort should be made to have engineers in protective ensemble to cover the dirty dump using their heavy equipment if the PDS is relocating or the dump is full and a new one needs to be dug. The area must be marked so friendly forces will not use it and if the tactical situation allows, it should be guarded to prevent local nationals from scavenging the dirty dump.

ESTABLISHING A PATIENT DECONTAMINATION STATION ON A SHIP OR LARGE WATERCRAFT

5-383. This section provides procedures for receiving, decontaminating, and monitoring limited numbers of patients who have been exposed to CBRN agents and subsequently transferred on to a naval vessel, a hospital ship (T-AH), or another ship or large watercraft of opportunity. Information is compiled from NTTP 3-20.31/CGTTP 3-20.31 and FM 3-11.5/MCWP 3-37.3/NTTP 3-11.26/AFTTP(I) 3-2.60.

Shipboard Decontamination of Ground Force Personnel

5-384. In general, the best approach to decontaminating contaminated ground force personnel is to provide them with support and a suitable location to execute their standard decontamination and change out procedures on land before transport to a ship. Ideally, all patients should be thoroughly decontaminated before they are transported to a ship, but this may not always be possible due to their critical medical condition or the operational situation ashore. Some casualties may need to be evacuated *dirty* by watercraft or rotary-wing aircraft after undergoing only operational decontamination. It is assumed that the steps of gross decontamination to remove liquid or solid contamination (patient operational decontamination) have been applied before casualties are transported to a ship.

WARNING

Immediate (gross) and operational decontamination procedures for contaminated ground force personnel are not adequate to allow them to enter inside a ship. Individuals must have undergone thorough decontamination to avoid contaminating the ship and others aboard.

5-385. The PDS designated in USN naval ships' technical manuals as the contaminated triage area acts as a transition area allowing contaminated clothing removal, skin decontamination, and chemical agent monitoring to take place in the a semi-protected area on deck without releasing contaminants into the ship's ventilation system. Both ambulatory and nonambulatory contaminated injured personnel are processed in this designated area for any further required gross decontamination.

Ship Ventilation Considerations

5-386. Prior to receiving contaminated patients via helicopter, the ship is steered into the wind. This is necessary because the main air intakes of the ships' ventilation systems are generally not filtered and are typically located forward of deck areas where decontamination operations are normally conducted. The intent is to keep any airborne contamination associated with decontamination procedures on deck from being drawn into the ship's ventilation system.

Oxygen Generation Station

5-387. If so equipped, compressors in the oxygen generation station, located immediately aft of the flight deck, must be turned off during the decontamination operation and remain off for a period of one-half hour after the decontamination operations end. The ventilation system of the flight deck decontamination station maintains the entry passageway at a negative pressure and provides a flow of clean air from the elevator passageway, through the decontamination compartments, and out an exhaust fan in the entry passageway. The vents are sized for proper flow velocity to prevent the release of airborne contaminants to the rest of the ship.

WARNING

On vessels so equipped, the exhaust fan overhead in the passageway must be operating for decontamination operations and for using the shipboard contaminated triage area/PDS for screening/holding patients who may have infectious diseases. The airflow induced by this fan is critical to contamination containment. This fan is not used during other operations.

Control of Doors

5-388. At no time should two doors of the same compartment be opened simultaneously, nor should the forward and aft doors of the airlock in an entry passageway be opened simultaneously when processing contaminated patients. Failing to observe this precaution will result in an interruption of the airflow and possible release of contaminants. On vessels so equipped, doors leading into elevator passageways are controlled by the decontamination team in the compartments adjacent to the passageway and should be opened only when the chemical agent detector/monitor indicates it is safe to do so.

Communication

5-389. Doors should be opened only for movement of patients. Communication among the compartments should be made with radios, an intercom system, or by writing notes (such as a grease pencil on writing board) visible through the windows between compartments.

Monitoring of Contamination

5-390. Chemical agent detectors/monitors are employed by shipboard monitoring station personnel to ensure that the patient are free of chemical contaminants before being moved inside the ship. A secondary use of the chemical agent detector/monitor is to monitor decontamination team personnel, equipment, and the area of the flight deck used for decontamination after the processing is completed. A handheld ionizing radiation survey equipment/detector with a pancake head is used to monitor patients potentially contaminated with radioactive particles. There is currently no device available to readily monitor biological contaminants.

Heat Stress

5-391. The decontamination team members must recognize the potential for heat injury when wearing their protective clothing for extended periods. Compartments may become warm during decontamination operations and the team leader must ensure that members drink liquids before, during, and after the operations. Canteens or camelbacks with drink tubes should be placed in the compartments to allow team members to drink through the mask during the operations.

ACTIONS TO TAKE PRIOR TO ARRIVAL OF PATIENTS ON A SHIP

5-392. Immediately upon notification that contaminated patients are to be received, the ship's engineer, or his damage control assistant if assigned, activates ventilation systems located in the vicinity of the ship's designated contaminated triage area and ensures that all other general ship preparations are being made for receipt of contaminated patients (windward direction and securing the oxygen generation station).

Prepare the Ship for Receiving Contaminated Patients

5-393. Other recommended preparations of the decontamination facility prior to arrival of contaminated casualties include—

- Under the guidance of the ship's engineer, open or close as necessary room and passageway ducts and dampers to provide maximum ventilation to all spaces used during the decontamination procedures so that any off gassed chemicals present on incoming casualties are expelled from these working spaces as quickly as possible.
- Check to ensure that supplies and equipment specified below are available in each compartment.
- Check that floor drains in the decontamination compartments are open and unclogged.
- Close all doors of the decontamination station.

Chemical Agent Monitors

5-394. If so equipped, turn on chemical agent detectors/monitors in vapor hazard areas if the agent is unknown or chemical agent contamination is suspected. Once the chemical agent detectors/monitors are warmed up, perform confidence checks on each chemical agent detector/monitor per their technical manual.

Decontaminant

5-395. Prepare pails/buckets of decontaminant. Each station will have pails/buckets filled with 5 percent chlorine solution (for cutting tools and to wipe down equipment) or soap and water mixture (to use on patient's skin). The pails/buckets must be color coded (for example, orange or red for hypochlorite

mixtures and a more subtle color for the soap and water mixture). This will help team members to distinguish the contents. The pails/buckets of the two solutions should be allocated as follows:

- Flight deck- two pails/buckets per station/one 5 percent chlorine solution and one soap and water (maximum 6 pails).
- Skin decontamination compartment- two pails/buckets per compartment—one 5 percent chlorine solution and one soap and water.
- Monitoring compartment- one pail/bucket per compartment—soap and water solution.

5-396. Position the supplies and equipment inside the entry passageway. It will not be taken onto the flight deck until the flight deck director so directs. There are two types of cutting instruments that should be used: the medical strap cutter or similar long handled seat belt cutting tool will be used for rapidly cutting most areas of the garments. The blades of these knives should be checked for sharpness before the operation and be replaced as necessary. The bandage scissors will be used to cut shoelaces, hoods, and other areas not appropriate for the medical strap cutter. The team leader will ensure that these supplies and those listed for each compartment are in place.

5-397. Wet the flight deck. To minimize the possibility of agent absorption into the surface of the flight deck, pre-wet the flight deck (from the entrance of the decontamination station to 15 feet aft of the yellow line) with the fire hose 5 to 10 minutes before the contaminated patients arrive by helicopter.

Prepare the Decontamination Team and Flight Deck Personnel

5-398. Overgarments and protective masks of the decontamination team should be stored in a readily accessible area and should be marked with the name of each team member for rapid access.

5-399. The flight deck personnel will wear the protective mask and protective gloves when supporting the landing and takeoff of the helicopter and when transporting the patient to the deck area forward of the yellow line.

5-400. Decontamination team members should be fully dressed in their protective ensemble (MOPP Level 4) by the time the helicopter lands on the deck or any watercraft carrying contaminated casualties docks with the ship. Those who are to perform procedures on the flight deck will wait in the entry passageway. Mask carriers will not be worn but will be left inside the decontamination station. All personnel will wear voice amplifiers on their protective masks. They will check that each amplifier has a working battery installed before operations begin.

5-401. The ship's engineer, or his damage control assistant if assigned, checks each team member to ensure that the mask and protective clothing are donned and fitted properly.

5-402. The medical officer assigned to oversee operations within the designated contaminated triage area wears a white band with red cross on the left arm. Each team member will wear a strip of tape on the front of the uniform with his name marked on it.

5-403. All other ship's personnel will remain inside enclosed areas of the ship during and for one half hour after the end of decontamination operations.

5-404. When not setting up the decontamination site, team members can receive additional *hip pocket* or just-in-time training on such topics as: basic medical signs and symptoms of chemical agents; safe patient litter transfer techniques; roles and responsibilities; the use of detection devices; correct litter patient lift techniques; the importance of work rest cycles; and prevention of heat injuries.

5-405. Table 5-13 on page 5-64 is an example of minimal staffing for one work cycle of the operation of a contaminated triage area on a ship. More individuals are needed to ensure adequate work/rest cycle rotation.

Table 5-13. Minimal staffing for one work cycle at a patient decontamination site on a ship

<i>Job</i>	<i>Per lane</i>	<i>For three lanes</i>
Command and control cell		
Officer in charge	1	1
Master at arms – May also serve as safety officer, or another individual can be designated. The master at arms also performs pat-down search and secures ordnance, and personal affects.	1	1
On Deck Arrival Point		
Augmentees to remove litters (1 team of 4).	4	12
Primary triage officer (physician, physician assistant, nurse, or senior corpsman).	1	1
Corpsman to administer treatment.	1	3
Augmentees to perform protective overgarment cut-off procedures. They wear toxicological agents protective aprons.	2	6
First Compartment Decontamination Area		
Augmentees who cut off underclothing and decontaminate the patient. They wear toxicological agents protective aprons.	4	12
Corpsman	1	3
Second Compartment Contamination Check Area		
Augmentee trained to use various contamination check tools.	1	3
Corpsman.	1	3
Hot Line Patient Reception		
Augmentees to move litter patient out of second compartment across hot line.	2	6
Corpsman on clean side of hot line outside second compartment.	1	3
Total medical	5	13
Total augmentees, others	15	41
Total personnel for one work cycle	20	54

PROCEDURES TO BE PERFORMED ON THE FLIGHT DECK

5-406. Equipment should be staged in the entry passageway. When the helicopter landing operation is complete and the patients have been checked for ordnance, take the equipment onto the flight deck and position the pails/buckets of decontamination solution containing scissors and long handled seat belt cutters at the yellow line near the entrance to the decontamination station. (Up to three stations are set up, one station for each patient requiring decontamination so that three patients can be processed simultaneously.)

5-407. Tables 5-14 and 5-15 list recommended quantities of equipment and supplies required for each compartment of the shipboard decontamination process.

Table 5-14. Equipment and supplies required for patient decontamination procedures conducted on the flight deck

Equipment and supplies	Per lane	For three lanes
Trash can with trash bag insert (extra bags placed beneath first bag).	1	3
Pail/bucket of decontamination (5 percent chlorine solution) (See Appendix B of this publication.)	1	3
Pail/bucket of decontamination (soap and water) solution.	1	3
Containers of bleach.	2	6
Measuring cup for dilution of bleach.	1	3
Bandage scissors (minimum, more are needed as they dull).	2	6
Long-handled seat belt cutter (minimum, more are needed as they dull).	2	6
Self-sealing plastic bags (box) for field medical cards.	2	6
Sponges.	2	6
Decontamination toxicological agents protective apron.	4	12
Self-sealing plastic bags (for personal effects).	One per Patient	
Canteens of water (in compartment).	4	12
Sharps container.	1	3
Pad of paper and ballpoint pen.	1	3
Field medical cards	1	3
Clock or timer for 10 minute dwell time.	1	3
Felt marker/grease pencil with writing board (for communicating through window).	1	3
Blanket/sheet	6	18

Table 5-15. Equipment and supplies required for patient decontamination procedures conducted in first compartment

Equipment and supplies	Per lane	For three lanes
Trash can with trash bag insert (extra bags placed beneath first bag).	1	3
Pail/bucket of decontamination (5 percent chlorine solution) (See Appendix B of this publication.)	1	3
Pail/bucket of decontamination (soap and water) solution.	1	3
Containers of bleach.	2	6
Measuring cup for dilution of bleach.	1	3
Bandage scissors (minimum, more are needed as they dull).	2	6
Long-handled seat belt cutter (minimum, more are needed as they dull).	2	6
Self-sealing plastic bags (box) for field medical cards.	2	6
Sponges.	2	6
Decontamination toxicological agents protective apron.	4	12
Self-sealing plastic bags (for personal effects).	One per Patient	
Canteens of water (in compartment).	4	12
Sharps container.	1	3
Pad of paper and ballpoint pen.	1	3
Clock or timer for 10 minute dwell time.	1	3
Felt marker/grease pencil with writing board (for communicating through window).	1	3

MOVING A LITTER PATIENT THROUGH A PATIENT DECONTAMINATION STATION ON A SHIP

5-408. Contaminated patients are initially processed in the open air of the flight deck where they are triaged and outer clothing is removed. The patients are then brought to the first compartment where inner clothing is removed and decontamination takes place. They are then taken to the second compartment where contamination monitoring is performed and the patient is brought inside the ship.

5-409. The flight deck personnel carry the patient from the helicopter across the yellow line and secure the litter on the deck. They return a folded clean litter (obtained from the ramp area) to the helicopter immediately, leaving the contaminated litter to be decontaminated and retained on the ship.

5-410. The master at arms removes all battle dress items, ordnance, and weapons. Weapons should be secured outside the skin of the ship or within the entry passageway of the decontamination station until they can be monitored to determine that they are free of contamination.

5-411. The medical officer performs triage once ordnance is cleared. All procedures on the flight deck are done with litters resting on the deck. Litter stands will *not* be used.

On Deck Procedures Removing the Litter Patient's Protective Ensemble

5-412. Clothing removal procedures are based upon the assumption that patients arrive on ship wearing protective mask, overgarment, gloves, and overboots.

Note. If the patient does not have a complete protective ensemble, the processing will be performed in the same order specified; removal of outer layer of clothing followed by inner layer of clothing. If the patient has no protective mask, he should be positioned with his head toward the bow of the ship, into the wind, while his clothing is removed on the flight deck.

5-413. Remove the patient's personal articles from pockets. Place all items in a plastic bag for later decontamination or destruction. Label the bags with the patient's name and last four of Service member's social security number (information will be written on a 3 x 5-inch card or piece of paper and then the card will be placed into the plastic bag). Seal the bags then wipe with 5 percent chlorine solution. These sealed bags are then secured in an area outside the skin of the ship until the items can be decontaminated in a 5 percent chlorine solution, rinsed, dried, and rechecked for contamination. Nondecontaminable items are inventoried and destroyed. Decontaminated items that are determined to be contamination free are bagged and eventually returned to the patient.

5-414. Remove mask hood (if worn) and outer protective ensemble garments for litter. Then perform a litter transfer to place the patient wearing their inner garments (for example, work/duty uniform) and protective mask on a clean litter.

5-415. Patient lifts are performed with the litters on deck, not on litter stands. To do this, the patient's outer protective garments are removed and are lying under the patient on the litter. The patient is log rolled to the side. A clean litter is placed on top of the cut off clothing along the patient's back. The patient is then rolled back on to the clean litter. The litter containing the contaminated clothing is taken to the first compartment to be washed and the contaminated garments are bagged on the deck.

5-416. Procedures on the deck require four personnel with at least one nurse or medical corpsman per lane. Up to three lanes can be established for the concurrent processing of patients. Personnel are at MOPP Level 4 with decontamination TAP aprons and a voice amplifier on the mask.

5-417. Decontamination aprons are worn so that team members can decontaminate themselves before lifting the patient and also to keep the knees of their protective overgarment dry if they must kneel on the deck. Decontaminate TAP aprons and gloves between each patient.

Note. All transfer techniques should be practiced by the decontamination team using personnel or weighted mannequins. These transfer techniques will need to be modified based on the injuries of the patient.

CAUTION

Bandages may have been applied to control severe bleeding and are treated like tourniquets. Only medical personnel remove bandages, tourniquets, and splints. Cut around bandages during clothing removal. Bandages should remain on the patient until the skin decontamination station.

5-418. Decontamination team members on the flight deck gather contaminated equipment, clothing, and other items placing them in a contaminated trash bag for removal. They decontaminate their rubber gloves in preparation for the next patient.

5-419. Once all patients have been taken inside the ship, all equipment and decontamination supplies are moved to a secure yet quickly accessible location such as inside the first set of doors of the entrance passageway. The handles of the doors leading into the decontamination station are also decontaminated. Outer garments from the patients are gathered up, along with discarded bandages, and are placed in designated contaminated trash bags. These bags are secured temporarily in the passageway so that helicopter operations can resume. Cutting teams decontaminate their own gloves, aprons, hoods, and masks.

5-420. Decontamination team members must take frequent water breaks.

Procedures to be Performed in First Compartment (Liquid Hazard Area)

5-421. Remove inner garments to the skin and decontaminate the skin. This requires four personnel with at least one nurse per compartment. Up to three lanes may be established per compartment for the simultaneous processing of patients. Personnel are at MOPP Level 4 with decontamination TAP aprons and a voice amplifier on the mask.

Prepare for Decontamination Operations

5-422. All cutters decontaminate their gloves, scissors, and stainless steel work tables (work stands) with decontamination solution. All clothing from the previous patient is bagged and ready for return to the entry passageway.

5-423. Flight deck team leader passes patient's treatment status and injuries to the leader of team in first compartment.

5-424. The patient remains on the *clean* decontaminable litter as it is placed on the stainless steel table in the first compartment. Doors to the compartment should remain closed.

Remove Patient's Uniform

5-425. Decontamination personnel dip their gloves in the 5 percent chlorine solution.

5-426. Remove the patient's personal effects from his uniform pockets. Place these in the plastic bag. Reseal the bag. If the articles are not contaminated, return them to the patient. If the articles are contaminated, place them in the contaminated holding area until they can be decontaminated and returned to the patient.

5-427. Remove uniforms and undergarments. Removal of IV bags and tubing is at the discretion of the medical director of decontamination. The IV lines should be protected during patient litter transfer. Clean wounds as discussed earlier in the chapter. Old tourniquets, bandages, and splints are bagged with contaminated clothing. Seal the bag.

Decontaminate the Skin, Hair, and Litter

5-428. Sponge soap and water over the patient's body including hair, as the hair readily absorbs agent if it is exposed to agent vapor. Exercise care not to get decontaminant in the patient's eyes (if they are not wearing their mask). Log roll the patient to one side to apply the decontaminant to the patient's back. Apply the

decontaminant thoroughly to the litter while the patient is rolled to the side. Rinse the patient and litter completely with the spray device.

Transfer the Patient to the Second Decontamination Compartment (Vapor Hazard Area)

5-429. A complete purge of airborne contaminants in the first decontamination compartment must occur before the door to the next decontamination compartment is opened. The decontamination team members must also check to see that the second stage decontamination compartment is ready (outer door closed and compartment not occupied by another patient) before opening the door and passing the patient into the next compartment.

CAUTION

All decontamination team members must ensure that a complete purge of the airborne contaminants in each decontamination compartment has occurred before the door to the next decontamination stage is opened. The ship's engineer should be able to specify the minimum time required for a complete purge cycle to occur in each decontamination compartment on the individual ship.

5-430. The bagged and sealed patient's discarded clothing is passed back to the entrance passageway only after the patient has been taken to the next compartment and the door has been closed.

5-431. Once the door is opened to the monitoring compartment, pass the patients on their litters to that compartment.

5-432. Decontamination team members wipe down their TAP aprons starting from the top and working down using the 0.5 chlorine solution or soap and water. They also wash their gloves with 5 percent chlorine solution and ensure all cutting tools are placed in the bucket containing 5 percent chlorine solution. The steel table is also washed off with the 5 percent chlorine solution before the next patient enters.

PROCEDURES PERFORMED IN SECOND (MONITORING) COMPARTMENT (VAPOR HAZARD AREA)

5-433. This requires two personnel per compartment. Personnel are in mask only (voice amplifier on mask), with gloves (7-mil thickness) and apron.

Prepare for Monitoring Operations

5-434. Monitoring for chemical contamination is performed with a chemical agent detector/monitor and monitoring for radiological contamination is performed with the handheld survey equipment/detector (for example, dosimeters). There is no real-time monitoring capability for BW agents.

5-435. For CW agent monitoring, the chemical agent detector/monitor should be turned on as soon as the team is alerted that a chemically contaminated patient is to be received. It must be warmed up and cleared before it can be used effectively for monitoring.

5-436. Perform confidence checks in all modes. Also perform confidence checks after monitoring each patient.

- If the chemical agent detector/monitor is working properly, the confidence check should cause a response as described in the operator's manual.
- If not, try the confidence test again. If a minimum response is not obtained, the chemical agent detector/monitor should be replaced (or be operated for an extended period to improve its response).

5-437. If feasible, chemical agent detector/monitor should be operated on battery power so as not to restrict its movement around the patient. Monitoring should be initiated with fresh batteries to prevent interruptions.

Monitor the Patient and Personal Articles

5-438. Operate the chemical agent detector/monitor in each of its modes if the agent is unknown. If two chemical agent detectors are available, set one on one mode and one on a different mode and monitor both concurrently. If there is certainty of the type of agent the patient was exposed to (for example, based upon M8 detector paper readings prior to patients' arrival onboard the ship or the patient's medical signs and symptoms), monitor with multiple chemical agent detectors on the same mode if feasible. Monitor the—

- Service member.
- Litter, particularly the handles.
- Bag of personal effects.
- Tactical combat casualty care card.
- Identification tags.
- Intravenous bag and tubing.

5-439. Keep the chemical agent detector/monitor inlet about one half inch from the skin. The greater the distance, the less likely it is to respond to the contamination.

5-440. Move the chemical agent detector/monitor slowly over the surface; about 1 foot every 2 seconds and follow a pattern that ensures the person is monitored thoroughly.

5-441. As soon as any bar readings appear, pull the chemical agent detector/monitor away and/or put on cap.

5-442. Check first the areas that would most likely be contaminated: near wounds where the garment was broken and at the neck, ankles, and waist. Also monitor the areas that might adsorb agent vapor, such as the hair.

5-443. If contamination is found, stop monitoring and note the general location. Use the decontaminant to spot decontaminate where the chemical agent detector/monitor indicates there is contamination.

5-444. Replace the black cap on the chemical agent detector/monitor nozzle between patients, even though the display may be showing no bars.

5-445. Before switching channels (or turning off the chemical agent detector), always clear it by putting on the inlet cover and waiting for a zero bar reading.

Remove the Mask

5-446. Once monitoring is complete and there is no contamination present, remove the patient's mask. Place the mask in a small trash bag and close it by knotting the neck. This mask does not proceed into the ship's MTF with the patient.

5-447. After removing the mask, clean the face. Pass the bagged mask back to the previous compartment when the door is opened for the next patient to enter.

5-448. Once the patient has been completely decontaminated, transfer the patient out of the decontamination station and into the clean regions of the ship via subsequent airlock chambers. Cover the patient with a clean sheet and transport him to the clean staging area in the elevator passageway.

CAUTION

All decontamination team members must ensure that a complete purge of the airborne contaminants in each decontamination compartment has occurred before the door to the next decontamination stage is opened. The ship's engineer should be able to specify the minimum time required for a complete purge cycle to occur in each decontamination compartment on the individual ship.

PROCEDURES FOR DECONTAMINATING THE FACILITY AND THE DECONTAMINATION TEAM ON A SHIP

5-449. Once all patients have been processed through the decontamination station, ship's engineer, or his damage control assistant if assigned, will direct the team members in decontaminating themselves (technical decontamination), the decontamination station, and the flight deck.

5-450. Team members from the flight deck will begin decontaminating first, as their portion of the process ends first. The team members then apply 5 percent chlorine solution to areas of the flight deck upon which litters were placed during the processing. The team members place all discarded material in bags, seal them by double knotting the necks of the bags, and ensure all debris are removed from the flight deck. The team members then decontaminate scissors, long-handle seat belt cutting device, rescue knives, and aprons and place these reusable items in the entry passageway.

5-451. As soon as the last patient has been transported out of the first decontamination compartment (liquid hazard area), the team members in that compartment bag all discarded items, then decontaminate (with 5 percent chlorine solution) the patient table, cutting devices, bulkheads, and deck. These items and the room are then to be rinsed with water.

5-452. Team members from the flight deck then decontaminate their gloves and overboots and proceed into the entry passageway to remove overgarments. The team members will remove their overgarments in the passageway as follows:

- Using the buddy-method, each member will cut the back of the overgarment smock with a long-handle seat belt cutting device, or scissors. The overgarment jacket is cut upward from the waist through the hood or in the reverse direction. The overgarment is removed from the front. The overgarment arms are turned inside out as the smock is removed, roll the cut smock inside out, and place it in a contaminated trash bag.
- Each member then removes the overgarment trousers by cutting each leg from the back, starting at the ankle, and proceeding through the waist. The cut trousers are also to be sealed into contaminated trash bags.
- The team members of the first compartment decontaminate the exposed areas of their masks, aprons, overboots, and gloves in order. The team members then remove their TAP aprons and hang them up. The team members empty buckets of decontamination solution. Then remove their overgarments as described above. The team members remove overboots last and leave them in the room to aerate.

5-453. While still wearing mask and gloves, the team members place the bagged overgarments near the entrance to the compartment and proceed into the monitoring compartment to undergo a detector/monitor check.

5-454. Once the chemical agent detector/monitor shows they are clean, the team members remove their masks, then their gloves, leaving both in the compartment to aerate, and proceed into the clean staging area.

Note. Scrubs may be pre-positioned here for team members to change into upon completion of the decontamination process.

5-455. Once the team members from the first decontamination station (liquid hazard area) have moved into the second decontamination compartment (vapor hazard area), the flight deck team members move from the entry passageway to the first decontamination station (liquid hazard area) wearing their masks, gloves, and overboots. The team members first place the bagged garments left in the compartment into the entry passageway and shut the door.

5-456. The team members next remove their overboots and leave them in the compartment to aerate. Wearing mask and gloves, they proceed into the second decontamination compartment (vapor hazard area) once the preceding team members have vacated it.

5-457. Once monitoring has established that each team member is cleaned, he removes the mask, then gloves, and leaves both items on the patient table to aerate and exits into the clean staging area.

5-458. Once the detector operators have monitored all personnel and cleared them to exit the decontamination station, they move out, back through the decontamination station, making checks to ensure the areas and equipment have been decontaminated. On the flight deck, they monitor areas of the deck that have been decontaminated and the weapons that have been taken from the patients.

Note. When monitoring with chemical agent detector/monitor on the flight deck, strong winds can affect chemical agent detector's ability to detect. The chemical agent detector/monitor nozzle must be held the proper distance from the surface, about one half inch, and must be swept over the surface at a slow rate (about one half foot per second) to monitor most effectively. The chemical agent detector/monitor is also susceptible to false positive readings in the presence of aqueous film-forming foam and jet propulsion fuel, type 5.

5-459. Once all monitoring outside the decontamination station is completed, chemical agent detector/monitor operators will unmask and secure the detectors.

5-460. Contaminated garments, bandages, splints, and other items removed from patients in the decontamination process are placed in double contaminated trash bags and sealed by double knotting the necks of the bags. Once the decontamination operations are completed and the flight deck has been cleared, these bags are taken aft, remaining outside the skin of the ship, to the biological materials incinerator.

MOVING AN AMBULATORY PATIENT THROUGH A PATIENT DECONTAMINATION STATION ON A WATER VESSEL

5-461. The ambulatory patient is escorted and assisted through the process by a member of the decontamination team. As with litter patient decontamination, contaminated ambulatory patients are initially processed in the open air of the flight deck where they are triaged and outer clothing is removed; they are then brought to the first compartment (liquid hazard area) where inner clothing is removed and decontamination takes place; after this, they are taken to the second compartment (vapor hazard area) where contamination monitoring is performed and the patient is brought inside the ship.

5-462. The flight deck personnel direct the patient from the helicopter across the yellow line to the on deck triage area. The master at arms removes all battle dress items, ordnance, and weapons. Weapons should be secured outside the skin of the ship or within the entry passageway of the decontamination station until they can be monitored to determine that they are free of contamination.

5-463. The medical officer performs triage once ordnance is cleared.

On Deck Procedures—Removing the Ambulatory Patient's Protective Ensemble

5-464. Clothing removal procedures are based upon the assumption that patients arrive wearing protective mask, overgarment, gloves and overboots.

5-465. Remove and secure personal articles from the overgarment pocket.

5-466. Decontamination team members direct the ambulatory casualties to remove mask hood (if worn). Patients can assist one another in this process if they are able. The patients are then directed toward the first

compartment. Ambulatory patients can accompany litter patients into the compartment, or move to the compartment in groups.

5-467. Decontamination team members on the flight deck gather contaminated equipment, clothing, and other items placing them in a contaminated trash bag. The team members decontaminate their rubber gloves in preparation for the next patient.

5-468. Once all patients have been taken into the passageway, all equipment and decontamination supplies are placed inside the first set of doors of the passageway. Handles of the doors leading into the decontamination station are also decontaminated. Outer garments from the patients are gathered up, along with discarded bandages and are placed in contaminated trash bags. These bags are secured temporarily in the passageway so that helicopter operations can resume. Cutting teams decontaminate their own gloves, aprons, hoods, and masks.

Procedures to be Performed in the First Compartment (Liquid Hazard Area)

5-469. Remove inner garments to the skin and decontaminate the skin. Decontamination personnel assist ambulatory patients by cutting off undergarments.

5-470. Old tourniquets, bandages, and splints are bagged with contaminated clothing.

Cleaning Wounds

5-471. Follow procedures discussed earlier in the chapter to clean wounds, change splints and tourniquets.

Decontaminate the Skin, Hair, and Litter

5-472. Sponge soap and water over the patient's body, including hair, working from head to toe. Patients should be directed to lower their heads when washing the hair so that any agent in the hair does not get washed into the eyes and airway. Each individual should shower from 2 to 5 minutes. Decontamination members can help supervise the patients to make sure they wash every area of the body starting with the head and working toward the feet while standing.

Procedures to be Performed at the Second Decontamination Compartment (Vapor Hazard Area)

5-473. The decontamination team members check to see that the second decontamination compartment is ready (outer door closed and compartment not occupied by another patient) before opening door and taking the patient into that compartment. More than one ambulatory patient can be brought into this compartment at a time to speed up the process.

5-474. Discarded clothing is bagged. It is passed back to the passageway only after the patient has been taken to the next compartment and the door has been closed.

5-475. Decontamination team members wash down their TAP aprons starting from the top and working down. They also wash their gloves with 5 percent chlorine solution and ensure all cutting tools are placed in the bucket containing 5 percent chlorine solution.

5-476. The now nude ambulatory patients stand with their legs spread at shoulder width and arms held out to the sides. Monitoring for chemical contamination is performed with a chemical agent detector and monitoring for radiological contamination is done with a handheld ionizing radiation survey meter. There is no real-time monitoring capability for BW agents. The individual's personal articles that are in plastic bags can also be monitored for contamination. If contaminated, the items are decontaminated and returned to the individual at a later date. If uncontaminated they can remain with the ambulatory patient. The patient's identification tags are always worn by the patient.

Remove the Mask

5-477. Once monitoring is complete and there is no contamination present, remove the patient's mask. Place the mask in a small trash bag and close it by knotting the neck. This mask does not proceed into the ship's MTF with the patient.

5-478. After removing mask, clean the face. Pass the bagged mask back to the first compartment when the door is opened for the next group of patients to enter.

PROCEDURES FOR CLOSING DOWN THE PATIENT DECONTAMINATION SITE ON BOARD A SHIP

5-479. This section will discuss how to close down a PDS on board a ship.

Procedures for Decontaminating the Facility and the Decontamination Team

5-480. Once all patients have been processed through the decontamination station, the ship's engineer or his damage control assistant if assigned, will direct the team members in decontaminating themselves, the decontamination station, and the flight deck.

5-481. Team members from the flight deck will begin decontaminating first, as their portion of the process ends first. They apply 5 percent chlorine solution to areas of the flight deck upon which litters were placed during the processing. They place all discarded material in bags, seal them by double knotting the necks of the bags, and ensure all debris is removed from the flight deck. They then decontaminate scissors, medical strap cutters, and aprons and place these reusable items in the entry passageway.

5-482. As soon as the last patient has been transported out of the first decontamination compartment (liquid hazard area), the team members in that compartment bag all discarded items, then decontaminate (with 5 percent chlorine solution) the patient table, cutting devices, bulkheads, and deck. These items and the room are then rinsed with water.

5-483. Team members from the flight deck then decontaminate their gloves and overboots and proceed into the entry passageway to remove overgarments. The team members remove their overgarments in the passageway as follows:

- Using the buddy method, each cuts the back of their buddy's overgarment smock with a long handled seat belt cutter, or scissors. The overgarment jacket is cut upward from the waist through the hood or in the reverse direction. The overgarment is removed from the front. They turn the arms inside out as the smock is removed, roll the cut smock inside out, and place it in a contaminated trash bag.
- Each then removes the overgarment trousers by cutting each leg from the back, starting at the ankle, and proceeding through the waist. The cut trousers are also sealed into contaminated trash bags.

5-484. The team members of the first compartment decontaminate the exposed areas of their masks, aprons, overboots, and gloves in order. The team members then remove their TAP aprons and hang them up. They empty buckets of decontamination solution. They then remove their overgarments as described above. They remove overboots last and leave them in the room to aerate.

5-485. While still wearing mask and gloves, they place the bagged overgarments near the entrance to the compartment and proceed into the second decontamination compartment to undergo a chemical agent detector/monitor check.

5-486. Once the chemical agent detector/monitor check shows they are clean, the team members remove their masks, then their gloves, leaving both in the compartment to aerate, and proceed into the clean staging area.

Note. Scrubs may be prepositioned here for team members to change into upon completion of the decontamination process.

5-487. Once the team members from the first decontamination station have moved into the second decontamination compartment to be checked for residual contamination, the flight deck team members move from the entry passageway to the skin decontamination compartment wearing their masks, gloves, and overboots. The team members first place the bagged garments left in the compartment into the entry passageway and shut the door.

5-488. The team members next remove their overboots and leave them in the compartment to aerate. Wearing mask and gloves, the team members proceed into the second decontamination compartment once the preceding team has vacated it.

5-489. Once monitoring has found each team member to be clean, they remove their masks, then gloves, and leave both items on the patient table to aerate and exits into the clean staging area.

5-490. Once the detector operators have monitored all personnel and cleared them to exit the decontamination station, they move out, back through the decontamination station, making checks to ensure the areas and equipment have been decontaminated. On the flight deck, they monitor areas of the deck that have been decontaminated and the weapons that have been taken from the patients.

Note. When monitoring with chemical agent detector/monitor on the flight deck, strong winds can affect the detector's ability to detect. The detector's nozzle must be held the proper distance from the surface, about ½ inch and must be swept over the surface at a slow rate (about ½ foot per second) to monitor most effectively. The chemical agent detector/monitor is also susceptible to false positive readings in the presence of aqueous film-forming foam and jet propulsion fuel, type 5.

5-491. Once all monitoring outside the decontamination station is completed, chemical agent detector/monitor operators unmask and secure the chemical agent detectors/monitors.

Disposal of Contaminated Garments

5-492. Contaminated garments, bandages, splints, and other items removed from patients in the decontamination process are placed in double contaminated trash bags and sealed by double knotting the necks of the bags. Once the decontamination operations are completed and the flight deck has been cleared, these bags are taken aft (remaining outside the skin of the ship), to the biological materials incinerator.

NIGHT OPERATIONS

5-493. Night operations make patient movement through a PDS more challenging than other operations primarily because of the visual limitations imposed by darkness. Floodlights will typically not be appropriate in a battlefield situation where blackout conditions are imposed to limit tactical vulnerability. Safety and site organization will be critical to successful operations. Blackout conditions will definitely place limits on the following:

- Safe movement of patients and personnel in the area of the drop-off point.
- Safe movement of litter crews through patient triage and treatment areas.
- Ability of medical personnel to visualize patient medical signs which is already made difficult where patients are in protective ensemble.
- Ability of decontamination team to see what they are doing during patient decontamination.
- Movement of ambulatory patients through the decontamination process.

Reducing the Risk of Accident During Night Operations

5-494. To reduce the incidence of accident the following measures are suggested:

- Set up the decontamination site during the day, with the aim of having its lay out simple enough and well understood so that it can be used just as well at night.
- Lanes for movement from the different triage areas are marked with cloth tape, caution tape, or other markings at waist height, so that litter teams will know where to go.
- Routes through the PDS are clear of debris and holes.
- Adequate flashlights (with red lens filters), are available at the arrival point, triage area, treatment areas, decontamination lanes, and hot line.
- Operators have their name and decontamination team member job clearly marked in large letters on tape which is on the front and back of their protective ensemble.

- Operators have voice amplifiers on their protective masks.
- Use chemical lights and, or, construction tape, place at waste level to mark travel routes within the decontamination site.
- Provide personnel at the drop-off point with night vision devices so that they can identify approaching vehicles.
- Be certain of vehicle offload procedures and ensure that patients are moved out of the drop-off point before offload vehicles are allowed to move again.
- Only wheeled vehicles with ground guides are allowed to move in the drop-off point and speed limits of 5 miles per hour (walking speed) are enforced.
- Mark concertina wire with chemical lights, especially along the hot line, to prevent accidental movement into the wire.
- Rehearse patient movement and processing while there is still sunlight.

Activities During Night Operations

5-495. This section will discuss night operation activities.

Entry Control Point

5-496. Attach the chemical light to the front end of the vehicle (below the level of the hood), to preclude its interference with the driver's night vision.

5-497. The individuals manning the ECP should be equipped with a radio, a pair of binoculars, and night vision goggles for standoff inspection of the approaching evacuation vehicle.

5-498. Once the vehicle halts at the ECP, the ECP personnel should conduct a cautious approach of the vehicle. They should note the MOPP level the evacuation vehicle crew is in and, regardless of MOPP level, question the crew about the numbers and types of casualties they have and what type of agent the patients were exposed to if they know.

5-499. Individuals manning the ECP use detection paper or tape to make a rapid and accurate determination of whether or not a liquid chemical agent is present on, or in, a vehicle. Use the chemical agent detector/monitor to detect vapors coming from any liquid contamination on, or in, a vehicle. Visually inspect the vehicle at the ECP and test any suspect liquids on the vehicle with detection paper. Areas likely to have liquid contamination are the vehicle's wheel well areas, tires, and rear portion of the vehicle.

5-500. Information is relayed from the ECP (preferably by radio), to the decontamination OIC or NCOIC. The personnel manning the ECP are in MOPP Level 4. The OIC or NCOIC informs the triage officer and others at the PDS as well as those at the receiving MTF. Knowing the agent can help care providers better focus their diagnosis and care. It will also help the decontamination team members to know if they need to remain at MOPP Level 4.

5-501. Litter teams may be utilized to transfer casualties from the ECP to the arrival point, but this is highly labor intensive and not recommended. The contaminated evacuation vehicle may be routed into the drop-off point on a route that has minimal impact on other vehicle movement into the area.

5-502. Ground guides meet vehicles at the ECP who are traveling to the drop-off point. The guides must be equipped with red lens flashlights. Litter bearers (if adequate numbers are available), can serve as ground guides or assistant vehicle commanders can be asked to perform this function. Assistant vehicle commanders can be asked to perform this function. Ground guides will walk no more than five meters in front of the vehicle. Every vehicle must have a ground guide at night. Speed limits of 5 miles per hour (walking pace) must be enforced so that personnel are not run over by vehicles.

Triage and Treatment Areas

5-503. Patients are off-loaded from the ambulances, given a pat-down search, and taken to the triage point. The patients are triaged and visibly marked with prepared tags, adhesive tapes. It is important to remember

that triage categories will change as the patient processes through the PDS. These colors can be used to denote the patients current medical triage category as follows:

- Immediate – Red
- Delayed – Yellow
- Minimal – Green
- Expectant – Black

5-504. The use of these colors can extend into night operations with the use of chemical lights in the colors mentioned above, with the exception that the *expectant* patient would be marked with a blue chemical light.

5-505. Triage areas will need to be marked with chemical lights, appropriate for the triage category, attached to engineering tape. Medical personnel (combat medic/corpsmen/Air Force medics) must be equipped with red filtered flashlights. Augmentees may need to assist medical personnel by holding lights while they work.

Decontamination Lanes

5-506. Site preparation will require time for shuffle pit preparation, dirty dump preparation, and removal of any ground obstacles. If there is time to accomplish any of this labor-intensive work prior to activating a PDS, it will greatly improve PDS operations.

5-507. If preparation prior to actual use cannot be done, at the very least a ground reconnaissance must take place prior to site activation. All vehicle movement routes must be marked, points along the route requiring direction indicators identified, and any ground obstacles identified for removal.

5-508. Both the litter decontamination and ambulatory decontamination areas must be surveyed to ensure ease of movement for litter teams, and decontamination and medical personnel. The ambulatory decontamination area must be evaluated for direction indicators that might facilitate easy movement of ambulatory patients through the various steps and likewise for any obstacle that might impede foot traffic.

Personnel Requirements

5-509. Night operations will require additional personnel to fill such jobs as ground guides and individuals to assist medical personnel by holding red lens filter flashlights during triage and emergency procedures in the dirty side triage and EMT areas.

COLD WEATHER OPERATIONS

5-510. While it is difficult to deploy many CW agents during cold weather, they can be formulated to exist as liquids at cold temperatures presenting primarily a liquid or frozen liquid hazard as opposed to a vapor hazard. As the liquid contaminated individual is moved into a warm environment then liquid agents may begin to present more of an off gassing hazard. Radiological particles present a hazard at any temperature. In cold temperatures, biological agents present only a limited hazard, though sporulating agents can still be hazardous if inhaled. Cold temperatures greatly increase the risk of patient cold shock and hypothermia. Patients who are medically compromised because of blood loss, exposure to a chemical agent, or severely ill from a biological or radiological exposure have little energy reserve to maintain their core body temperature and therefore they are more susceptible to developing hypothermia.

Where Cold Temperature Challenges Exist

5-511. Any environment where the ambient air temperature drops below 65°F (18°C) can present a chill hazard to the medically compromised patient and creates an environment where the use of unheated water for outdoor decontamination is perceived as very uncomfortable by most individuals. A fall or winter climate will present a challenge as well as desert environment that can become very cool once the sun sets. Rainy climates can pose a temperature hazard for patients as well as air conditioned decontamination tents which allow workers longer work cycles, but can create an environment that may be very cool for the medically compromised patient. Medically compromised patients, such as those affected by a significant nerve agent exposure or blood loss, have a greater chance of developing hypothermia, especially in cooler climates.

Protecting Decontamination Team Members

5-512. While the risk of heat injury is greatly reduced for the decontamination team members wearing full protective ensemble, heat injury can occur if individuals wear excessive thermal undergarments under their protective ensemble and do not anticipate the heat that their bodies generate once they begin to work.

5-513. While protective ensemble will offer some warmth, it is not sufficient to keep an individual warm in colder climates. Wearing a complete uniform under the overgarment will increase the insulation effect. Thin long underwear that can wick sweat away from the body can also help when temperatures go below 30°F (-1°C). Keeping active also warms the body.

5-514. Decontamination team members should layer clothing under their protective ensemble so that it can be removed if needed. It is best to have a warming tent on the warm side of the hot line where decontamination team members can warm themselves when needed. If a heated warming tent is not available then blankets should be available for staff in the rest area. Just as rest breaks to cool individuals are needed in warm temperatures, rest breaks to warm workers are needed in cold climates.

Note. Team members should train at various temperatures to gain a better understanding of the amount of layered under-clothing that is appropriate for their work level at the PDS so that they are not overheated while working.

5-515. Wool glove liners can be worn under butyl rubber gloves in freezing climates. In any cool condition, the cotton liners should be worn under the rubber gloves to help insulate the hands. Wearing wool or cotton glove liners will reduce the individual's tactile sensation at the finger tips, but the team member's hands must be protected as butyl rubber gloves offer no insulative properties against the cold.

5-516. If possible, heated triage and treatment tents or heated buildings should be used. This will reduce both staff and patient exposure to the cold. If contaminated clothing worn by patients has not been removed from them prior to their being brought into these areas, then the areas must be well ventilated so hazardous chemical vapors do not build up inside the enclosed space. Ideally, patient clothing should be removed just inside or outside the entrance to these facilities.

5-517. In a cold environment, individuals may not feel as thirsty as they would in warm weather. They will fail to drink the amount of water they need, and will then become dehydrated. The recommended daily water intake per individual is from 3 to 6 quarts (3 to 6 canteens).

5-518. At freezing temperatures, slips and falls on ice can pose a real hazard to patients and decontamination team members, especially around decontamination tents where soap and water is used. Rock salt or similar material, should be carried to place on ice patches around decontamination tents.

Cold Shock

5-519. This is a patient's sudden physiological response to cold which can rapidly elevate blood pressure and can result in sudden death in susceptible individuals. The risk is greater for those with preexisting heart disease and the aged. Cold shock can be minimized by inquiring about preexisting medical conditions before decontamination. Encouraging patients to gradually get wet, rather than suddenly stepping into a cold stream of water; or by ensuring that water used for decontamination operations is adequately heated.

Hypothermia

5-520. This is a condition of deep body cooling that usually takes longer to develop than one would normally encounter during decontamination operations. Most individuals can tolerate 55°F (13°C) water, but will experience discomfort and shiver severely. This may however, impact on the individual who is already medically compromised. Shivering becomes the source of self-generated heat for people who are exposed to the cold. A cold and shivering individual is generating body heat and this in and of itself is not a sign for alarm. Blood that circulates through the head, arms, hands, legs, and feet cools near the skin surface and will eventually cool the core of the body over a period of time which can lower the core temperature to dangerous levels. The body's vasoconstriction slows heat loss through this process to some degree. Every effort should be made to reduce the amount of time that a patient is exposed to the cold to conserve the

patient's body heat and maintain their core body temperature and their energy. A simple way that medical personnel can assess if a decontaminated patient is experiencing hypothermia is for the medical personnel to place an ungloved hand on the chest or back of the patient. If the skin feels warm, then hypothermia is unlikely. Core temperature is more accurately measured with a hypothermia assessment thermometer which is inserted rectally and can read as low as 70°F (23°C).

5-521. *Mild hypothermia* is characterized by shivering and the person may report that they feel cold. They may have goose bumps on the skin. Individuals may not be able to perform fine motor tasks with their fingers, such as buttoning a button.

5-522. In *Moderate hypothermia* the individual may be ill tempered and slow moving. They may stumble, slur their speech, shiver intensely, not be able to use their hands effectively, and act inappropriately. Shivering stops when the body core temperature decreases to 86°F (30°C).

5-523. *Severe hypothermia* is a life threatening situation where the core body temperature has reached dangerously low levels. There is a lack of shivering, unresponsiveness, pupil dilation, and cloudy consciousness. The person may be unable to move. If not warmed immediately the individual will progress to respiratory failure, cardiac arrest, and death.

Note. Patient decontamination still remains critical during cold weather operations. Every effort should be made to reduce the amount of time that a patient is exposed to the cold during decontamination to conserve the patient's body heat, to conserve their energy, and to maintain their core body temperature.

Use of Detectors in Cold Weather Operations

5-524. Chemical vapor detectors will not work effectively in cold weather as agents give off few vapors in cold climates. The life of the battery is also significantly reduced, especially at temperatures below freezing.

5-525. Radiological survey equipment/detector will still be effective in colder climates however, response time may be longer and battery strength will be impacted.

5-526. In freezing climates, chemical vapor detectors can be placed in rest tents that are warm, to measure any vapors in these areas.

Patient Decontamination Strategies for Cold Weather Operations

5-527. One method for the selection of appropriate cold weather decontamination is based on ambient temperature. The closer the ambient temperature is to freezing, the more patient operations are conducted inside a heated enclosure.

5-528. Regardless of the ambient temperature, individuals who have been exposed to a known life-threatening level of chemical contamination should disrobe, undergo decontamination, and be sheltered as soon as possible.

5-529. Refer to Table 5-16 for decontamination methods based on ambient temperature.

Table 5-16. Decontamination methods based on ambient temperature

Method	Temperature (typical)	Warm side triage and treat	Clothes removed	Decontamination water temperature	After decontamination patient moved to
1	65°F (18°C) and above	Outside	Outside	Decontamination outside	Outside clean side triage area
2	36°F (2°C) to 65°F (18°C) and above	Outside	Outside	Decontamination outside	Heated clean side triage area
3	35°F (1.6°C) and below to 64°F (17°C)	Outside	Inside	Heated decontamination enclosure	Heated clean side triage area
4	35°F (1.6°C) and below	Inside	Inside	Dry decontamination (flour, sand, paper towel, reactive skin decontamination lotion) for immediate decontamination	Transport to indoor heated decontamination area, preferably in a building
Note: Method 1 is the easiest and method 2 is the most complex. Grey areas are where activities are performed inside a heated enclosure. Adapted from Guidelines for Cold Weather Mass Decontamination During a Terrorist Chemical Agent Incident, SBCCOM, August 2003.					
Legend: C Celsius F Fahrenheit					

5-530. Sample decontamination methods based on ambient temperature are as follows:

- Method 1. These are standard patient thorough decontamination operations conducted without special heating tents or water heating apparatus. Decontamination operations that are conducted in the temperature range of 65°F (18°C) and above can be performed in this manner using existing equipment.
- Method 2. Here, standard patient thorough decontamination operations are conducted, but the patient is quickly transferred to a clean side area that is heated. This is typically conducted when temperatures are in the 64 - 50°F (18 - 10°C) range.
- Method 3. Patients are triaged and given lifesaving treatment outside but are decontaminated in a heated tent with heated water and then moved to a heated enclosure on the clean side of the hot line. This is appropriate when temperatures are in the 50 - 35°F (10 - 2°C) range.
- Method 4. Patient triage, decontamination, and clean side treatment are conducted in a warm area (heated tents, vehicles, or buildings). Dry decontamination is used initially, inside a decontamination tent, until the patient can be transported to a warm facility where the water is heated and the patient remains inside the warm enclosure for treatment. This is appropriate when temperatures are below 35°F (2°C).

Steps to Take to Attempt to Reduce the Incidence of Patient Cold Injury and Hypothermia

5-531. Patient protective ensemble should not be removed until the patient appears to be medically stable enough to undergo decontamination.

5-532. If temperatures are near freezing, use a dry decontaminant (sand, paper towel, RSDL, M295) for immediate (gross) decontamination and then move the patient inside a warm tent or room before clothing is removed. Outer protective clothing is removed in a ventilated area immediately outside or near the entrance to the heated room if the garments are heavily contaminated.

5-533. If the patient does not need to have their entire body washed, then remove the clothing and decontaminate only those areas not covered by the clothing. Remember that thicker winter clothing, if worn at the time of exposure, will offer some degree of protection against chemical agents as compared with thin summer clothing. Thicker clothing should offer adequate protection against dry particles and spores.

5-534. Once the process of clothing removal begins, make the decontamination process as fast as possible so that the patient can be covered again with a blanket.

5-535. If available, conduct patient thorough decontamination operations inside a heated building or heated tent. Use warm soapy water for decontamination if possible.

5-536. Have ample supplies of blankets on hand to cover the patient as soon as they are decontaminated.

5-537. In cold conditions, blankets may have to be available on the warm side of the hot line, in the decontamination area, to cover the patients in between patient lifts if the temperature is cold. These blankets would stay on the warm side of the hot line and could be used for other patients. There is a hazard that contamination could be transferred on the blankets so they should not be reused if they touch the contaminated ground. Ideally, a better solution is to bring the patient into a heated tent and remove clothing, decontaminate, and cover the clean patient as quickly as possible.

5-538. If decontamination operations are typically conducted in a location where the ambient temperature is 65°F (18°C) or below, use a PDS system that heats the water used for decontamination and also heats the air inside the decontamination tent. Water may have to be heated to 100° F (38°C) or greater so that it is comfortably warm, but not hot, by the time it reaches the patient.

5-539. A PDS with plumbed tentage and sprayers that is operating in a climate where the temperatures are near or below freezing must have heaters for the fresh and wastewater storage bladders so that these do not freeze. Water transport lines should also be covered and insulated to prevent freezing along these narrow areas. Power generators should remain on or kept warm so that they do not freeze.

Chapter 6

Veterinary Service Support

GENERAL

6-1. The U.S. Army Veterinary Corps under the direction of Secretary of the Army and supervision of the U.S. Army is the sole provider of veterinary services to DOD. Refer to DODD 6400.04E for more information.

6-2. The Secretary of the Air Force provides the food inspection program at Air Force bases and may develop locally approved lists of food suppliers from which food products are procured only for individual Air Force installations.

Note. The heads of the other DOD components will coordinate with the DOD Executive Agent on related matters under their areas of cognizance.

6-3. The U.S. Army Veterinary Corps' mission is to execute veterinary service support essential for FHP and HSS and sustain a healthy and medically protected force; train, equip, and deploy the veterinary force; and promote the health of the military community. In some instances, veterinary service support is provided to allies/coalition partners and/or host nation agencies. The U.S. agencies that may be provided this support include—

- United States Department of State.
- Department of Agriculture.
- Department of Commerce.
- Department of Transportation.
- Department of Homeland Security (Transportation Security Agency, USCG, U.S. Customs, U.S. Border Patrol, and U.S. Secret Service).
- Department of Justice (Drug Enforcement Agency).
- Federal Bureau of Investigation.
- Central Intelligence Agency.
- Health and Human Services (Food and Drug Administration, CDC).

6-4. According to DODD 6400.04E, it is DOD policy to provide Army veterinary service personnel (including veterinarians and veterinary food safety officers) with relevant training and specialization to plan and deliver—

- Food protection.
- Animal health and welfare.
- Veterinary public health.
- Training.
- Research Development Test and Evaluation.

FOOD PROTECTION MEASURES

6-5. Food may become contaminated from adversary employment of CBRN weapons/agents or from terroristic contamination of food procurement facilities and food supplies. The CBRN/TIMs agents may be introduced into ingredients prior to reaching the production facility; during production or in the storage area of the procurement facility; while the product is in transit; at the military storage facility; or at the unit food service facility. Regardless of where the agent is used, the effect is the same; personnel may become ill or die if they consume the contaminated food. To ensure food protection, veterinary personnel inspect and

monitor food from its procurement until it is issued to the consumer. Throughout the AO, all Services logistics and food service personnel must take precautions to protect subsistence from contamination.

6-6. Some of the functions of veterinary personnel—

- Perform surveillance inspections of operational rations and of all Service-owned subsistence received, stored, issued, sold, or shipped from/to military installations (including those items received from depots and supply points). See AR 40-656/NAVSUPINST/4355.10A/MCO 10110.48 for definitive information on veterinary surveillance inspections.
- Perform sanitation audits of commercial facilities that produce or provide such items as dairy products, seafood (fish and other water foods), red meats, poultry, eggs, pork, baked goods, fresh fruits and vegetables, bottled water, and block or packaged ice. See AR 40-657/NAVSUP 4355.4H/MCO P10110.31H and the most current version of Military Standard 3006 for definitive information on sanitation audits of commercial food establishments.
- Conduct basic food screening and microbiological laboratory procedures to ensure adherence to food protection standards and to identify potential foodborne pathogens.
- Advise theater logistics units (sustainment brigade, medical company [area support], multifunctional medical battalion, and brigade support battalion), ration breakdown point, and dining facilities on storing subsistence to minimize the threat of CBRN contamination.
- Inspect, monitor, and submit laboratory samples of subsistence or food-producing animals that are contaminated or suspected of being contaminated by CBRN agents.
- Provide units with guidance and instructions for the proper handling or decontamination of subsistence.
- Protect the financial interests of the government as it affects the use and disposition of safe, government-owned subsistence.
- Participate in humanitarian and civic assistance or disaster relief actions as directed.
- Provide food surveillance inspections of dining facilities for security and storage of food products.
- Assist Army and Navy installations teams with installation food and water risk assessments.
- Perform food and water risk assessments for forces during short-term operations or exercises conducted OCONUS.

6-7. The physical accountability of food from the point of origin until it is consumed by stateside or deployed U.S. forces must be maintained. Physical accountability of the food storage facility is a key factor in preventing deliberate contamination of food and water. To mitigate the risk of foodborne illnesses, all units must use the basic principles of risk management. See ATP 5-19 or Marine Corps Order 3500.27C for definitive information on risk management. The basic principles for risk management should be the guide for developing techniques and procedures for ensuring food protection. See Military Standard 3041 and Military Handbook 3041 for definitive information regarding installation food and water risk assessments. The availability of noncontaminated subsistence/Class I items in an AO depends upon the amount of planning taken for the protection of subsistence from CBRN warfare. An adequate defense posture for a CW attack will also protect food against BW contamination and radiological fallout.

6-8. All planners must integrate risk management for food and water into the mission planning, preparation, and execution of all operations. They must answer the questions about what needs to be done to ensure food and water protection. The medical planner should identify all food protection issues as they develop the medical annexes to operations orders. The veterinary staff officer provides input on all food protection issues to the medical planner for inclusion in the medical annexes of the HSS plan. See Appendix B for more information on HSS annex. Commanders must be aware that food defense is part of the overall HSS effort.

6-9. Make risk decisions at the appropriate levels in the chain of command. The responsibility for food protection must be assigned and identified by tactical SOPs. After receiving the food and water risk assessment with risk mitigation recommendations, operational commanders are ultimately responsible for the health risk decisions to allow procurement of food and water from unapproved sources.

6-10. Do not accept any unnecessary risk when it comes to food and water protection.

VETERINARY MEDICAL CARE

6-11. Provide comprehensive veterinary medical care for all military working dogs (MWDs) in the AO. Refer to AR 190-12 for more information.

6-12. Provide limited veterinary care to other DOD-owned animals and other government-owned animals (GOAs) when time and resources permit and to indigenous animals, as directed.

6-13. Veterinary personnel are concerned with the protection of GOAs and animals procured for consumption. Animals must be protected from CBRN contamination, whenever possible. If feasible, animals should be moved into enclosures to protect them as much as possible from contamination. Protective equipment is not available for MWDs; however, protection of the animal's feet and body must be considered. When MWDs must cross a contaminated area, improvise foot protection by using items such as butyl rubber material and consider placing MWDs in vehicles to avoid contamination.

6-14. Since collective protection systems are not a part of veterinary units, animal treatment facilities must be established in contamination free areas. Veterinary treatment personnel must remain in MOPP Level 4 when caring for CBRN animal casualties until the animals have been decontaminated. The decontamination and treatment of MWD CBRN casualties is detailed in FM 4-02.18, ATP 4-02.85/NTRP 4-02.22/AFTTP(I) 3-2.69 and the DOD MWD Veterinary Service, Handler Training Manual.

6-15. Veterinary personnel must be practical when considering evacuation requests and handling of contaminated animals; the foremost concern is safety of unit and support personnel.

VETERINARY PUBLIC HEALTH

6-16. Veterinary public health is essential for the identification and control of those diseases that can be transmitted from food, water, or ice and those diseases transmitted from animals to man (zoonotic). Veterinary public health personnel will—

- Support prevention and control programs to protect Service members from food- and waterborne diseases.
- Evaluate zoonotic disease data collected in the AO and advise preventive medicine/public health elements and higher headquarters on potential hazards to humans.
- Establish animal disease prevention and control programs to protect Service members and their families and other DOD and allied personnel from zoonotic diseases.
- Assess the presence of animal diseases that may impact the CONUS agriculture system if contaminated equipment or personnel are allowed to redeploy (such as foot and mouth disease).
- Perform investigations of unexplained animal deaths to include livestock and wildlife and submit samples for identification, if applicable.

6-17. Animals can serve as sentinels (markers) of CBRN contamination or exposure. Military personnel should report unexpected death or illness of wild or indigenous animals to their supporting veterinary unit, especially if the onset is sudden and large numbers of animals are affected in a short period of time. This is especially true for BW agents, as many agents cause similar clinical signs in animals and people.

VETERINARY UNIT OPERATIONS IN A CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR ENVIRONMENT

6-18. The primary function of the veterinary unit, while it is in the contaminated area, is concentrated on protection and decontamination of organic personnel, equipment, and MWDs. When possible, the mission and duties of the contaminated unit/personnel may be transferred to other operational veterinary units/personnel by the commander.

6-19. The commanders of veterinary units, develop contingency plans and tactical SOPs required for the veterinary teams in a CBRN environment (see Appendix B for a sample format for the veterinary support portion of the HSS plan). Plans and tactical SOPs include procedures for—

- Protecting veterinary personnel in the CBRN environment.
- Training veterinary personnel to function in the CBRN environment.
- Monitoring the physical accountability and protection of subsistence in the CBRN environment.
- Maintaining assigned CBRN equipment.
- Inspecting subsistence in the CBRN environment.
- Monitoring the decontamination of CBRN-contaminated subsistence, MWDs, and other GOAs.
- Treating MWDs and other GOAs that become CBRN casualties.
- Reporting intelligence data through command channels.
- Ensuring the security of veterinary equipment, supplies, and personnel.
- Using veterinary personnel to support assigned CBRN missions.

6-20. Upon receipt of a CBRN warning, veterinary leaders place contingency plans into operation and direct veterinary personnel to assume the appropriate MOPP level. After assumption of the directed MOPP level, veterinary personnel, within limits dictated by the tactical situation, ensure that actions are taken to protect subsistence items, MWDs, and other GOAs.

VETERINARY SUPPORT FOR SUBSISTENCE

6-21. Veterinary personnel support commanders in developing readiness plans and tactical SOPs for the protection, decontamination, and use of subsistence items in the CBRN environment. This assistance is either in the form of direct or indirect veterinary support as follows:

- Direct veterinary support is provided to commanders by assignment of veterinary personnel at Class I activities. This support consists of technical advice to aid the commander in formulating plans and procedures pertaining to the storage, decontamination, and use of subsistence that may become exposed to a CBRN agent.
- Indirect veterinary support is provided to unit commanders by disseminating information and guidance pertaining to CBRN contamination of subsistence.

6-22. Veterinary personnel inspect subsistence at the user level on an area support basis.

6-23. If subsistence items have not been protected according to CBRN protection plans and procedures or if the plans/procedures need modification, a recommendation for corrective action is initiated by veterinary personnel.

6-24. Following a CBRN attack, all subsistence within the boundaries of the contaminated area is considered contaminated and managed accordingly until testing determines which foods are safe for consumption. As a method of control, subsistence items located in contaminated storage facilities/areas are restricted from issue or use until necessary CBRN testing can be completed. Access to subsistence storage facilities/areas will be restricted based on their level of contamination.

6-25. In most instances, decontamination of subsistence does not begin until the surrounding area and storage facility are decontaminated. Veterinary teams provide technical guidance on food decontamination procedures to unit decontamination teams.

VETERINARY SURVEY OF STORAGE FACILITIES AND SUBSISTENCE

6-26. Veterinary personnel conduct surveys of CBRN-contaminated subsistence and storage facilities to obtain data for the veterinary assessment of the situation. The designated MOPP level must be adhered to while conducting the surveys.

6-27. Veterinary personnel use available CBRN-detection equipment for the survey. The survey is conducted, if possible, in conjunction with CBRN detection or survey teams.

Survey of Storage Facility

6-28. A preliminary inspection is made to determine the effectiveness of the storage facility and other protective measures in preventing entrance of a CBRN agent into the facility. An inspection of the structural integrity of the facility is made, checking for such damage as broken windows and holes. The inspector notes any damages and the overall condition of the facility. The area surrounding the facility is also examined for the presence of animals, rodents, birds, and insects acting unusual or whose death is unusual or unexplained.

6-29. A survey of the storage facility is conducted using CBRN alarms/detectors/monitors to determine the presence of a CBRN agent. The inspection determines if a CBRN agent or residue remains in the facility using the detector paper, tape, and other detection equipment. For more information on CBRN alarms, refer to STANAG 2047.

6-30. Specimens are collected for submission to the supporting laboratory. Recorded symptoms of contaminated Service members or animals, gross pathology, CBRN equipment readings, and other observations are reported. This information, when combined with histopathology and other medical laboratory tests, aids in identifying the nature, level, and type of CBRN agent.

Survey of Subsistence Items

6-31. A survey of subsistence items must be conducted to determine the presence of a CBRN agent on or in the item and the extent of damage caused by the contamination. Veterinary personnel select those subsistence items most likely to have been contaminated for testing. The items will be located near entrances, near ventilation inlets, and near aisles.

6-32. Packaging materials are tested for the presence of CBRN agents. The presence of unusual liquids or stains is noted. The degree of biological contamination can only be determined by laboratory analysis. Results of the survey of packaging and packing materials are recorded. If a CBRN agent is present, then this information is included in the survey.

6-33. At the completion of the initial survey of the storage facility and subsistence by veterinary personnel, the findings are provided to the commanders. These findings will be as definitive and timely as possible. These survey findings must address the following points:

- Survey method and inspection procedures used to obtain data, to include type of detection equipment used. Data obtained from support units, such as medical laboratory/chemical units, should be included, noting the source of the data.
- Estimate of the quantity of food contaminated or suspected of being contaminated by the CBRN agent. The quantity of contaminated subsistence is reported by the amount in each of the following categories:
 - Individual operational rations; field packaged meals.
 - A-Rations.
 - Unitized group rations—heat and serve.
 - Semipерishable ration components.
 - Perishable items.
 - Medical diet field feeding supplement (not a stand-alone ration; it must be used in combination with the unitized group ration).
- The recommendation as to advisability and feasibility of conducting a decontamination operation should include an estimate of the amount (percent) of contaminated subsistence that can be recovered if decontamination is accomplished. The decontamination process may materially reduce the storage life of the subsistence, thus requiring accelerated movement through the supply system.

6-34. Some subsistence items may require upgraded protective storage in an enclosed facility with controlled temperature and/or relative humidity versus storage in an open area protected by barrier covers. A determination is made to identify the type of precautionary markings required on subsistence containers. These precautionary markings aid personnel involved in the storage, issue, receipt, and preparation of the subsistence.

TESTING, SCREENING, AND COLLECTING FOOD SAMPLES IN THE FIELD

6-35. The testing capabilities in veterinary units focus on screening capabilities for the presence of biological agents particularly foodborne pathogens and limited chemical contaminants. If a sample tests positive on the initial screening, more definitive testing can be completed by the area medical laboratory (AML), DOD Food Analysis and Diagnostic Laboratory, or by the APHC Region-Europe Laboratory Sciences' Microbiology and Molecular Biology Division and Veterinary Pathology Division.

Note. For definitive information on how samples are prepared for shipment to the supporting laboratory, see the applicable food laboratory sample guide or refer to Chapter 8 of this publication.

6-36. Collecting food samples for laboratory analysis can be accomplished during procurement, receipt, or surveillance of food items. Either veterinary or preventive medicine/public health personnel may collect food samples from food procurement establishments or dining facilities. Food samples will be split so that a portion of the original sample is preserved until the field testing is completed. Perishable samples should be maintained at a temperature of 1°C to 4°C (33.8°F to 39.2°F) during transport.

6-37. Shipping containers must be approved by the International Air Transportation Association and must contain sufficient material to absorb the entire contents in the event of a leak. The Chemical, Biological, Radiological, Nuclear, and High-yield Explosives (CBRNE) Response Team (previously called technical escort unit) should be requested to transport food samples suspected of containing BW or CW agents. For more information on CBRNE Response Team, refer to ATP 3-11.24.

6-38. Random sampling, however, is not very effective at identifying microbial pathogens in solid food unless the level of contamination is relatively high. If microbial pathogens are present in food, they are usually in very low levels and contamination is found in localized areas rather than uniformly distributed. When possible, it is better to test for indicators such as total plate counts, coliforms, or generic *Escherichia coli* that are likely to be present in higher levels when food is contaminated with pathogens. In CONUS, major foodborne pathogenic bacteria can be identified by many state diagnostic laboratories and CDC in a PulseNet collaboration effort headed by CDC.

6-39. A documented chain-of-custody using DA Form 4137 (Evidence/Property Custody Document) or DD Form 1911 (Materiel Courier Receipt), or Office of the Chief of Naval Operations (OPNAV) Form 5580/22 (Evidence/Property Custody Receipt) must accompany all food or water samples suspected of being intentionally contaminated or containing endemic foodborne or waterborne pathogens. These samples will not be split prior to arrival at the first receiving laboratory. This will prevent accidental contamination of the samples and ensure that valid samples arrive at the destination laboratory.

6-40. Public health/preventive medicine, hospital, and medical laboratory personnel should follow the same basic guidelines on how and where to submit samples.

SUBSISTENCE DECONTAMINATION

6-41. The commander determines if subsistence is to be decontaminated. Veterinary personnel provide technical advice to the commander to assist him in making this decision. The commander concerned determines how subsistence is provided to affected units and what actions, if any, are taken to decontaminate supplies. The commander and his staff coordinate priorities for large-scale decontamination operations.

6-42. Decontamination removes the contaminant and provides food that is safe for consumption. Food salvage operations require extensive efforts to assess, identify, and evaluate. These efforts are further compounded if food supplies are suspected of being compromised by CBRN contaminants. Decontamination efforts require even more elaborate procedures that impact labor, time, and supplies of operational forces. The use of appropriate decontamination must be emphasized to fit the situation and the mission. That is, decontaminate just enough to sustain operations and keep fighting, rather than to try and control or create a contamination-free environment. Normally, decontamination efforts will be limited to the scope and nature of the packaging and packing materials. In addition, food decontamination, if deemed

necessary, would only occur in critical situations where other food supply options are not available. Most decontamination is performed in or very near the AO.

6-43. There are three levels of decontamination for subsistence. These are individual, unit, and support levels which are dictated by whoever has control.

Individual Decontamination

6-44. The individual Service member performs this level of decontamination. Individual decontamination of subsistence is performed by each Service member on those subsistence items in his possession at the time of the attack. This is performed in conjunction with individual/equipment decontamination procedures as soon as possible after a CBRN attack. Individual decontamination of subsistence is limited to operational rations that are in the original containers that do not permit or have not allowed CBRN penetration. The decision to decontaminate subsistence, however, rests with the individual's commander and not with the individual, except when the Service member is separated from his unit. Decontamination procedures are conducted as outlined in the unit tactical SOP or as modified by the unit commander. At the individual level, decontamination procedures are employed to the extent that the CBRN hazard to the subsistence is adequately reduced or eliminated, thus allowing for continuation of the mission.

Unit Decontamination

6-45. Unit personnel under the supervision of CBRN-trained personnel organic to the unit perform this level of decontamination. Decontamination procedures for subsistence items in possession of the unit are performed as soon as possible after a CBRN attack and in conjunction with area decontamination procedures. Decontamination is attempted only on subsistence items that are in original, intact containers that do not permit or have not allowed CBRN penetration. Decontamination procedures are conducted by unit personnel in accordance with tactical SOPs and supervised by unit CBRN-trained personnel. Special decontamination requirements and/or advisability of decontamination efforts are relayed to unit commanders through command or medical channels, as required. The decontamination procedures employed are aimed at adequately reducing or eliminating the CBRN hazard presented by the subsistence.

Support Decontamination

6-46. Specially trained and specially equipped decontamination units/teams accomplish this level of decontamination. The decision to decontaminate subsistence items at this level rests with the commander responsible for supplies. Support decontamination of subsistence is accomplished at major subsistence storage facilities/areas, such as the General Service Class I activities in the theater. At the support level, veterinary personnel advise on technical matters pertaining to the decontamination operations involving subsistence items. Veterinary personnel also monitor the decontamination results and recovery operations. They make recommendations if procedures need modification or correction and ensure that decontaminated subsistence is wholesome and suitable for issue. The support decontamination procedures must eliminate or reduce the CBRN hazard presented by subsistence to as low a level as possible.

DISPOSITION OF SUBSISTENCE

6-47. The responsible veterinary officer has final approval for determining whether decontaminated subsistence is wholesome and is fit for human consumption. Subsistence supplies meeting wholesomeness standards should be identified and returned to a protective posture. Subsistence supplies not meeting the standards set for human consumption will be disposed of as directed by the senior veterinary authority.

VETERINARY SUPPORT TO MILITARY WORKING DOGS/GOVERNMENT-OWNED ANIMALS IN A CBRN ENVIRONMENT

6-48. A CBRN incident is still a significant and realistic threat to U.S. forces and the MWDs/GOAs that support them.

Chemical Warfare Agents and Toxic Industrial Materials

6-49. The traditional CW agents can be dispersed by aerosol, vapor, or liquid from traditional and nontraditional munitions and methods. Toxic industrial materials are also a threat to MWDs/GOAs whether working CONUS or OCONUS; because they could be used offensively, accidentally released, or are part of a disaster incident site. Military working dogs/GOAs are highly likely to become contaminated with CW agents and/or TIMs because they work close to the ground and may not wear protective paw coverings, do not have a protective garments, may lick their own hair or paws, and may drink or eat contaminated water or food. Protecting MWDs/GOAs from exposure to CW agents and TIMs is difficult due to the lack of protective garments or shelters designed for MWDs. For more information on protecting MWDs and their rations and equipment in a chemical/TIM environment, see ATP 4-02.85/NTRP 4-02.22/AFTTP(I) 3-2.69.

6-50. The veterinary medical response to traditional CW agents and TIMs will depend on the agent, dispersal method, route of exposure, clinical signs, and length of time the MWD/GOA is in contact with the agent. As a general rule, MWDs/GOAs will present with similar clinical signs as their human counterparts for most of the CW agents. Respiratory absorption may occur after dispersal of aerosol, vapor or liquid agents and is of greatest concern because of the speed of absorption and toxicity. Absorption through the mouth may occur simultaneously with respiratory exposure. However, oral and gastrointestinal absorption is of greater concern when a MWD/GOA eats contaminated food, drinks contaminated water, or licks its own fur that is contaminated. Absorption through the skin via the MWD/GOA's paws is of the greatest concern since pads of the MWD/GOA's paws have sweat glands, no hair, and will absorb agents. Because of the combination of hair covering and lack of sweat glands, the risk of chemical absorption through the skin is of less concern in MWDs/GOAs than in people; however, the risk is still significant and surface decontamination procedures should be followed. Initial issue guidelines for MWD Medical CBRN Defense Materiel can be found in Department of the Army Supply Bulletin, Army Medical Department (AMEDD) Supply Information, SB 8-75-S7.

6-51. Decontamination of the MWD/GOA and its equipment should take place as soon as possible to prevent or reduce any further absorption of the CW agents or TIMs and prevent cross contamination. During decontamination, special attention should be paid to the MWD/GOA's face, ears, eyes, nostrils, abdomen, under the tail, paws and between legs to ensure all contamination is removed. The MWD/GOA's eyes should be flushed with copious amounts of water, ophthalmic solution or saline and thoroughly evaluated after decontamination prior to being treated with any medications. For definitive information on the medical effects of traditional CW agents and TIMs of concern for MWDs, diagnosis, decontamination, treatment, and prognosis, see ATP 4-02.85/NTRP 4-02.22/AFTTP(I) 3-2.69.

Biological Warfare Agents

6-52. Disease produced by the offensive use of BW agents against U.S. forces could be lethal and/or disabling. These BW agents could also infect the animal population within the contaminated area; however, diseases that are likely to be used in BW may cause less severe clinical signs in MWDs. This is primarily due to varied species susceptibility between dogs and humans for most BW agents. It is important to keep in mind that MWDs/GOAs may serve as a source for zoonotic infection, fomites, or as a vehicle for an arthropod vector. For definitive information on BW agents, see ATP 4-02.84/MCRP 4-11.1C/NTRP 4-02.23/AFMAN 44-156_IP.

6-53. The veterinary medical response to the threat or use of biological weapons may be different depending on whether veterinary medical measures are employed prior to exposure or whether exposure has already occurred and/or symptoms are present. If provided before exposure, active immunization or prophylaxis with antibiotics may prevent illness in those MWDs that are exposed. Active immunization may be effective against several potential BW agents, in man, but there are no approved canine immunizations for likely BW agents. The best modality for future protection of MWDs against a wide variety of biological threats is the use of vector control measures and appropriate decontamination procedures; however, MWDs are usually less susceptible than humans to most of the agents used in BW.

6-54. If the MWD does become contaminated with a biological agent, decontamination should be completed with soap and water as previously described. Military working dog equipment should be decontaminated with 5 percent chlorine solution, or according to FM 3-11.5/MCWP 3-37.3/NTTP 3-11.26/AFTTP(I) 3-2.60.

Note. Although DOD MWD Veterinary Service no longer recommends prophylactic doxycycline, doxycycline (10mg/kg/day) may be an effective treatment for MWD exposed to the BW agents of concern and may also safely be used prophylactically at the same dose if exposure is considered likely.

Nuclear and Radiological Weapons

6-55. If U.S. forces are attacked with nuclear weapons, and/or exposed to radiation from nuclear or radiological accidents, MWDs will present the same types of medical problems as seen with human patients. These medical problems will include blast, thermal, and radiation injuries and radiation sickness depending on the amount of radiation received. Veterinary care will be based upon the clinical condition of the MWD and its prognosis for recovery. For definitive information on the medical effects of radiation, diagnosis, treatment, and prognosis, see ATP 4-02.83/MCRP 4-11.1B/NTRP 4-02.21/AFMAN 44-161(I).

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Chapter 7

Preventive Medicine/Public Health Support

GENERAL

7-1. As a compliment to CBRN surveillance, health surveillance is conducted by medical personnel and preventive medicine/public health personnel to establish baseline health conditions, capture data on OEH exposures, and monitor for subsequent deviations. Health surveillance focuses on ensuring CBRN detection, collection, and reporting operational requirements are met. Critical planning factors must ensure that—

- The CBRN detection requirements are resourced (for example, operators are trained and tasked to operate CBRN detection systems).
- The CBRN detection resources are integrated into CBRN, medical, and health surveillance plans.
- Personnel, food, drinking water, air, the environment, and equipment are monitored for CBRN contamination and the effectiveness of decontamination measures.
- Surveillance for outbreaks of disease is performed on and off the installation to identify a possible biological attack.
- Sample collection techniques and procedures are rehearsed and understood.
- The sample evacuation process is rehearsed and understood.
- Accurate records are kept to monitor personnel for long-term health problems that could be operationally related.
- The CBRN reports should be provided to subordinate and higher commands.
- A CBRN reporting system is established and provides the required reports to higher and adjacent commands.

SAMPLE MANAGEMENT

7-2. Preventive medicine/public health personnel must be trained and equipped to perform sample management. The key tasks are collect, package, transport, store, transfer, analyze, track, report, safeguard, and dispose. In some circumstances, commanders may require technical level expertise (for example, CBRN specialists or preventive medicine/public health personnel) over tactical forces that are CBRN-capable. Preventive medicine/public health and CBRN reconnaissance and surveillance elements are generally tasked for collecting and initially packaging agent samples. Preventive medicine/public health personnel and CBRN reconnaissance and surveillance elements are responsible for environmental *sample collection*, but preventive medicine/public health personnel are responsible for environment health sample collection and exposure surveillance. Specially trained medical personnel are responsible for collecting clinical specimens. The key tasks are collect, package, transport, store, transfer, analyze, track, report, safeguard, and dispose. The chain-of-custody process should begin when the sample is collected. The chain-of-custody and support documents are critical because they provide an audit trail of when and where the sample was taken. The team assigns an identification number and affixes it to the sample or its container to aid in identification. For detailed information on sample management and chain-of-custody, see Chapter 8 of this publication and ATP 3-11.37/MCWP 3-37.4/NTTP 3-11.29/AFTTP 3-2.44.

7-3. The collection of water, soil and vegetation involves the collection of a sufficient number of samples to properly analyze the source with regard to contaminants. Water, soil, and vegetation samples are collected by CBRN personnel, preventive medicine/public health personnel, and bioenvironmental engineers for identification or verification of CBRN contamination. At least four samples should be taken—three samples of the suspected contamination and one control sample—from a nearby, uncontaminated area for reference. For more detailed information on when, where, and how to sample, refer to ATP 3-11.37/MCWP 3-37.4/NTTP 3-11.29/AFTTP 3-2.44.

MEDICAL CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR REPORTS

7-4. The CBRN incident medical reports are to be prepared for incidents and provided to medical channels in a timely and adequate manner. The documentation and archiving of actual or potential CBRN exposures is essential (and required) to address future investigation and/or health surveillance of potentially exposed personnel.

7-5. The medical *incident report* actually consists of two *forms* or sets of reported information. The first is referred to as the initial field account survey (IFAS). In some documents, the IFAS has been called the basic exposure evaluation form. The IFAS is a documentation of the on-site field information regarding the CBRN hazard, detection results, exposures, symptoms, visual and witness information, and other details. This form is especially critical and will typically need to be completed by units involved in an attack, and CBRN units or preventive medicine/public health personnel involved in collection of CBRN samples and reporting. There may be multiple units completing separate IFASs. The second form is referred to as the incident report survey (IRS). The IRS has been referred to as the Health Incident Technical Summary report in other documents. This form is a postincident health assessment typically prepared by medical and preventive medicine/public health assets. Preventive medicine/public health assets cannot complete the IRS without adequate information from the IFAS.

7-6. The IFAS and IRS forms (for more information about these forms, refer to ATP 3-11.37/MCWP 3-37.4/NTTP 3-11.29/AFTTP 3-2.44) are available as electronic data fields in the Defense Occupational and Environmental Health Readiness System. Use of this module will allow for real-time data archiving; however, typically only preventive medicine/public health assets will have access to this system. For the most current versions of these forms, access and download from the Defense Occupational and Environmental Health Readiness System Web site. If completed as hardcopy, then these forms must be submitted and stored in the Military Exposure Surveillance Library or Service-specific data collection system.

INITIAL FIELD ACCOUNT SURVEY

7-7. The IFAS ensures that CBRN incident details and a roster of exposed and medically treated personnel are adequately captured. This is critical for future use in medical surveillance considerations. Medical and preventive medicine/public health personnel will use information on the IFAS, along with other pertinent documents, when documenting a health risk assessment summary of the incident.

7-8. The determination that an OEH exposure is significant enough to report it as an *incident* is somewhat subjective, but there are certain criteria that indicate a report should be prepared. The most obvious scenarios are those events that result in real-time health impacts that require medical countermeasures or treatment. However, even events where there is no notable impact to human health or mission should be documented if something triggers a specific evaluation or investigation of the potential presence of a CBRN/OEH hazard. For these types of incidents, documentation of negative findings can be important to address future medical queries. It is essential that Service members understand that it is to their own benefit to help so that potential exposure incidents are adequately documented if they have future health concerns or claims that may be attributed to such exposures.

7-9. The IFAS should be completed by medical and preventive medicine/public health personnel and the chain of command involved in the incident. The ATP 3-11.37/MCWP 3-37.4/NTTP 3-11.29/AFTTP 3-2.44 provides a list of considerations that can be used to determine if an OEH incident warrants a significant activity (SIGACT) report and additional exposure documentation. Details in the IFAS and the underlying reports such as SIGACTs and roster may be classified. Unit security personnel must review the IFAS and determine the classification it should have. Since standard SIGACTs typically do not include all the required information for CBRN/OEH exposure incidents, ensure that the IFAS is filled out to expand the information that may have been put in the SIGACT. If a SIGACT already contains all the required information, then a separate IFAS is not required; otherwise, the IFAS should be completed and should just reference the SIGACT number. By completing the IFAS, preventive medicine/public health personnel can properly investigate the exposure and work with medical personnel so that appropriate medical follow-up and health

surveillance is conducted. In addition, the information can provide valuable lessons learned that could help mitigate future health impacts from similar events. Complete the form as thoroughly as possible and submit to the command surgeon or preventive medicine/public health officer within 24 hours of an incident. An IFAS should be completed if one of the indicators listed below is present:

- The presence of an OEH hazard is plausibly associated with actual observed (acute) clinical health outcomes that are reported and/or treated (for example, complaints of headaches, dizziness, skin/eye irritation/burning, coughing, nausea, and other abnormal signs).
- The presence of an acute OEH hazard is indicated through positive detection using real-time field equipment.
- Evaluation of data or related information by an appropriate medical professional indicates that exposure to the OEH hazard could plausibly result in some significant (moderate or higher risk level) clinically relevant adverse health outcome (significant long-term chronic effects).
- Visual/sensory cues indicating potential presence of an OEH hazard (obscurants/cloud, odors, strange liquid/powders) are present.

INCIDENT REPORT SURVEY

7-10. The IRS report is a consolidated assessment of overall incident information pertaining to personnel exposures and any associated health effects. Completion of the IRS ensures that the necessary information is consolidated and submitted to the designated DOD data archive. Ideally, this information is prepared as an unclassified document so that personnel and providers can have access. Preventive medicine/public health personnel designated by the command surgeon/medical officer will prepare the IRS. While details in some of the underlying documents and reports (SIGACTs, IFAS, and roster) may be classified, to the extent possible the IRS report itself should be completed at the lowest classification possible for the widest distribution. For further information on the IRS, refer to ATP 3-11.37/MCWP 3-37.4/NTTP 3-11.29/AFTTP 3-2.44. The IRS consists of six basic sections. Most sections are straightforward but some additional information is described below:

- Most of the required elements listed on the IRS report should be contained in other documents. Information such as SIGACT, IFAS, rosters, field and/or analytical data, risk communication documents, may be referred to as attachments. However, some assessment/interpretation of the information is necessary to provide an overall summary of the required information. For example, the preventive medicine/public health personnel should summarize the incident information and provide a qualitative risk estimate of the level of the acute health effects presented during the incident, and, a risk estimate of the potential for long-term chronic health consequences of concern (see APHC TG 230 for information regarding OEH risk estimation). Depending on the incident, risk communication products (for example, fact sheets and briefings) may be prepared.
- Health effects and medical information.
- Include reference to the roster that indicates those persons medically treated and their disposition. Provide any rapid medical evaluation reports and any Standard Form 600 (Chronological Record of Medical Care) overlays.
- Describe overall types and severity of acute and chronic health effects and the *risk levels* ranking assigned for each. If none are identified, state “none identified/anticipated.” If health effects/risk is only to unique personnel/units, explain.

SHORT-TERM RISK LEVELS

7-11. The following are short-term risk levels, health effects, and medical treatment that may occur during the mission:

- *Extremely high*—loss of ability to accomplish the mission if hazards occur during mission. Notable in-theater medical countermeasures/resources were required (protection, treatment, exposure documentation).
- *High*—significant degradation of mission capabilities in terms of the required mission standard, inability to accomplish all parts of the mission, or inability to complete the mission to standard if hazards occur during the mission. Some in-theater medical countermeasures/resources (for example, protection, treatment, and exposure documentation) required.
- *Moderate*—limited degradation of mission capabilities. Limited in-theater medical countermeasures/resources.
- *Low*—expected losses have little or no impact on accomplishing the mission. No in-theater medical resources required/anticipated other than documentation for health incident technical summary.

Note. Personnel may be grouped into different exposure categories (reflecting different exposure levels/durations/estimated severity of exposure). These different groups may then each be designated with different risk levels.

LONG-TERM RISK LEVELS

7-12. The following are long-term risk levels, chronic effects, and medical surveillance that may occur postdeployment:

- *Extremely high*—significant future medical surveillance activities and medical provider resources anticipated. Document IRS and exposure data in designated DOD archive and designate a registry to actively track the identified personnel/group and conduct specific active surveillance and/or medical follow-up procedures for life cycle of identified group.
- *High*—notable future medical surveillance activities and related resources anticipated. Document IRS and exposure data in designated DOD archive; specifically identified exposed personnel/group documented; possible passive medical surveillance activities for this group.
- *Moderate*—limited future medical surveillance activities and related resources anticipated. Document IRS and exposure data in designated DOD archive; document potential groups/personnel of interest.
- *Low*—no specific medical action required. Document IRS and exposure data in designated DOD archive.

Note. Personnel may be grouped into different exposure categories (reflecting different exposure levels/durations/estimated severity of exposure). These different groups may then each be designated with different risk levels. It is recommended that long-term risk estimates be coordinated with a Service health surveillance center physician.

7-13. When completing the IRS, especially for assessing the degree of any potential long-term health risks of concern and/or follow-up medical surveillance, and preparing risk communication products (fact sheets, briefings), preventive medicine/public health personnel should contact Service subject matter experts for consultative assistance, see Table 7-1.

Table 7-1. Service consultative assistance

<i>United States Army</i>	<i>United States Navy</i>	<i>United States Air Force</i>
Army Public Health Center (Provisional) Phone: (800) 222-9698 For specific assistance with health risk reporting and documentation of potential for long-term health effects and medical surveillance, contact the Army Public Health Center (Provisional) Environmental Medicine Clinical Consult Service at email: USAPHC-environmentalmedicineprogram@amedd.army.mil Phone: (410) 436-2714	Navy and Marine Corps Public Health Center Phone: (757) 953-0700	U.S. Air Force School of Aerospace Medicine (USAFSAM) Phone: (888) 232-3764

SUBMISSION OF INCIDENT REPORT SURVEY

7-14. When completed, the IRS and all associated attachments/documents, including copies of IFAS, associated roster, analytical data, medical treatment/rapid medical evaluation information, and risk communication products (for example, fact sheets and briefings) should be submitted to the combined JTF surgeon/FHP officer who is ultimately responsible for final determination and submittal to the Military Exposure Surveillance Library or Service-specific data collection system.

WATER SAFETY AND MANAGEMENT

7-15. During military operations, the contamination of water, whether intentional or inadvertent, may reach concentrations that will and could produce mass casualty proportions, not only for U.S. and coalition forces, but also, all civilians, plants, and animals in the AO.

7-16. Water supplies directly affect the combat efficiency, morale, general health, and welfare of Service members in battle. It is required for consumption, sanitation, and decontamination. The quantity required depends upon the regional climate and the type and scope of operations. The quality necessary depends on the intended use of the supply. Water requirements are significantly greater in sustainment areas, where there is heavy demand for aircraft and vehicle washing, medical treatment, laundry and bath facilities, and construction projects. Patient and equipment decontamination require large amounts of water.

7-17. The presence of contamination can be determined only by special methods of analysis. Water samples for identification or verification of CBRN threats and hazards contamination are collected by preventive medicine/public health personnel. The supporting laboratory should provide guidance on sampling procedures and collecting kits for use in collecting the samples.

7-18. Treatment of contaminated water requires chemicals and equipment that are only available to logistics water units. Individual Service members or units should not attempt to treat their water. Contaminated water may be decontaminated only when clean sources are not available. These decontamination operations must have the approval of the medical authority (preventive medicine/public health personnel or command surgeon).

WATER SAMPLE COLLECTION

7-19. Water is supplied as either a packaged or bulk product. A packaged product is manufactured and procured, stored, transported, and supplied in a container. Water in larger quantities is supplied by water buffalo, tanker truck or blivet.

DETECTION OF CONTAMINANTS IN WATER

7-20. The military standard issue of CBRN detection, protection, and decontamination equipment provides the unit with the ability to detect and protect against a number of CBRN agents. See information below, and also refer to TB MED 577/NAVMED P-5010-10/AFMAN 48-138_IP; NAVMED P-5010-9 for additional information:

- Detection of chemical agents is accomplished by using water test kits or chemical agent detectors such as Fourier transform infrared spectroscopy and portable mass spectrometry/gas chromatography.
- Detection of nuclear contamination in water is accomplished by using radiological survey instrumentation and counting techniques appropriate for the type and quantity of radiation suspected. A radiation subject matter expert should be consulted when in doubt.
- Detection of biological agents in water is accomplished in the field by the use of microbiological test kits. The specialty kits will be provided as needed and will be available to preventive medicine/public health personnel and supporting laboratory personnel.

7-21. When contamination is discovered, the following actions are taken:

- Mark the water source using the standard contamination markers; ensure that personnel do not consume the water until approved.
- Notify the commander that the water source is contaminated and unfit for drinking, food preparation, and personal hygiene. The commander establishes safeguards to prevent personnel from using the contaminated water supply.
- An alternative source of uncontaminated water is sought and used. The primary source for obtaining water is from logistics-operated water production and distribution points. Other sources are considered only when logistics-operated facilities are not available. Alternative sources that may be considered include—
 - Ground water source which is least likely to be contaminated.
 - Local fixed facility water supplies.
 - Movement to another location to obtain an uncontaminated water source, when the tactical situation permits.

7-22. Contaminated water must not be used until it has been treated by logistics water purification units and approved for use by the medical authority.

TREATMENT OF CONTAMINATED WATER

7-23. Contaminated water requires additional equipment and supplies to remove the contamination. Logistics water purification and distribution units are equipped to perform these duties.

7-24. Commanders and their staffs at all levels must be concerned about maintaining water support to allow completion of the unit's mission. To ensure adequate support, commanders and their staffs should address planning for tactical water support in all OPLANs and orders.

ENGINEER SUPPORT

7-25. Final selection of a fixed decontamination site is the responsibility of the local commander, usually assisted by the CBRN unit in charge. Direct coordination with an engineer unit must be done so the engineer commander is aware of the requirements for such an area.

Site Selection

7-26. A fixed decontamination site should be easily accessible but out of contamination range of populated areas. It should be large enough to accommodate planned operations and have drainage and soil characteristics favorable for operations and storage of contaminated materials. Water is an integral part of the decontamination process. Though nonpotable water is used, it must be available, not contaminated by CBRN agents and TICs, and in sufficient quantities or the decontamination operation will cease to function. The site should be favorable for cover and concealment.

Site Preparation

7-27. The work required to prepare and maintain the site is determined by the CBRN unit responsible for the site, but can be expected to include clearing and grading, drainage analysis, and construction of drainage facilities and hazardous waste holding facilities. Horizontal construction and maintenance of showers, wash racks, and other structures as required and hardening of the site are engineer tasks. Well drilling, water source improvement, and other support may be required to help the logistics unit supply potable water for the decontamination site.

Storage of Contaminants

7-28. A large decontamination site generates quantities of contaminated water and materials. The CBRN unit in charge of the site plan is responsible for permanent disposal of these materials. Engineers, however, are involved in temporary storage of these materials, particularly contaminated water. Extreme care must be taken to prevent escape of contaminated water or materials into the surrounding area, especially into potable water sources and sanitation systems. Contaminated water may be treated for reuse depending on contaminants.

Responsibilities

7-29. The Army Service component command commander is responsible for the control and distribution of water to U.S. Army forces, to other U.S. Services, and, as required, to allied support elements. The Army Service component command Deputy Chief of Staff for Logistics has the overall responsibility for developing the water distribution plan for the theater and supervising the Army Service component command commander's priorities and allocation procedures. Logistical personnel or host nation support, if available, operate and perform organizational maintenance on semipermanent and permanent water purification utilities at fixed installations.

Logistics Organizations

7-30. The logistics organizations are responsible for the management, control, purification, storage, and distribution of water, including organizational maintenance of water equipment. Initially existing developed and surface sources are used before ground water resources are tapped. The employment of CBRN munitions can contaminate surface water supplies over a wide area. Subsurface water supplies are unlikely to be contaminated at first. Earth and rock layers are effective in diminishing contamination. In a CBRN emergency, it may be necessary to use a subsurface water supply.

Environmental Effects on Planning

7-31. Environmental conditions determine the location of water sources and how much water is needed for subsistence. Refer to Tables 7-2, 7-3, 7-4, and 7-5, on pages 7-8 and 7-9, for environmental factors' advantages and disadvantages. Specific guidance regarding environmental factors is found in FM 3-34, FM 90-3 and FM 90-5.

Table 7-2. Environmental factors-temperate regions

<i>Temperate regions</i>	
<i>Advantages</i>	<i>Disadvantages</i>
Abundant resources. Lakes. Streams. Rivers. Existing wells. Local water systems. Sources convenient to locate, develop, and access. Water sources can be purified at small unit level. Drinking water does not require cooling.	Surface sources easily contaminated by chemical, biological, radiological, and nuclear munitions. Natural contamination possible by organics, disease-bearing organisms, and inorganic salt. Environmental pollution from local development such as septic fields may contaminate ground water.

Table 7-3. Environmental factors-tropical regions

<i>Tropical regions</i>	
<i>Advantages</i>	<i>Disadvantages</i>
Water resources available but more scattered. Lakes. Streams. Rivers. Existing wells. Local water systems. Water sources can be purified at small unit level.	Surface sources easily contaminated by chemical, biological, radiological, and nuclear munitions. Dense vegetation may make access difficult. Increase of natural contamination. Presence of waterborne diseases and parasites capable of transmitting disease may make water unsuitable for bathing and laundry use until disinfected. Higher water use needed because of high humidity and heat.

Table 7-4. Environmental factors-frigid climates

<i>Frigid climates</i>	
Advantages	Disadvantages
Water resources may be abundant, but frozen. Lakes. Rivers. Streams. Existing wells.	Increased consumption to prevent dehydration. Water purification, storage, and distribution system must be protected from freezing. Snow and ice are impractical to melt for other than very small units due to excessive fuel needed for melting.

Table 7-5. Environmental factors-arid regions

<i>Arid regions</i>	
Advantages	Disadvantages
None.	Surface fresh water almost nonexistent. Available water sources limited and widely dispersed. Increases water use to prevent heat casualties. May dictate the tactical scenario. Lack of water makes extensive storage and distribution system vital.

7-32. Once a well is completed by installing casings, screens, and pumps, it is turned over to logistics water units for use. To prevent contamination, wells must be capped when they are no longer needed. In order to expedite reopening of closed wells, agreements have been made between many host nations to standardize capping and labeling. These procedures are covered by the NATO STANAG 2885.

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Chapter 8

Medical Laboratory Support

GENERAL

8-1. Medical laboratory services must continue their support role even under CBRN conditions. These laboratory services can be located at various roles of care and MTFs within a theater of operations. Laboratories providing analytical services for clinical specimens (for example, human blood, tissue, and bodily fluids) are commonly referred to as diagnostic laboratories. All diagnostic laboratories are required to adhere to federal standards established in DODI 6440.02, Clinical Laboratory Improvement Program. Other designated support laboratories within the theater, such as the U.S. Army's AML or the USN's forward-deployable preventive medicine unit (FDPMU) which provide analysis of environmental CBRN samples (for example, air, food, soil, and water) are commonly referred to as environmental laboratories. These environmental laboratories may also be capable of providing follow-on field confirmation and/or theater validation analysis for CBRN agents within a clinical specimen when additional testing is required. Environmental laboratories are not regulated by DODI 6440.02; however most perform quality assurance/control, sustainment training, and proficiency testing to validate capabilities.

MEDICAL TREATMENT FACILITY CLINICAL LABORATORIES

8-2. At Role 2, medical laboratory support may be very limited. Diagnostic testing for evidence of CBRN exposure or disease may be difficult unless technologies are present to ensure high levels of safety (for example, biological safety cabinets). Laboratory personnel prepare collected suspect CBRN specimens for submission to supporting medical laboratories while maintaining chain-of-custody.

8-3. At Role 3, medical laboratory support in a field hospital is intended for providing clinical laboratory support and is primarily in support of acute surgical cases, blood services, and immediate services required for intensive care operations. Microbiology services may also be available to include bacterial culture and antimicrobial sensitivity testing. A polymerase chain reaction technology has been fielded to most Role 3 MTF laboratories for initial field confirmation analysis of BW agents. Patients with documented or suspected exposure to CBRN weapons/agents will be medically evaluated; specimens will be collected, packaged, and a chain-of-custody will be established and forwarded through technical channels to a supporting medical laboratory for further analysis.

8-4. In a mature theater, most hospitals will have DOD-validated diagnostic platforms so that field confirmation may be promptly completed. Specimens are only forwarded through technical channels for definitive analysis.

8-5. If specialized diagnostic laboratory assets are unavailable within the area of responsibility, clinical specimens may be forwarded to the nearest OCONUS clinical diagnostic laboratory at Landstuhl Regional Medical Center, Tripler Medical Center, or 121st General Hospital or to the closest CONUS reference laboratory. The combatant command surgeon will be able to provide a recommendation on where to send specific samples to get the fastest results back.

8-6. Designated medical laboratories are equipped to perform the necessary additional analyses to provide definitive identification of suspect CBRN and other infectious agents of command and DOD interest. Definitive identification supports attribution to implicate or point to the source of the identified material. The definitive identification of suspect BW/CW agents also aids commanders in the AO in maintaining the health of their command and implementing appropriate FHP.

FIELD (ENVIRONMENTAL) LABORATORIES

8-7. This section discusses Service's field laboratory capabilities.

AREA MEDICAL LABORATORY

8-8. The AML is the Army's specialized theater laboratory that deploys worldwide as a unit or by task-organized teams to perform surveillance, analytical laboratory testing and health hazard assessments of environmental, occupational, endemic, and CBRN threats in support of force protection and WMD missions. It is organized as—

- Staff (headquarters) section—this section provides command and communications support for the unit and accomplishes all required administrative functions of the unit.
- Analytical chemistry (CBRN) section—this section conducts analytical chemistry support by providing identification of chemical agents in water and soil.
- Microbiology (endemic) section—this section conducts biological agents analysis using multiple methodologies; provides identification of endemic disease agents, and supports animal pathology and endemic disease surveillance.
- Occupational and environmental health surveillance section—this section provides identification for environmental samples and clinical specimens using multiple methodologies. This section also provides diagnostic capability to identify outbreaks of regionally specific endemic diseases and serves as a resource of information for higher command medical personnel.

BIOLOGICAL AUGMENTATION TEAM

8-9. The BAT is a USAF asset that provides expertise in biological identification and risk analysis. This capability may be utilized to augment existing and future medical UTCs as well as JTFs. In addition, it may augment the capabilities of the Bioenvironmental Engineering Surveillance teams, PAM teams, TET and/or all of them as part of the tailored AFMS CBRN Force Module.

FORWARD-DEPLOYABLE PREVENTIVE MEDICINE UNITS

8-10. The FDPMU are rapidly deployable, portable, flexible and sustainable preventive medicine platforms that provide advanced FHP support to forward deployed elements of the naval and Joint force. These units are able to identify and assess environmental hazards through advanced detection and diagnostic equipment and real-time analytical capabilities to include field confirmation and theater validation identification of CBRN agents and recommend countermeasures to reduce risk to troops. A complete FDPMU or selected UTC is capable of deploying within 4 to 10 days of receiving a valid deployment order. Once equipment and personnel are deployed, partial analytical capabilities become available within 24 hours with full analytical capabilities available within 48 hours.

SEABASING PLATFORMS

8-11. Medical departments on aircraft carriers; large deck amphibious assault ships (general purpose); hospital ships; and command ships are also equipped to provide necessary fast-turnaround field confirmatory and theater validation-level laboratory testing capabilities for environmental samples from other ships assigned to carrier strike groups, expeditionary strike groups, or other units operating within the area of responsibility.

SAMPLE COLLECTION AND MANAGEMENT OF CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR HAZARDS

8-12. The means to initiate a sample/specimen collection and analysis for CBRN hazards include—

- Routine operating procedures.
- Chemical, biological, or radiological samples collected from field units or detector/warning systems.
- Combat injuries.
- Symptomatic individuals.
- Commander requests for information through command channels.

8-13. The decision makers and initiators of a CBRN sample collection and analysis mission include Joint and Service-specific commanders, command surgeons, and their supporting medical and CBRN staff elements.

8-14. Collection of suspect CBRN environmental and food samples is conducted by qualified preventive medicine personnel, AML field laboratory personnel, CBRN specialists, damage control personnel, veterinary personnel, public health officers, technical intelligence collection teams, or bioenvironmental engineering personnel. Similarly, human or animal clinical specimens (for example, serum, blood, and other body fluids) are collected by trained medical personnel in clinical, veterinary, or hospital settings utilizing the appropriate universal safety precautions and provided to appropriate medical diagnostic laboratories for analysis. Laboratory personnel will provide consultation, as needed, regarding the types and sources of samples to collect. In order for personnel to be qualified to perform CBRN sample/specimen collection, they must be trained on the procedures for collection, labeling, chain of custody, and transport of CBRN samples/specimens found in ATP 3-11.37/MCWP 3-37.4/NTTP 3-11.29/AFTTP 3-2.44. For any CBRN specimen or sample, the supported unit's CBRN staff may specify a CBRN Response Team to receive and transport the sample. The staff will need to be supplied with the results of the analysis in a timely manner to aid in rapid decisionmaking.

8-15. Suspect samples are collected and initially packaged by the unit obtaining the sample. The sample will be properly labeled, double-bagged, and prepared for shipment. If possible, the exterior of the sample container and transport bag should be decontaminated using approved methods in order to reduce the likelihood of accidental exposure. Ensuring that the chain-of-custody is maintained, the sealed samples are sent to a sample transfer point (which is often the nearest capable laboratory asset), to the nearest appropriate medical laboratory for identification. It is critical that the sample be maintained within a temperature range of 2°C (35.6°F) to 8°C (46.4°F) using ice or refrigeration during storage and transport. If a sample transfer point is used, a sample courier officially takes over custody of the samples for transport to an in-theater medical laboratory or ship-based laboratory for identification to support any appropriate treatment decisions. If there is an in-theater field laboratory, the sample can be split for theater validation identification and sent to a CONUS laboratory for analysis and definitive identification. If background samples are requested by an in-theater laboratory or ship-based laboratory, for whatever reason, evacuation will be conducted in the same manner ensuring that the chain-of-custody is maintained throughout the transfer or evacuation process. Sampling and evacuation procedures for BW samples are discussed in detail in ATP 4-02.84/MCRP 4-11.1C/NTRP 4-02.23/AFMAN 44-156_IP.

Notes. 1. There are two types of samples: *environmental sample* which refers to nonhuman and nonanimal origin and *clinical specimen* which refers to human and animal origin.

2. Always consider that multiple known/unknown agents may be present before collecting a sample. Whenever possible, screen for chemical and radiological agents before collecting a biological sample. Chemical agents can damage or destroy biological agents. Also, chemical agents not identified in the sample can pose a hazard to the receiving laboratory personnel. Mark all samples that are potentially contaminated with chemical agents as such.

3. Precautions should be taken to protect the sample collector from potential BW agents; at a minimum, respiratory protection and rubber gloves must be worn. Additional care must be taken when collecting samples to prevent cross contamination. Disposable gloves should be worn as the outer layer of personal protection and must be changed between sample collection.

4. Environmental samples should be delivered to designated supporting environmental laboratory for processing. To the maximum extent possible, environmental samples should not be delivered to a clinical laboratory for analysis without prior approval from the MTF commander due to the increased risk of accidental contamination. This will prevent accidentally spreading a CBRN agent in the MTF.

8-16. The CCDR/command surgeon must ensure it has an executable plan to get the samples to the supporting laboratories. In some cases, dedicated escort unit assets are used to escort samples. The priority

for dedicated escort unit assets will likely escort samples from the theater back to the CONUS-based nationally recognized reference laboratories for definitive analysis and identification.

8-17. Samples suspected of containing CBRN agents must be collected and transported using accepted chain-of-custody procedures (such as DA Form 4137, DD Form 1911, OPNAV Form 5580/22 or other form acceptable to law enforcement and federal agencies) to ensure sample-handling integrity for legal purposes. The Judge Advocate General's Office provides guidance and reviews on chain-of-custody procedures. See ATP 3-11.37/MCWP 3-37.4/NTTP 3-11.29/AFTTP 3-2.44 and Joint Biological Agent Identification and Diagnostic System CONOPS for procedural details. Chain-of-custody procedures are used to track all holders of the sample until the sample is destroyed.

8-18. A strict chain-of-custody must be maintained for every environmental sample or clinical specimen collected. The chain-of-custody document must accompany the sample or specimen during transport from the point of collection to the receiving medical or environmental laboratory to the final disposition of the sample. Each time the sample or specimen is transferred to another individual, the receiving person must sign the document to show that he received the sample or specimen and state what happened to it while in his custody. The document will provide answers to the following questions about the sample or specimen:

- Who collected the sample?
- When was it collected?
- Who has maintained custody of it?
- What has been done with it at each change of custody?

8-19. For clinical specimens, routine clinical laboratory custody procedures will be employed until the presence of a CBRN agent is suspected based on prior intelligence or initial laboratory testing at which time chain-of-custody procedures will be initiated. Chain-of-custody forms may be initiated prior to determining the presence of a CBRN agent, if desired.

8-20. Chain-of-custody forms are employed when moving specimens/samples to different locations within the same laboratory facility, upon shift changes, and when shipping/transporting specimens/samples to another laboratory. Every aliquot of specimens/samples *must* be accounted for on the chain-of-custody forms until approved for disposal or destruction by the Federal Bureau of Investigation or commander.

HANDLING AND STORAGE OF SPECIMENS/SAMPLES WITHIN THE LABORATORY

8-21. This section discusses the handling and storage of specimens/samples within the laboratory.

INCOMING SPECIMEN/SAMPLE DISINFECTION

8-22. Although specimen/sample containers should have been decontaminated at the time of collection, upon arrival at the laboratory, the outer specimen/sample container should be disinfected again (for example, wipe with chlorine solution [10 percent bleach/chlorine solution made by mixing one part undiluted bleach from the bottle with 9 parts water]) and placed into a protective container (for example, self-sealing plastic bag). This procedure should be performed outside the entrance to the laboratory so as to prevent contamination of the laboratory.

STORAGE

8-23. Specimens/samples should be stored at temperatures appropriate for the sample type, which is usually in a refrigerator (4°C [39.2°F]) for a short time (up to 1 hour) until they can be processed. After the specimen/sample has been split (for example, aliquot taken for analysis), the unused portion of the specimen/sample is usually stored in the refrigerator. Because of the potential hazardous nature of CBRN samples/specimens, good physical security on the storage area must be maintained. Storage containers are to be physically secured to control access so as to maintain chain-of-custody and assure biosafety.

SPECIMEN/SAMPLE ACCESSIONING

8-24. Recording and maintenance of pertinent data about the specimen/sample in the laboratory records is critical so that the specimen/sample can be tracked and results reported to the appropriate physician, unit, or agency. Using established laboratory SOP and worksheets, record the type of specimen/sample, location from which it was obtained, date and time of collection, specimen/sample identifying number, patient identifying information (if appropriate), and other pertinent information, and assign a unique laboratory accession number to each individual specimen/sample. In this process, the laboratory must record the specimen/sample identification number assigned by the collector, if one exists (see ATP 3-11.37/MCWP 3-37.4/NTTP 3-11.29/AFTTP 3-2.44). Data may be maintained using either paper records or secure computer databases that meet the needs of the laboratory. The operations security of such records must be maintained. Patient information may be shared under the Health Insurance Portability and Accountability Act Privacy Rule in an emergency situation, and to serve as a reminder that the protections of the Privacy Rule are not set aside during an emergency. The Health Insurance Portability and Accountability Act of 1996 Privacy Rule protects the privacy of patients' protected health information but is balanced to ensure that appropriate uses and disclosures of the information still may be made when necessary to treat a patient. For more information on Health Insurance Portability and Accountability Act of 1996, go to the U.S. Department of Health and Human Services Web site.

BIOLOGICAL SAFETY IN THE LABORATORY

8-25. According to standard safety practices and Service-specific directives, medical units/facilities will analyze clinical specimens and/or environmental samples according to their established laboratory SOP and current doctrine and policies. This will minimize the potential for spreading contamination within the laboratory facility and MTF. Standard precautions (appropriate PPE such as gloves, gowns, masks) must be used when handling and analyzing specimens/samples. When processing an unknown specimen/sample, utilize the highest available Biological Safety Cabinet in conjunction with universal standard precautions to help protect personnel from specimen/sample aerosolization and to prevent cross contamination within the laboratory. Class II Biological Safety Cabinets provide the minimum level of protection necessary to protect against specimen/sample aerosolization.

8-26. Due to the situation, it may not be feasible for the specimen/sample to be shipped in a timely manner to a laboratory having better containment capabilities. Therefore, under these circumstances, field laboratories should use the best containment and decontamination procedures to process the initial specimens/samples. On occasion, CDC and World Health Organization field laboratories have used biosafety Level-2 conditions for these agents. A health risk assessment should be completed to evaluate risk, adequacy of control measures, and the need for additional controls such as powered air purifying respirators. Services will determine procurements of additional environmental engineering controls. If additional respiratory protection is utilized, Services must ensure that proper certification and training are achieved.

8-27. The handling of specimens/samples that may contain Ebola, Marburg, or Variola viruses require additional precautions. Procedures recommended for handling these suspect specimens/samples include—

- Commanders should make the greatest effort possible to protect the laboratory personnel from these agents. However, assays for these agents are available in field deployed laboratories because the need for laboratory results in a timely manner is imperative.
- If rapid test results are urgently needed and no laboratory with suitable biological containment facilities is close by, process the initial specimen/sample using the highest biological safety level possible. Once the patient or environmental material is known to contain Ebola, Marburg, or Variola, make all reasonable efforts to send future similar specimens/samples to a laboratory with appropriate biological containment facilities. Commanders should make all reasonable efforts to limit the further exposure of laboratory personnel to these agents.
- Dispose of all biohazardous waste using normal biohazard waste transport, tracking, and disposal (incineration) procedures.

FOUR LEVELS OF CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR IDENTIFICATION

8-28. The information below outlines the DOD four-tier system for determining the identification of CBRN hazards. These tiered levels provide a consistent basis for applied military operational decisionmaking at the tactical, operational, and strategic levels.

8-29. The higher the level of identification completed on a CBRN hazard—the higher the confidence the commander has that a CBRN attack or incident has occurred. Specimens/samples may not require analysis at all four levels of identification. An example of this is a presumptively identified CBRN sample sent directly to a theater validation laboratory. An overview of the levels of identification is provided in Figure 8-1.

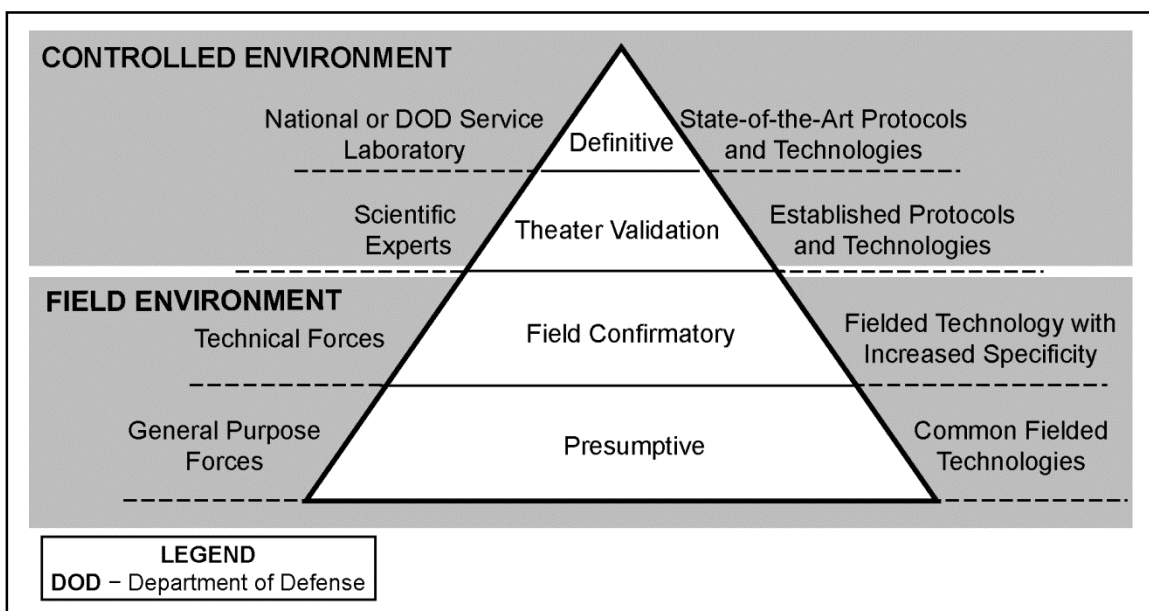


Figure 8-1. Overview of the four chemical, biological, radiological, and nuclear levels of identification

Note. In Figure 8-1, *Technical Forces* are those specially trained and equipped forces that possess a higher degree of CBRN detection and sampling capability compared to conventional forces.

8-30. In OCONUS, preventive medicine personnel, AML field laboratory personnel, CBRN specialists, damage control personnel, veterinary personnel, public health officers, technical intelligence collection teams, or bioenvironmental engineering personnel collect suspect CBRN environmental and food samples while trained medical personnel in a clinical, veterinary, or hospital setting utilizing the appropriate universal safety precautions will collect human or animal clinical specimens. These samples/specimens are then routed through the different levels of CBRN identification as depicted in Figure 8-2.

8-31. In CONUS, the samples/specimens are sent through the Laboratory Response Network (LRN) national network of laboratories. The LRN network includes the following types of laboratories:

- Federal—these include CDC, the U.S. Department of Agriculture, the Food and Drug Administration, and other facilities run by the federal agencies.
- State and local public health—these laboratories are run by the state and local departments of health.
- Military—these are laboratories operated by the DOD.
- Food testing—these include Food and Drug Administration, U.S. Department of Agriculture, and others that are responsible for ensuring the safety of the food supply.

- Environmental—including laboratories that are capable of testing water and other environmental samples.
- Veterinary—Some LRN laboratories such as U.S. Department of Agriculture, are responsible for animal testing.

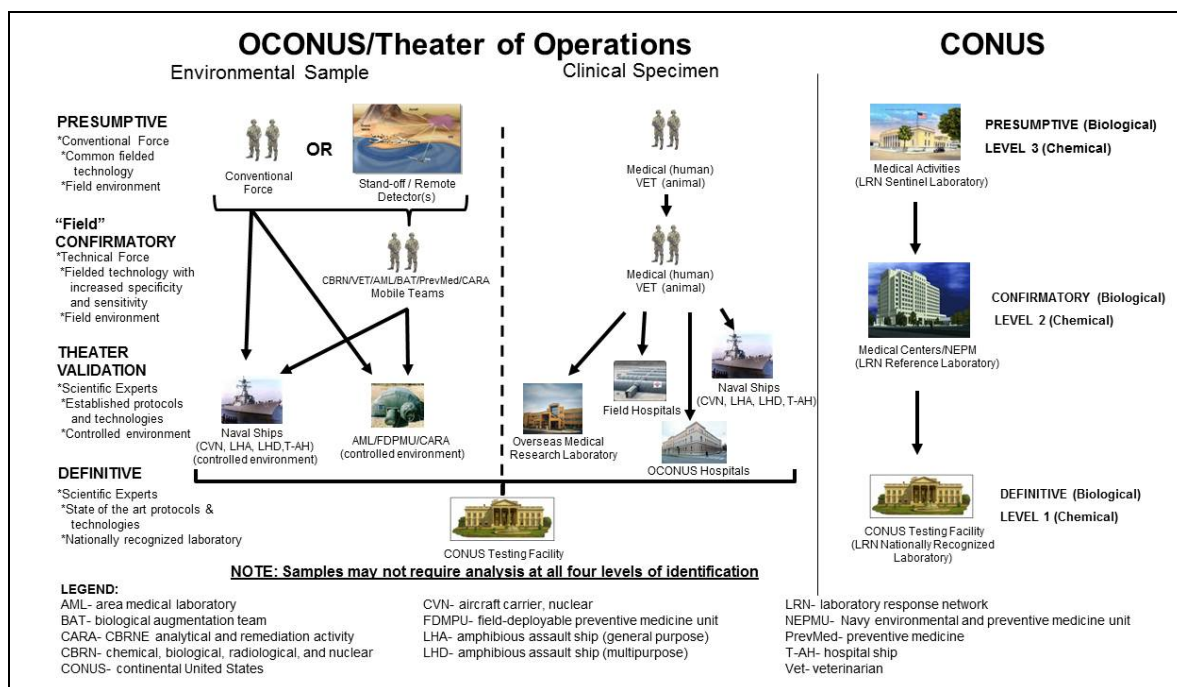


Figure 8-2. Levels of chemical, biological, radiological, and nuclear identification

Notes.

1. Veterinary personnel and the USAF BAT are able to provide field confirmatory identification to biological samples only.
2. U.S. Army preventive medicine personnel are able to provide field confirmatory identification to chemical samples only.
3. Forward deployed Navy medical assets including the forward-deployable preventive medicine unit and those aboard aircraft carriers, amphibious assault ships (general purpose), and amphibious assault ships (dock) continue to operate within a three-tiered system and conduct both field confirmatory and theater validation level analyses on suspected BW materials within the same laboratories.
4. Technical CBRN forces can perform field confirmatory identification to chemical and radiological samples only.

PRESUMPTIVE IDENTIFICATION

8-32. Presumptive identification is the employment of technologies with limited specificity and sensitivity by conventional forces in a field environment to determine the presence of a chemical, biological, radiological, and/or nuclear hazard with a low level of confidence and the degree of certainty necessary to support immediate tactical decisions.

8-33. Presumptive identification is obtained using commonly fielded devices/materials/technologies available to conventional forces to indicate/warn of the possible presence of a CBRN/target substance.

It provides important information to support warning decisions and actions, such as taking avoidance, protection, and decontamination measures.

FIELD CONFIRMATORY IDENTIFICATION

8-34. Field confirmatory identification is the employment of technologies with increased specificity and sensitivity by technical forces in a field environment to identify chemical, biological, radiological, and/or nuclear hazards with a moderate level of confidence and the degree of certainty necessary to support follow-on tactical decisions.

8-35. Field confirmatory identification is obtained using fielded devices/materials/technologies that are available to specially trained personnel and units in a field environment that includes collection and analyses of samples to substantiate the presence and type of a CBRN/target substance at a given area/location. Field confirmatory identification can be used to prove (or disprove) previous presumptive results. It results in higher confidence levels to support tactical decisions regarding avoidance, protection, and decontamination measures and immediate treatment.

THEATER VALIDATION IDENTIFICATION

8-36. Theater validation identification is the employment of multiple independent, established protocols and technologies by scientific experts in the controlled environment of a fixed or mobile/transportable laboratory to characterize a chemical, biological, radiological, and/or nuclear hazard with a high level of confidence and the degree of certainty necessary to support operational-level decisions.

Note. For biological theater validation identification, culture of the agent should be included when possible.

8-37. Using accepted quality assurance measures, theater validation quantifies the CBRN sample. It provides additional critical information to support timely and effective decisions regarding avoidance, protection, and decontamination measures and medical prophylaxis and treatment for affected units and personnel. It can also support preliminary attribution to implicate or support trace analytics for the source of the identified CBRN material.

DEFINITIVE IDENTIFICATION

8-38. Definitive identification is the employment of multiple state-of-the-art, independent, established protocols and technologies by scientific experts in a nationally recognized laboratory to determine the unambiguous identity of a chemical, biological, radiological, and/or nuclear hazard with the highest level of confidence and degree of certainty necessary to support strategic-level decisions.

Note. For biological definitive identification, culture of the agent needs to be included.

8-39. The definitive identification process may take several hours to a couple of days (sometimes weeks) to be accomplished, depending on the number of tests required. This level of identification is performed in a reference laboratory which has a broader variety of methodologies available and highly skilled testing personnel, thus providing the highest levels of accuracy. The preliminary findings by the supporting laboratories provide leadership with valid information that can be used to initiate protective, preventive, and initial casualty care procedures; however, definitive identification is required for legal/retaliatory actions.

8-40. One aspect of definitive level of identification is accomplished by means of devices, materials, or technologies that detect two or more independent biomarker results using different methodologies, including culture. A biomarker refers to a detectable/measurable substance that is correlated with the presence of a BW agent (bacteria, virus, or toxin). Biomarkers should be unique to the biological agent, often associated with virulence, and can be independent of the biological agent's viability/infectivity/functionality. Some biomarkers are more useful or accurate in identifying the biological agent than others. Likewise, some

analytical methods are more sensitive and specific in detecting certain types of biomarkers. Types of biomarkers include—

- Nucleic acid (deoxyribonucleic acid or ribonucleic acid) sequence(s) unique to the microorganism; detected by nucleic acid amplification based techniques or sequencing.
- Unique antigens associated with the microorganism, toxin, or host response (unique proteins, polysaccharides, lipids, or any combination of these three) detected by antibody/affinity based methods, for example, enzyme-linked immunosorbent assay, electrochemiluminescence, or lateral flow.
- Enzymatic or growth properties as demonstrated on biochemical tests or selective media, such as characteristic colony morphology on culture and phage inhibition.
- Microscopic characteristics, such as those identified using Gram stain, fluorescent antibody stain, immunohistochemical stain, or cytopathic effects.

8-41. New biomarker technologies are also being utilized to identify exposure to chemical agents. For example, changes in cholinesterase levels may indicate exposure to nerve agents. Emerging biomarker technology is also expected to help in identifying radiological exposure, especially at low levels.

NATIONALLY RECOGNIZED REFERENCE LABORATORIES

8-42. Final sample or specimen identification for biological agents is accomplished at one of the nationally recognized CONUS reference laboratories such as USAMRIID, the NMRC, or the CDC. Other DOD laboratories provide vital specific technologies and expertise to support and advise both the operational forces and the nationally recognized reference laboratories. These reference and specialty laboratories are heavily involved in research to advance CBRN laboratory analytics.

8-43. The USAMRIID has played a key role as the DOD's lead laboratory for the medical aspects of biological defense. It is an organization of the U.S. Army Medical Research and Materiel Command and is the lead medical research laboratory for the U.S. Biological Defense Research Program. It is the only laboratory within DOD with the capability to study highly hazardous bacteria and viruses requiring maximum containment at biosafety Level-3 and biosafety Level-4. The USAMRIID's mission essential tasks include research and development of therapeutic countermeasures and vaccines, rapid identification of biological agents, test and evaluation of medical products, develop and maintain safety, security and surety standards as well as training and education for the military and civilian workforces.

8-44. The CDC is one of the 13 major operating components of the Department of Health and Human Services, which is the principal agency in the U.S. government for protecting the health and safety of all Americans. It is a nationally-recognized reference laboratory providing definitive identification of suspect biological agents.

8-45. The NMRC is a premier research organization that is one of DOD's nationally recognized reference laboratories. The Biological Defense Research Directorate, a subordinate organization of the NMRC, provides definitive identification of biological agents in clinical specimens and environmental samples and is a leader in the development of handheld immunological assays and molecular diagnostics that support HSS and deployment readiness.

OTHER DEPARTMENT OF DEFENSE LABORATORIES

8-46. This list is not inclusive, for more information on Service-specific CBRN defense capabilities refer to Appendix C.

The United States Army Medical Research Institute of Chemical Defense

8-47. The USAMRICD can provide laboratory support for the identification of CW agents from clinical specimens and technical guidance on prevention, protection, and medical management of CW agent injuries.

The Armed Forces Radiobiology Research Institute

8-48. The Armed Forces Radiobiology Research Institute can provide technical and laboratory support for nuclear and radiological incidents or events. They can provide identification on the type of radiological hazard that exists and provide recommendations on shielding, hazard levels, and preventive measures. However, their laboratory support capabilities are very limited.

The United States Army Public Health Center

8-49. The APHC can provide medical and scientific expertise to prevent adverse health effects resulting from CBRN threats. Support includes hazard characterization, site characterization, hazard mitigation, material management, medical surveillance and exposure documentation.

The Army Materiel Command Treaty Laboratory

8-50. The Army Materiel Command Treaty Laboratory was established to verify compliance with the Chemical Weapons Convention.

Defense Laboratory Network

8-51. The Defense Laboratory Network was formalized in 2011 under DODI 6440.03 and is responsible for coordinating operational systems of DOD laboratories, programs, and activities possessing analytic or response capabilities. The Defense Laboratory Network is an active member network of the Federal Interagency Integrated Consortium of Laboratory Networks and its Network Coordinating Group.

Edgewood Research, Development and Engineering Center

8-52. The Edgewood Research, Development and Engineering Center maintains a rapidly deployable mobile environmental monitoring and technical assessment system. This mobile analytical response system provides a state-of-the-art analytical assessment of chemical or biological hazards at incident sites.

The Department of Defense Food Analysis and Diagnostic Laboratory

8-53. The DOD Food Analysis and Diagnostic Laboratory is an accredited public health laboratory services to support worldwide DOD FHP through scientifically sound, timely, and accurate testing.

The Navy Environmental and Preventive Medicine Unit

8-54. The Navy Environmental and Preventive Medicine Units are strategically located at installations around the world and offer specialized consultation, advice, and recommendations in matters to include chemical, biological, radiological and environmental defense to units of the operational forces in the areas assigned. The units provide laboratory support for outbreak investigations of BW agent identification or special studies involving disease surveillance. The forward-deployable preventive medicine units have deployable teams with the capability of performing field confirmatory identification of biowarfare agents in a deployed setting.

The United States Air Force School of Aerospace Medicine

8-55. The USAF School of Aerospace Medicine (radiochemistry laboratory) can provide definitive identification of radiological samples.

The Air Force Radiation Assessment Team

8-56. The AFRAT is based with the USAF School of Aerospace Medicine and can provide much of this radio-analytical capability in the field when the appropriate unit tasking code is requested according to its mission capability statements.

The United States Air Force Bioenvironmental Engineering

8-57. The USAF Bioenvironmental Engineering units can provide field confirmatory identification of CBRN agents and quantification of some chemicals and radiological hazards.

The United States Air Force Biological Augmentation Team

8-58. The BAT can provide commanders with rapid, specific pathogen identification and field confirmation level analysis.

LABORATORY RESPONSE NETWORK

8-59. The LRN was established by the Department of Health and Human Services, CDC in 1999 in accordance with Presidential Decision Directive 39. The LRN is charged with the task of maintaining an integrated network of state and local public health, federal, military, and international network of laboratories that can respond quickly to acts of chemical or biological terrorism, emerging infectious disease, and other public health threats and emergencies. The linking of state and local public health laboratories, veterinary, agriculture, military, and water- and food-testing laboratories is unprecedented. Refer to the LRN Web site for more information.

Laboratory Response Network-Biological

8-60. The Laboratory Response Network-Biological (LRN-B) is a national and international integrated network of laboratories that are fully equipped to respond quickly to acts of biological terrorism, emerging infectious diseases, and other public health threats and emergencies. In the U.S., the LRN-B accomplishes this mission using a network of community hospital laboratories, local, county and state public health laboratories, select federal laboratories and the CDC.

8-61. Providing the base of the LRN-B are the Sentinel Laboratories, which are hospital clinical microbiology laboratories. These laboratories play a key role in the early detection of biological agents. Sentinel laboratories provide routine diagnostic services, rule-out, and referral steps in the identification process. While these laboratories are not equipped to perform the confirmatory tests, they can culture clinical specimens and identify presumptive biological threat agents. Sentinel laboratory personnel then forward the presumptive agents to LRN-B Reference Laboratories for confirmatory testing.

8-62. The LRN-B Reference Laboratories have the capability to confirm the identity of select biological threat agents. They are made up of more than 150 state and local public health, military, international, veterinary, agriculture, food, and water testing laboratories. In addition to LRN-B laboratories located in the U.S., there are now also LRN-B Reference Laboratories in Australia, Canada, United Kingdom, Mexico, and South Korea serve as reference laboratories abroad.

8-63. The LRN-B also has National Laboratories, which are responsible for specialized strain characterizations, bioforensics, select agent activity, and handling highly infectious biological agents requiring biosafety Level-4 containment. The National Laboratories are located at CDC, USAMRIID, and the NMRC.

8-64. Refer to Figure 8-3 for the LRN-B designation.

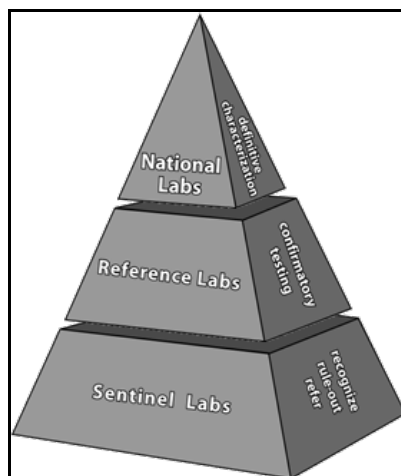


Figure 8-3. The laboratory response network for biological threats

Laboratory Response Network-Chemical

8-65. The Laboratory Response Network-for chemical threats or LRN-C is a network of laboratories which collects and tests clinical specimens to determine if there is clinical evidence of exposure to chemical agents. A designation of Levels 1, 2, or 3 identifies laboratory capabilities and defines member network participation. For more information go to: the CDC Web site. Also, refer to Figure 8-4 for laboratory designation for chemical threats.

Level 1 Laboratories

8-66. Ten laboratories currently participate in Level 1 activities. These laboratories, which serve as surge-capacity laboratories for CDC, are able to detect not only the toxic chemical agents that Level 2 laboratories can detect but also can detect exposure to an expanded number of chemicals, including mustard agents, nerve agents, and other TICs. Using unique high-throughput analysis capabilities, they expand CDC's ability to analyze large number of patient specimens when responding to large-scale exposure incidents.

Level 2 Laboratories

8-67. Thirty-four labs are designated as Level 2 laboratories. Chemists in these laboratories are trained to detect exposure to a number of toxic chemical agents. Analysis of cyanide, nerve agents, and toxic metals in human specimens are examples of Level 2 activities.

Level 3 Laboratories

8-68. Nine laboratories are designated as Level 3 laboratories. All 53 laboratories (10 Level 1s, 34 Level 2s, and 9 Level 3s) have Level 3 capacity. These laboratories (Levels 1, 2, 3) work with hospitals and other first responders within their jurisdiction to maintain competency in clinical specimen collection, storage, and shipment.

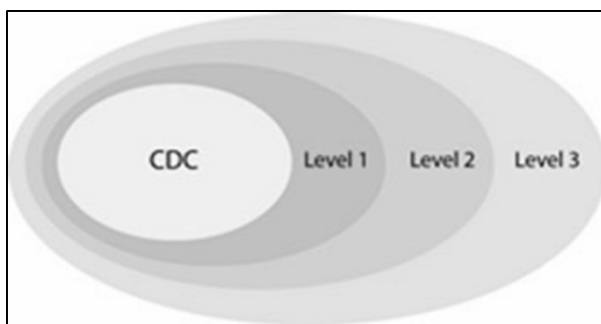


Figure 8-4. The laboratory response network for chemical threats

Chapter 9

Combat and Operational Stress Control

GENERAL

9-1. The invisible, pervasive nature of CBRN weapons creates a high degree of uncertainty and ambiguity with fertile opportunity for false alarms, rumors, and stress reactions. The terrible nature of some of these weapons will create fear for the future, the homeland, and perhaps even for the survival of civilization. The CBRN threats, regardless of origin, present significant combat and operational stress/psychological effects to the Service members.

9-2. The CBRN environment presents multiple challenges to military operations when considering combat and operations stress. The perception of a CBRN threat, whether real or not, in a high combat and operations stress environment places Service members at high risk of suffering COSR. Therefore, commanders and leaders must take actions to prevent and reduce the potential numbers of COSR cases. Working in an actual CBRN environment poses both a real and perceived danger to Service members conducting military operations. Pseudo symptoms may be experienced by those believing they have been exposed or simply overwhelmed by the operational stressors resulting from CBRN use. Whether the threat is real or perceived, the protective measures alone can be a significant stressor to Service members required to utilize them.

9-3. The symptoms and physical signs (such as sweating and feeling anxious) caused by excessive stress are similar to some signs of true CBRN agent injury. Therefore, far forward combat and operations stress triage is essential to prevent over evacuation and loss of the individual to the unit. For more information on COSC see FM 4-02.51, FM 6-22-5, and MCRP 6-11C/NTTP 1-15M, Combat and Operational Stress Control.

9-4. The key to addressing COSR resulting from CBRN operations is resiliency training in preparation for actual engagements. Leaderships must develop a CBRN training program prior to deployment that will build confidence in equipment and unit capabilities. This leads to cohesion and esprit de corps, which is a primary component in COSC.

9-5. The devastation of high-yield explosive devices along with the resultant casualties can be overwhelming for Service members who are called upon to respond to such events. The sheer magnitude of a high yield explosive can cause significant COSR in affected units and organizations, whether it is used in an adversary strike or as part of ongoing combat operations.

9-6. For personnel with adequate protective equipment, the CBRN environment serves primarily as an operational challenge which makes combat missions much more difficult and time-consuming. These factors contribute to Service members' high rates of COSRs.

9-7. Stress reactions are higher in high operational tempo which would be more common in a CBRN environment, particularly when there is little opportunity to meet physical needs like sleep. Stress reactions may present in many forms and may range from mild to severe. Below are some of the potential reactions. Awareness of these reactions can foster early intervention.

- Physical signs—rapid breathing or shortness of breath, feeling dizzy, headaches, feeling nauseated, profuse sweating or sweaty palms and rapid heart rate. In a CBRN environment, physical signs may mimic exposures to the agents due to anxiety and over-vigilance.
- Mental signs—sleep disturbance, poor attention and concentration, poor problem solving, confusion, hyper-vigilance and nightmares.

- Emotional signs—irritability, blaming others, fear or anxiety, feeling overwhelmed, guilt, denial, agitation and sadness (depressed mood).
- Behavioral signs—withdrawal, change in communication, increased alcohol consumption, change in appetite, emotional outbursts, jumpiness or being easily startled and suspiciousness.

COMBAT AND OPERATIONAL STRESS REACTION

9-8. *Combat and operational stress reaction* is the expected and predictable emotional, intellectual, physical, and/or behavioral reactions of an individual who has been exposed to stressful events in war or stability operations (JP 4-02).

9-9. Using protective clothing and other defensive measures against CBRN warfare adds to physical fatigue, primarily because of heat, visual and auditory restriction, and impeded movement. The necessity for precautions will further reduce the time available for rest and sleep, increasing exhaustion. The threat of CBRN warfare is a major source of combat and operations stress whether or not CBRN agents are actually used. The following adds significant combat and operations stress to the physical and psychological stress of MOPP:

- Associated fear of the unknown.
- High degree of ambiguity in detecting the threat.
- Uncertain short- and long-term effects of CBRN weapons.

9-10. Stress itself contributes greatly to fatigue. The CBRN COSR may include—

- Hypochondriasis—Service members may hyperalert to physical sensations, looking for warning signs. They will find things that worry them and will bring them to the doctor or medical personnel for reassurance or in hope of being sent to safety. This trend is generally observed by increased rates of sick call.
- Depression or simple exhaustion—uncertainty, lack of confidence in equipment and leaders, assuming a passive defensive posture, and new or surprise weapons all tend to increase COSR symptoms.
- Hysteria—this is a COSR with physical symptoms that mimic real CBRN injury. The early U.S. Army World War I ratio (in supposedly well-trained but inexperienced personnel) was two *gas mania* cases for every one true exposure case (a 2:1 ratio). Epidemic hysteria can occur as the first anxious person hyperventilates (breathes too fast, gets light-headed, and has *pins and needles* sensations and muscle tenseness in face, fingers, and toes). Others, seeing this and believing him to be a true gas casualty, become anxious and hyperventilate, too.
- Panic flight—this may also be epidemic. It occurs when a group feels threatened, unprepared, and believes that the only defense is immediate flight. Some event causes one Service member to run, after which the others in the group panic and run uncontrollably.
- Anxiety and *phobic* avoidance—Service members may refuse to go into places or to use equipment which is wrongly believed to be contaminated. Even when they go, they may be too anxious and cautious to perform well. They may shun people who are believed to be contagious or contaminated.
- Obsessive compulsive decontamination (*obsessive-compulsive* cleaning)—this wastes time and scarce supplies. This can even cause dermatologic problems if Service members use caustic decontamination chemicals on their skin.
- Congregating in safe areas—Service members will naturally find excuses to stay in collective protection or safe areas. Headquarters personnel in such protection areas may become isolated with the personnel in the field. Medical teams which must work in collective protection areas may find many nonpatients giving reasons to join those who are working inside and being difficult to move out. The misconduct stress behavior version of this is desertion to hide in safe areas.
- Stealing protective equipment—if there is not enough protective equipment or collective protection to go around, another potential misconduct stress behavior is stealing from or harming others to take over their protection.
- Paranoia and suspiciousness—vision and hearing are impaired in MOPP and everyone looks alike. Even friends may not be readily identified. People tend to develop a *paranoid* suspicion of the

strange, monster-like figures; they may become jumpy and shoot at shapes or sounds without checking first. This requires emphasis on vehicle and other target identification training, challenge procedures, and passwords. Identifying labels may have to be added to personalize the MOPP gear.

- Malingering—Service members who deliberately fake CBRN injury, or who self-inflict minor chemical injuries to gain evacuation are malingering, a misconduct stress behavior. Exposing one's radiation counter to radiation artificially in order to raise the count and be relieved of duty also is malingering.

9-11. Combat and operational stress reactions may include the following:

- Denial—things are too horrible for a Service member to think about, so he just thinks about something else, to assist him in coping with the threatening environment.
- Rationalization—Service members may believe that no one would be so insane as to use such terrible weapons, so why should they waste their time preparing and training for them? This type of COSR may result in lack of preparation or preparedness in the event of actual CBRN use.
- Fatalism—Service members may believe that if anyone is so insane as to use these weapons, that they are so terrible and that they cannot protect themselves anyway. Therefore, they see no value in preparing and training to protect themselves in the event of their use.
- False alarm—if there is a threat situation with frequent false alarms, personnel may neglect alerts and fail to react, believing it is *just another false alarm* when, in fact, it is the real thing.
- Overconfidence—Service members may feel overly confident about the capability of their equipment and/or procedures to provide an early warning of the impending threat. This over confidence may result in Service members not taking all necessary and prescribed precautions.
- Utopia—Service members may feel that future research, medications, and/or treatments will reduce and eliminate the threat in the near future, so they do not feel it is necessary to train to protect themselves from exposure to CBRN threats and hazards.

LEADER ACTIONS IN SUPPORT OF COMBAT AND OPERATIONAL STRESS CONTROL IN A CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR ENVIRONMENT

9-12. Mission-oriented protective posture requires much more active leadership. It hides the usual nonverbal cues of alertness, understanding, and readiness to act which leaders normally rely on. Leaders must move around, touch to get attention, and insist on information and confirmation. This movement increases the leader's risk of heat exhaustion, carelessness, and being accidentally shot by a nervous Service member. Accidental fratricide (killing of leaders and other friendly personnel) has been alarmingly high in MOPP field exercises which use the multiple integrated laser engagement simulation devices. The same problem occurs in jungle and night fighting where vision and hearing are also reduced. Fratricide must be prevented by careful adherence to the unit SOP, coordination between units, target identification, and the use of challenge procedures.

9-13. Being in MOPP interferes with normal friendly support, such as conversation, sharing food, or facial expressions such as smiling. As a result of the sensory and social isolation and encapsulation, Service members tend to feel alone. They may feel surrounded by a totally hostile world in which even the air they breathe is against them. This isolation tends to make people become passive, insecure, and at high risk for COSRs unless it is actively counteracted. It requires a more active, verbal, and deliberate effort to maintain a sense of comradeship, unit cohesion, and esprit de corps.

9-14. Covering up or withholding information can permanently destroy the leadership's credibility. Utilization of unit or attached public affairs personnel and a solid command information program can prevent rumors or stop them from spreading. A wide range of command information program products are available through public affairs channels.

9-15. Service members who have an understanding or situational awareness of mission requirements tend to exhibit less anxiety while executing assigned tasks. Keep information flowing, dispel myths, and control rumors by—

- Discussing the mission and its possible long-term implications upfront. Within operations security requirements, include such information as—
 - Mission objectives.
 - Expected duration.
 - Known CBRN threats and countermeasures.
- Focusing on unit cohesion. Emphasize that the unit will face CBRN threats together. Cohesion is the single best predictor of an organization's ability to engage and sustain operations in high stress environments. Unit cohesion creates a holistic and collaborative environment that increases unit's readiness and resilience.
- Conducting resiliency training. Successful COSC in a CBRN environment is directly related to the amount of preparation and training conducted in the development of equipment confidence and its ability to sustain prolonged usage. Training should be routine and conducted before deployment orders are issued. Use training procedures that emphasize the buddy system as a means of keeping watch for each other. Peer support is a key element in reducing COSR at the unit level. Unit peers are essential in monitoring the health and reactions of fellow Service members and are key in recognizing COSR quickly so that preventive or mitigating measures can be employed.
- Developing CBRN SOPs. Having known standards published to and practiced by unit personnel can have a significant impact in the overall stress or anxiety of Service members facing operations in a CBRN environment. The SOPs and training develop cohesion and confidence in unit personnel. The SOPs should include the following:
 - Train in the protective mask often. It takes repeated wear and time to acclimate and get over the claustrophobic feeling of wearing the mask. The training can be conducted during a variety of activities.
 - Have personnel wear the mask often in garrison or during lulls in other activities, even at desk jobs. If on average, one person in five wears the mask, on a rotational basis, at any given time, everyone will quickly become accustomed to wearing it.
 - Periodic prolonged wear (8 hours or more) helps Service members gain confidence and realize that they can tolerate the discomfort.
 - Have personnel wear the mask while performing combat-related (mission essential) tasks.
 - Training in MOPP Level 4 will increase personnel confidence in their ability to wear the ensemble.
 - Ensure sleep plans are safely practiced. Have everyone practice wearing the mask while sleeping. Ensure personnel only sleep in safe places; do not allow personnel to sleep under or near vehicles or other motorized machinery. Require ground guides for all vehicles in the unit area. Service members require (when possible) at least 7 to 8 hours of uninterrupted sleep during every 24-hour period to sustain operational readiness.

INDIVIDUAL RESPONSIBILITIES

9-16. By following orders, individuals can increase their ability to cope with and prevent combat and operational stress-related conditions. Coping with the stresses of a CBRN environment requires extra individual action. Concentrate on the positive aspects of survival, not the negatives of illness or death.

Train

9-17. Use every opportunity to wear the protective mask or the entire MOPP ensemble during training, when permitted. You build self-confidence and endurance by frequently training with your protective mask, or at MOPP Level 4. Perform refresher training in basic CBRN survival skills.

Use Buddy System

9-18. Use the buddy system to increase your ability to survive. Service members looking out for each other give a sense of security that relieves stress. Looking out for each other improves every individual's ability to perform duties.

BEHAVIORAL HEALTH/COMBAT AND OPERATIONAL STRESS CONTROL

9-19. The following U.S. Army activities or units provide COSC support within an AO—

- A mental health section assigned to the brigade support battalion, medical company for the brigade combat team.
- Area support medical company mental health section for personnel assigned to units at echelons above brigade.
- Limited BH/Neuropsychiatry services at each combat support hospital provided by a psychiatric/BH nurse and BH specialist for inpatients and hospital staff (supported by the medical detachment, as necessary).
- Medical detachment, COSC provides BH/COSC direct support to brigade combat teams and for personnel at echelons above brigade on an area support basis.

9-20. Navy Medicine deploys mental health providers, both as individual augmentees and embedded assets, to ensure adequate access to care in the deployed environment. Operational Stress Control and Readiness (OSCAR) Program has been implemented throughout the operating forces. *Operational stress control and readiness* is a Marine Corps program that assigns mental health personnel directly as organic assets in ground combat units at the level of regiments, rather than attaching them to external medical treatment facilities or combat stress teams (see NTRP 1-02 and MCRP 5-12C). Each battalion or equivalent command maintains an OSCAR mentor/extender team—

- The OSCAR embeds BH expertise directly in operational units at the level of the regiment.
- The OSCAR psychiatrists, psychologists, and psychiatric technicians are organic to the military units they support and accompany their Marines into forward operational areas during deployment.

9-21. The USMC's BH capacity consists of OSCAR teams at the division-level and medical battalion-level. At the medical battalion-level, this consists of three OSCAR teams with the following assigned personnel: 1 psychiatrist, 2 psychologists, and 2 psychiatric technicians. Current tactics, techniques, and procedures do not change doctrinally in a CBRN environment for USMC.

Conduct Preventive Activities

9-22. In a CBRN environment, prevention is the most economical means of controlling COSR. Behavioral health personnel must begin consultation services before CBRN weapons/agents have been employed.

Control Combat and Operational Stress Reactions

9-23. Individuals with COSRs require triage. The evaluation of overstressed personnel is difficult but not impossible when the Service members and the evaluator are in MOPP. The primary method of BH evaluation is the interview and mental status examination.

CONDUCTING COMBAT AND OPERATIONAL STRESS CONTROL IN A CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR ENVIRONMENT

9-24. Conducting COSC activities is the commander's responsibility. Combat and operational stress control support is achieved through the aid of many resources available to command, to include military BH assets. The key to successful COSC operations in a CBRN environment is the prevention activities conducted prior to actual CBRN events. For more information on COSC manual for leaders and Service members, refer to FM 6-22.5 and MCRP 6-11C/NTTP 1-15M.

Note. In the USAF, COSC is not a leadership led program; it is more of a partnership between the leadership and mental health personnel. The USAF does not have COSC personnel organic in the units.

9-25. Combat and operational stress control operations, like any activity engaged in a CBRN environment, will take additional time and tax available resources in its implementation. Leadership identifies all available COSC providers and assets and seeks consultation in addressing and controlling COSRs reactions resulting from CBRN operations. As with any military operation, preferably, COSC assets should integrate and consolidate their resources to provide in depth full spectrum COSC/BH care. This is especially true in CBRN environments.

9-26. The CBRN COSC activities blends existing COSC functional areas to create a flexible set of interventions specifically focused on stress management for units and Service members following CBRN use and working in a CBRN environment. Successful CBRN COSC activities will require a thorough understanding of all the COSC functional areas.

9-27. The COSC functional areas of reconstitution and reconditioning will require a secure, uncontaminated area to be executed. These functional areas will not likely be done in a CBRN environment due to mission requirements and the length of time to conduct. Leaders, however, should review these functional areas to obtain familiarity with their concept.

Unit Needs Assessment

9-28. Leadership should be aware of all integrated COSC personnel in their unit. This will allow leaders to consult with COSC providers when Service members present with COSR reactions resulting from CBRN operations. The CBRN COSC activities are a flexible set of interventions tailored for units. The CBRN COSC unit needs assessment is a unit-level assessment and is the systematic process for identifying the COSC needs of units. Leaders should request unit needs assessments from available BH assets with specialized training in COSC. Unit needs assessment should—

- Add to unit effectiveness and should not interrupt or intrude on current or planned CBRN operations.
- Be conducted in a decontaminated or a clean location.
- Not be a substitute for individual-level screenings or COSC triage of individuals. Consultation and education activities prior to CBRN events prepare leaders to seamlessly institute COSC interventions while continuing to conduct military operations.

9-29. Operational Navy Commands complete mandatory requirements for command level Navy Operational Stress Control skills training within six months of deploying. As the basis for intervention strategies, the Navy/Marine Corps uses the COSC five core leader functions of—

- Strengthen.
- Mitigate.
- Identify.
- Treat.
- Reintegrate.

9-30. The U.S. Army uses the 6 Rs model to build on—

- Remind.
- Reassure.
- Rest.
- Replenish.
- Restore.
- Return.

9-31. Interventions should target—

- Battlefield ethics.
- Safety, security, and survival.
- Food, hydration, clothing, and shelter.
- Sleep.
- Medication (replace medications destroyed or lost).
- Orientation of unit/Service members to developing situation.
- Restoration of communication with unit, dependents, friends, and community.

9-32. The CBRN COSC consultation and education to Service members should emphasize normalizing the common reactions of CBRN events, improving their coping skills, enhancing self-care, facilitating recognition of significant problems, and increasing knowledge of and access to COSC services. The unit needs assessment after a CBRN incident, guides further consultation and education efforts.

Psychological First Aid

9-33. Psychological first aid is a group of basic psychological tenets used in the USAF to offer immediate support to those exposed to a potentially traumatic event. Most importantly, it provides for common-sense near term psychological and physical health needs, and also seeks to reduce initial distress by introducing adaptive coping and recovery skills.

9-34. Psychological first aid first provides for as many of the immediate safety, physical and emotional needs for those exposed, and does so as close to the event as possible. Providing resources close to the event keeps individuals *in the fight*. A safe area with food, water and a place to rest is provided. Leaders listening to responders' concerns and learning their needs demonstrates compassion and an understanding of their challenges and sacrifice—often this is as simple as arranging to have leaders and responders sharing meals together. Psychological first aid encourages those affected to maintain connections with peers and other social supports. It provides information on coping skills and available resources and how those exposed can seek care if needed. For individuals whose stress reactions aren't resolved in a short period of time, additional support from Mental Health or the COSC unit should be encouraged. Tenets of psychological first aid include—

- Safety—provide a physically and emotionally safe place (as the operational environment allows) for individuals to recuperate emotionally following a traumatic event. This may be as simple as designating a tent/shelter away from the incident with food, water and places to relax.
- Needs—learn what the Service member's needs and concerns are by listening with compassion and responding with a calm voice.
 - Are they worried about someone?
 - Do they want to make a phone call?
- Availability—make yourself available. For example, offer to go to the gym, dining facility, play games, morale tent, or just be there to talk/listen.
- Support—encourage Service members to stay connected with peers and social support, this maybe in the deployed setting or at home.
- Coping—provide basic coping skills that empower others to make decisions for themselves and restore normal function. Lead by example using self-care strategies mentioned earlier.
- Services—finally, link individual with supportive services, if needed. These include chaplains, first sergeants, or mental health personnel.

9-35. An important stress prevention strategy for CBRN operations is preparation and training for actual engagements. A CBRN training program should be developed prior to deployment that builds unit confidence in the capacity for competent use of safety equipment. In addition to successful mastery of skill sets, training leads to unit cohesion and esprit de corps, which is a primary component in successful missions and stress management.

Note. The USN/USMC uses Combat and Operational Stress First Aid principles. The Combat and Operational Stress First Aid is a flexible, multi-step psychological first aid process used in the timely assessment and pre-clinical care of stress reactions or injuries.

Traumatic Event Management

9-36. The CBRN traumatic event management in the U.S. Army will require specialized COSC services for potentially traumatizing events (PTEs) that occur while operating in a CBRN environment. The PTEs are events that cause individuals or groups to experience intense feelings of terror, horror, helplessness, and/or hopelessness. The traumatic event management will require assessment of the PTE that occurred and a tailored intervention at the group or individual level to stabilize, mitigate and support the resulting emotional and psychological reactions. Leaders should contact available COSC assets to request a traumatic event management assessment and intervention when PTEs occur. The CBRN PTEs that may require traumatic event management include—

- First exposure to a CBRN event.
- Witness mass injury or death resulting from CBRN attack.
- Unexpected casualties resulting from accidental CBRN exposure or equipment failure.

9-37. The COSC triage process is the sorting of Service members based on an assessment of their needs and capabilities, and the location where they can best be managed in keeping with the COSC management principles of brevity, immediacy, contact, expectancy, proximity, and simplicity.

9-38. Service members may require COSC triage in CBRN environments. The CBRN COSC triage follows the same categories and process as traditional triage in non-CBRN environments. There are four COSC triage categories in the U.S. Army—help in place, rest, hold, or refer.

Note. The language and logistics of COSC delivery among Services are divergent. These types of inconsistencies increase the likelihood of breakdown in the triage and referral process. Efforts may not be sufficient to ensure that COSC services or BH services are identifiable and accessible in a joint operational environment.

9-39. The assessment includes an evaluation of the Service member's physical and BH needs, potential medical emergencies, and other safety risks. Assessment should be performed by providers according to their professional training, expertise, and standards. The CBRN COSC triage, like COSC triage, will—

- Determine what intervention techniques best address the Service member's needs and functional capabilities.
- Consider the needs, abilities, and the safety of the Service member. It should also consider the unit's capacity to provide COSC interventions based on its operating tempo, mission, resources, response to prior consultations, and willingness to participate in COSC interventions.

9-40. The CBRN COSC triage considerations may include—

- Persistent or worsening traumatic stress reactions (such as dissociation, panic, autonomic arousal, and cognitive impairment).
- Significant functional impairments (such as role/work relationships).
- Dangerousness (suicidal or violent ideation, plan, and/or intent).
- Severe psychiatric comorbidity (such as psychotic spectrum disorder, substance use disorder, or abuse).
- Maladaptive coping strategies (such as pattern of impulsivity or social withdrawal under stress).
- New or evolving psychosocial stressors.
- Poor social support.
- Failure to respond to acute supportive interventions.
- Exacerbation of preexisting psychiatric conditions.
- Service members request for assessment.

9-41. The CBRN COSC stabilization is the acute management of disruptive behavior resulting from COSR and/or a behavioral disorder resulting from the stressors of working in or exposure to a CBRN environment. Such behaviors can severely impact unit functioning by posing a danger to the Service member and/or others. Leadership should be prepared to provide or coordinate stabilization services if required. Precoordination with medical unit personnel promotes safe management.

9-42. Service members operating in a CBRN environment may require COSC restoration services as a result of COSR. Service member restoration, rest, reassurance, and replenishment is normally a 24- to 72-hour (1- to 3-day) program in which Service members with COSR receive treatment. Service member restoration is accomplished using the principles of brevity, immediacy, contact, expectancy, proximity, and simplicity and the 6 R's. Service member restoration is typically provided by COSC assets, but can be managed by organic medical personnel or religious support personnel.

9-43. The measures below are applicable to Service members with COSR in a CBRN environment. The provider should be familiar with the 6 R's and with brevity, immediacy, contact, expectancy, proximity, and simplicity. In keeping with restorative efforts, the provider focuses on the following measures through leadership consultation, Service member education, and/or direct management:

- Minimizing exposure of Service members with COSR to further PTE.
- Reducing physiological arousal.
- Mobilizing support for those who are most distressed.
- Providing information and fostering communication and education.
- Using effective risk communication techniques.
- Providing assurance/reassurance.
- Mitigating fear and anxiety.
- Encouraging sleep hygiene.
- Reestablishing routines.
- Promoting exercise and nutrition.
- Encouraging self-paced emotional ventilation.
- Discouraging use of alcohol/substances.

9-44. The CBRN BH treatment exists when there is a formal provider-patient or provider-client relationship. Behavioral health treatment is provided for Service members with behavioral disorders to sustain them on duty or to stabilize them for referral/transfer. This is usually brief, time-limited treatment as dictated by the operational situation. The BH treatment includes counseling, psychotherapy, behavior therapy, occupational therapy, and medication therapy. Treatment assumes an ongoing process of evaluation and may include assessment modalities such as psychometric testing, neuropsychological testing, laboratory and radiological examination, and COSC providers' discipline-specific evaluations.

9-45. In the event a Service member requires BH treatment in a CBRN environment, regardless if the BH diagnosis is chronic or acute in origin, services should be managed by COSC/BH providers operating in support of the Service members unit or organization.

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Chapter 10

Medical Logistics Support

GENERAL

10-1. Military policy and guidance specifies that each Service maintains responsibility for sustainment of forces within their individual component. However, logistics support may also be provided by agreements with national agencies or allies or geographic combatant commander assignment of common, joint, or cross-servicing logistics responsibilities.

10-2. The geographic combatant commander has the authority to issue logistics directives and assign responsibility for common support functions between or among Service components within the area of responsibility. These measures are designed to ensure effective execution and economy of approved OPLANs and prevent unnecessary duplication of facilities and functions among the Service components.

Note. The geographic combatant commanders cannot enter into multinational relationships that are contrary to U.S. policy without the President and Secretary of Defense's direction.

10-3. According to DODD 5160.05E, Roles and Responsibilities Associated with the Chemical and Biological Defense Program, the Army is the DOD Executive Agent for the Chemical and Biological Defense Program. The Executive Agent will coordinate and integrate Research Development Test and Evaluation and acquisition requirements of the Military Departments for DOD chemical and biological warfare defense programs and serve as the Milestone Decision Authority for CBRN defense programs as delegated by the Under Secretary of Defense for Acquisition, Technology, and Logistics. The Executive Agent will establish a Joint Program Executive Officer for Chemical and Biological Defense, reporting through the Army Acquisition Executive to the Defense Acquisition Executive, to serve as the Joint Service Material Developer and oversee total life-cycle acquisition management for assigned CBRN defense programs.

10-4. The Assistant Secretary of Defense for Health Affairs establishes health policy and provides oversight of health policies being implemented by the Services' Surgeons General or the Medical Officer of the USMC. Within the DOD, two organizations play a prominent role in management of Class VIII materiel—the Defense Logistics Agency and the Defense Health Agency's Defense Medical Materiel Program Office.

10-5. The Director of the Defense Logistics Agency, in coordination with the geographic combatant commander, Chairman of the Joint Chiefs of Staff, and the secretaries of the military departments recommend the designation of a theater lead agent for medical materiel, as necessary to provide the operational capability for medical supply chain management and distribution from the strategic to the tactical level. The geographic combatant commander also designates a single integrated medical logistics manager to promote supply chain efficiency and minimize the theater medical logistics footprint. Refer to JP 4-02, ATP 4-02.1, DODI 5101.15, and DODD 5101.9 for additional information.

10-6. The Services' Surgeons General or the Medical Officer of the USMC provides guidance on medical logistics support policies to be implemented within their Services. The command surgeon is the geographic combatant commander's principal HSS advisor in theater and will normally serve as the joint force surgeon during CBRN operations. The command surgeon supervises the planning and execution of the HSS mission. The Geneva Conventions provide specific safeguards which apply to medical logistics support materiel and personnel.

MEDICAL LOGISTICS SUPPORT CONSIDERATIONS IN A CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR ENVIRONMENT

10-7. Commanders must initiate CBRN procedures to limit exposure of their units and facilities to CBRN attacks and to protect personnel and supplies from CBRN contamination. Where protection is not assured, CBRN defense calls for decontamination of critical supplies and materiel, which makes it difficult to provide necessary support. Medical units must implement systems to treat and evacuate larger numbers of casualties, who may also require special handling before, during, and after treatment. The supply system must provide needed protective clothing, shelter, and water to support the operation. The CCDR identifies functions and services available from host nation assets. United States military personnel may train and equip personnel from U.S., coalition, and host nation forces to ensure their survival.

10-8. Medical logistics support provides the required Class VIII materiel and equipment when and where it is needed in the theater of operation. The medical logistics support is one of the functional areas of HSS. As such, it requires comprehensive planning for inclusion in the HSS estimate and plan which supports the CCDR's OPLAN. One of medical logistics support missions is to provide Class VIII supplies and equipment to include medical support peculiar to CBRN operations.

10-9. The ability to sustain CBRN operations with an appropriate level of logistics support is vital to operational success. Operations in a CBRN environment can place significant burdens on the logistics system. Plans supporting deployment, reception, staging, onward movement and integration, sustainment and redeployment must continually be reviewed. Medical logistics personnel must train and prepare to operate in all situations. Logistics planning and training includes considerations for reducing vulnerabilities to a CBRN attack and ensuring logistics support operations. For detailed information on providing medical logistics support, see JP 4-02 and ATP 4-02.1.

10-10. Regardless of the operational theater, temperature sensitive medical supplies and equipment should have environmentally controlled warehouses or covered shelters to reduce the vulnerability to contamination and the elements. Host-nation support agreements will play a large part in securing needed protection for these supply items.

10-11. When assessing the likely nature and frequency of possible attacks on logistics facilities, the CCDRs should consider the number of available delivery means, chemical and biological weapons, and the ability of the adversary to deliver an agent to significantly disrupt operations. In planning logistics sites, the attack range of adversary air and surface weapons delivery systems armed with chemical, biological, or possibly nuclear warheads should be assessed. In a CBRN environment, CCDRs are responsible for sustainability, survivability, flexibility, and responsiveness of logistics supplies while the command surgeon is responsible for the protection of medical supplies and equipment. Disruptions of the main supply route and communications systems are to be expected.

10-12. Blood and blood components are valuable medical commodities and require special procedures for handling and protection. Storage, potency periods, protection, inventory management, and innovative technology all play an important part in managing the blood supply in a CBRN environment. Blood support must be highly organized and well-coordinated on the part of medical logistics support, operations and plans, blood bank, laboratory, transportation, and medical care personnel. The joint blood program office is responsible for management of the joint blood program in a theater. The joint blood program office functions as part of the CCDR's command surgeon's office but may establish an area joint blood program office for regional blood management.

10-13. In the U.S. Army, the medical platoon (Role 1 MTF) is authorized one each patient decontamination and one each chemical treatment MES when operating in a CBRN environment. Each patient decontamination MES has enough supplies to decontaminate 60 patients and the patient treatment MES has enough supplies to treat 30 patients.

Note. Although the chlorine granules in the chemical agent patient decontamination MES are used to prepare the chlorine solutions for use to decontaminate patients, the preferred method/means is soap and water. Refer to Chapter 5 for more information on patient decontamination.

10-14. Roles 2 and 3 MTFs (U.S. Army) are authorized three patient decontamination and chemical treatment MESSs. The MESSs are for use at the Roles 2 and 3 MTF PDS.

PROTECTING SUPPLIES IN STORAGE

10-15. Protecting supplies can be accomplished by placing them under tents, using plastic wraps, or providing storage warehouses with CB filtered-conditioned (heated or cooled) air systems. Wrapping supplies in two layers of plastic material provides protection from most agents for a short period of time; the thicker the plastic material, the longer the protection. Effectiveness of protective procedures can be checked by placing detector paper on supplies and between layers of the covering. Protection from the thermal and blast effects of nuclear detonations require much more elaborate measures. Placing the supplies in trenches, inside earthen berms, behind stonewalls, or in other field expedient facilities will enhance the protective posture of supplies from the nuclear effects. Even when taking these protective measures, a quantity of supplies will become contaminated and must be replaced. Plans should be in place for replacement of damaged items.

PROTECTING SUPPLIES DURING SHIPMENT

10-16. During shipment, supplies are protected by placement inside MILVAN containers, in covered enclosed vehicles or by wrapping them in several layers of plastic, in tarpaulins or in other protective material. To monitor exposure of supplies to CW agents during shipment, place M9 detector paper between the wrappings. If exposure is limited to the outer layer, simple removal of this layer may be all that is required to eliminate the contamination. Decontamination is much easier when the supplies and equipment have been protected by multilayers of overwraps.

MOVEMENT CONTROL

10-17. Movement control must coordinate the employment of all means of transportation, including that provided by allies or host nations to support the CCDRs' CONOPs. The USTRANSCOM is the DOD single manager for transportation that provides air, land, and sea transportation to meet national security objectives through the range of military operations. It orchestrates all transportation aspects of planning and execution with the joint staff and the appropriate combatant and Service component commands. The USTRANSCOM is composed of three component commands: The USAF's Air Mobility Command, the Navy's Military Sealift Command, and the Army's Surface Deployment and Distribution Command. The Commander, USTRANSCOM, as the single transportation manager, will provide for proper liaison with the CCDRs for movement of decontaminated personnel and materiel in theater. The CCDRs will exercise control over intratheater movement. Whatever unique circumstances prevail in a theater, logistics plans should provide CCDRs with the highest practicable degree of influence or control over movement. Refer to JP 4-0 for more information.

10-18. Planning airlift operations is a complicated process involving numerous interdependent functions. These range from such things as assuring that airlift facilities are capable of supporting a CBRN operation to selecting the most appropriate airlift for that operation. Airlift planners must be thoroughly familiar with each Service component's unique airlift capabilities, as well as those of common-user airlift. They must comprehend the nature of the CBRN threat to airlift and coordinate effective threat countermeasures. Finally, the entire airlift operation requires detailed planning, to include coordination of appropriate airspace control measures and communication procedures. The following are general considerations for airlift planners:

- Planners must know the capabilities of each airlift facility in the theater.
- The supported Service component is responsible for the movement of personnel and cargo to the onload site and forward after off-loading.

- The effectiveness of airlift is dependent on the number and type of aerial ports available within the theater. The USTRANSCOM designates peacetime aerial ports.
- The CDR designates wartime and contingency aerial ports in coordination with Commander, USTRANSCOM and appropriate host nation authorities.
- All command levels must plan for air base defense to protect airlift aircraft, aircrews, support personnel, and base facilities. This may include protection against conventional air-to-surface munitions, as well as CBRN weapons and unconventional warfare forces.
- Airlift plans must integrate international, host nation, and military airspace control procedures and regulations.
- Timely intelligence is essential to airlift mission planning. Airlift operations require considerable intelligence support to reduce their vulnerability.
- Airlift aircraft are very vulnerable to contamination.

Chapter 11

Homeland Defense

GENERAL

11-1. Although homeland security is not a specific military mission, medical commanders must plan for and be prepared to support a primary agency such as the Federal Bureau of Investigation or Federal Emergency Management Agency in response to a CBRN event. Various federal statutory authorities and policies provide the basis for federal actions and activities in the context of domestic incident management. The National Response Framework uses the foundation provided by the Homeland Security Act of 2002, Homeland Security Presidential Directive-5, and the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) to provide a comprehensive, all-hazards approach to domestic incident management. For more information on CBRN preparedness and response guidelines, see the United States Department of Homeland Security, National Response Framework, and DODI 3020.52. For more information on Homeland Defense, refer to JP 3-27.

Note. This chapter does not replace AFTTP 3-42.32 or BUMEDINST 3440.10A.

11-2. When a CBRN event occurs on a military installation, the installation medical authority provides the HSS initial response to the event site. Request for assistance from deployable HSS organizations and staffs are initiated by the installation medical authority through military channels.

11-3. The President will direct any DOD response in support of a primary agency to a CBRN event. Combatant commanders exercise combatant command of assigned forces, and are directly responsible to the President and Secretary of Defense for the performance of assigned missions and the preparedness of their commands. Combatant commanders prescribe the chain of command within their commands and designate the appropriate authority to be exercised by subordinate commanders. Dependent upon the location and type of threat to the homeland, Commander, U.S. Northern Command (USNORTHCOM) and/or Commander, U.S. Pacific Command would be designated as a supported CCDR for homeland defense. The designated supported CCDR will coordinate through military channels to the appropriate HSS organizations for response. The HSS response may be in the form of specialized medical response capability support or other Services specialized response teams (see Appendix C). The USAF can provide capabilities as described in AFTTP 3-42.32. Responding resources will provide HSS to support the primary agency or civilian public health agencies and/or organizations, emergency medical services (ambulance crews), or MTFs when directed.

11-4. The HSS response may include, but not be limited to—

- Providing emergency medical care to casualties at the incident casualty decontamination site and supervising the casualty decontamination process to ensure that no further injury is caused to the casualty.
- Providing en route emergency care for patients from the incident site to an MTF or designated location for further care. Normally, table of organization and equipment medical evacuation assets are not used but HSS personnel may provide en route care on locally available transport vehicles.
- Providing guidance to local responders in the management of CBRN casualties. This guidance may be on the correct use of antidotes, chemoprophylaxis, prevention of contamination spread in the MTF, patient decontamination at the MTF, and other related medical management procedures.
- Identifying suspect chemical, biological, or radiological materials used in the event.

- Providing guidance on the application of standard precautions for CBRN, especially preventive measures to prevent spread of contagious agents.
- Managing, triaging, and treating mass casualties.

11-5. Installation or base protection is a homeland defense mission. Medical treatment facilities have unique capability to support the installation and installation responders through the issue of Medical CBRN Defense Materiel, planning, and guidance provided by the public health emergency officers, and the application of the full range of available medical capability. Refer to DODI 6200.03 and DODI 6055.17 for more information on HSS response to a CBRN event at DOD installations.

UNITED STATES ARMY ROLE IN HOMELAND DEFENSE

11-6. Joint Task Force-Civil Support serves as the CBRN response headquarters for the defense CBRN response force (DCRF). The DCRF includes approximately 5,200 personnel sourced primarily from the active component (multi-Service). The DCRF capabilities include CBRN incident assessment, search and rescue, decontamination of DOD personnel and equipment, evacuee and casualty decontamination, EMT, Role 2 medical care (patient triage, along with trauma and emergency medical care), patient holding, ground and rotary-wing air patient movement, Role 3 medical care (surgical and intensive care), FHP measures, military personnel and equipment operational security, site accessibility horizontal engineering, logistics, general support to enhance lifesaving and reduce human suffering, command and control aviation lift, mortuary affairs, and transportation. The DCRF is designed to employ these capabilities in multifunction packages in order to provide critical lifesaving capabilities in a synchronized manner. There are two force packages, Force Package 1 (2,100 personnel) and Force Package 2 (3,100 personnel). Commander, Joint Task Force-Civil Support, has the flexibility to task-organize the DCRF based on the situation and mission in order to provide the most effective support to a CBRN response. For more information, refer to JP 3-41.

UNITED STATES ARMY NORTH

11-7. The U.S. Army North is designated as the Joint Force Land Component Command for USNORTHCOM and has operational control over Joint Task Force-Civil Support, Task Force 76; Task Force 46; and theater enablers includes one Sustainment Brigade, two Combat Sustainment Support Battalions, one Expeditionary Signal Battalion, and one Signal Company. The U.S. Army North Surgeon and his staff provide the medical expertise, consultation, and oversight to the U.S. Army North Commander and to the medical units assigned/attached to U.S. Army North in the conduct of the CBRNE Response Enterprise mission.

20TH SUPPORT COMMAND

11-8. The 20th CBRNE Command integrates, coordinates, deploys, and provides trained and ready CBRNE forces. It is capable of exercising command and control of specialized CBRNE operations to support Joint and Army force commanders primarily for overseas contingencies and warfighting operations, but also in support of homeland defense. The 20th CBRNE Command maintains technical links with appropriate Joint, Army, Federal, and State CBRN assets, as well as the research, development, and technical communities to assure Army CBRNE response readiness. Its capabilities include—

- Full time focus on Combating WMD, countering CBRNE threats and defeating all types of improvised explosive devices.
- Command and control joint, Army, and other government agencies' specialized WMD/CBRNE analytic, staff and operational forces.
- Force provider of trained and ready expeditionary CBRNE force packages to execute the wide range of combating WMD missions.
- Reachback communications connectivity from field to subject matter experts at headquarters, national level laboratories, industry, academia or other state/federal CBRNE resources.
- Core element of Joint Task Force for elimination of weapons of mass destruction.

UNITED STATES ARMY NATIONAL GUARD ROLE

11-9. The DOD developed a strategic plan for integrating National Guard and Reserve Component support for response to attacks using WMD. The plan defined a future operational capability based on enhancing their support to the civil authority in the U.S. in managing the consequences of WMD terrorism.

Note. The weapons of mass destruction-civil support teams (WMD-CSTs), CBRNE enhanced response force packages (CERFPs), and homeland response forces (HRFs) are part of the larger CBRN Response Enterprise which consists of both Title 32, United States Code [32 USC] and 10 USC forces.

Weapons of Mass Destruction-Civil Support Team

11-10. The purpose of WMD-CST is to support civil authorities during domestic CBRN incidents by identifying CBRN agents/substances, assessing current or projected consequences, advising on response measures, and assisting with appropriate requests for additional follow-on state and federal military forces. Units can also provide immediate response for intentional and unintentional CBRN or HAZMAT releases and natural or manmade disasters that result in, or could result in, catastrophic loss of life or property.

11-11. Each team consists of six smaller sections—

- Command.
- Operations.
- Communications.
- Administration/logistics.
- Medical/Analytical.
- Survey.

11-12. These teams provide a unique military capability. They can deploy rapidly to a suspected or actual CBRN incident, conduct reconnaissance to determine the effects of the attack, provide situational understanding, provide technical consultation to local authorities, and facilitate follow-on military support through validated civilian requests for assistance. Under 32 USC, the WMD-CST is under the command of the assigned Governor for Defense Support of Civil Authorities support (refer to Note below). Under 10 USC, the WMD-CST may be federalized to support a Joint Task Force-Civil Support as part of the overall national response of local, state, and federal assets.

Note. These teams move across state lines frequently to assist in regional and national events (for example, in response to Hurricane Katrina), and traditionally stay in USC 32 status. They *could* be placed in 10 USC status if needed, but this is not a pre-requisite for them to assist.

11-13. There are 57 WMD-CSTs (one for each state and territory; two in California, New York, and Florida). As the WMD-CST is on standby 24 hours a day, seven days a week (24/7), the advanced echelon will deploy within 90 minutes of notification and the rest of the team within three hours. This quick response gives the WMD-CST the ability to support the incident commander with critical information rapidly. The WMD-CST commander can advise the incident commander as to the type and level of hazard present, possible course of action, and additional National Guard assets for support of specific incident requirements.

Note. The WMD-CST equipment provides rapid presumptive results, which are verified through technical reachback.

11-14. The WMD-CST is composed of 22 personnel from both the Army and Air National Guard, with a variety of specialties. Assigned vehicles include a command vehicle, operations van, a communications vehicle called the unified command suite (provides a broad range of communications capabilities including satellite communications), and an analytical laboratory system van (contains a full suite of analytical equipment). The WMD-CST normally deploys via ground transport within a 250 miles radius but can travel via airlift if required.

11-15. The WMD-CSTs have a unique ability to assess CBRN events. This is accomplished through the expertise of personnel and the use of several computer-based modeling programs. In addition, the survey and medical team's high state of training and advanced technology equipment allow for accurate and timely sample collection and identification of CBRN agents and substances. The WMD-CST also provides the ability to act as a CBRN reconnaissance force that can provide a unique view at the incident site.

11-16. The WMD-CST provides assessments and presumptive level of identification to analyze the most common CBRN agents and substances. The WMD-CST's sophisticated detection, analytical, and protective equipment allows for operations to take place in environments that contain many different TIMs and CBRN materials. The PPEs (such as OSHA Levels A and B) used by WMD-CSTs provide more extensive protection from HAZMAT than does the equipment used by most military units.

11-17. The communications capability of the unified command suite allows any member of the WMD-CST to contact a wide range of technical experts. It also allows the commander to pass information and situation reports up channel to keep the joint force headquarters, National Guard Bureau, and USNORTHCOM apprised of the current status.

11-18. The WMD-CSTs have provided support to civil authorities in every major event since 1999 including Hurricane Katrina, National Football League Super Bowls, the Columbia space shuttle recovery, and Olympic events. For additional information on the WMD-CST, refer to ATP 3-11.46/AFTTP 3-2.81.

Note. The WMD-CSTs deploy constantly within their states as well as providing planning assistance and stand by for major events.

Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives Enhanced Response Force Package

11-19. The CERFP's mission is to respond to a CBRNE incident and assists local, state, and federal agencies in conducting CM by providing capabilities to conduct mass decontamination, medical triage and stabilization, fatality recovery, and casualty search and extraction.

11-20. The CERFP is composed of five elements staffed by personnel from traditional National Guard units. The elements are command and control, search and extraction, decontamination, medical, and fatality search and recovery. The CERFP command and control team directs the overall activities of the CERFP and coordinates with the JTF State and the incident commanders. The CERFP's search and extraction element mission is assigned to an Army National Guard Engineering Battalion, as well as ten Air National Guard medical personnel from the medical element, the decontamination element mission is assigned to an Army National Guard Chemical Battalion, and the medical element mission is assigned to an Air National Guard Medical Group.

Note. There is no security assigned to a CERFP.

11-21. The initial establishment of CERFPs placed at least one in each Federal Emergency Management Agency region. There are currently 17 validated CERFPs and 10 CBRN Task Forces (in the CERFPs) within each HRF. When an incident occurs within a team's response area, they are alerted through their state headquarters and mobilized on state active duty or 32 USC. If the incident is located within their state, they would proceed to the incident when directed by their joint force headquarters. If the incident is located outside of their state, their state headquarters would coordinate with the receiving state under the terms agreed to in the Emergency Management Assistance Compact.

11-22. After arriving at the incident site, the command team and element commanders coordinate with the incident commander and JTF commander to determine how to most effectively employ the CERFP.

11-23. Elements of CERFPs have responded to incidents of national significance to provide assistance to civil authorities and to mitigate human suffering. For more information on CERFP, see ATP 3-11.47/AFTTP 3-2.79.

Homeland Response Force

11-24. The HRF is part of the DOD CBRN Response Enterprise. Designed to be employed primarily with forces in state active duty or 32 USC status, the HRF provides the command structure to oversee the deployment of multiple WMD-CSTs and CERFPs. They are comprised of a brigade level command and control element and a battalion sized CBRN response casualty assistance, and a CBRN Task Force (such as CERFP) in each of the 10 Federal Emergency Management Agency regions.

11-25. The HRF is composed of elements staffed by personnel from already established National Guard units. The HRF's capabilities include search and extraction, casualty decontamination, emergency medical triage and treatment, security element, and command and control. When directed by proper authority and upon consent of the Governor(s), the HRF alerts and assembles within 6-12 hours. For more information on HRF, see JP 3-41.

UNITED STATES ARMY RESERVE ROLE

11-26. The Reserve Component forces are structured and operated to mirror their respective active component counterparts. When called to active duty, Reserve Component forces conduct civil support missions under 10 USC guidelines exactly as active component forces. The Reserve Component forces are called to active duty through the mobilization and demobilization processes.

11-27. Selected units, such as U.S. Army Reserve Component CBRN units, are equipped with additional resources to support casualty decontamination requirements. The mission of these units is to provide a domestic response capability for casualty decontamination in support of CM operations.

11-28. These units are equipped with a platoon set of domestic response style equipment to decontaminate both ambulatory and nonambulatory casualties. The set includes a quickly erectable tent with runoff containment included for the actual decontamination, two other tents for sun protection for the workers and victims, showers for washing and rinsing, and roller systems for decontaminating nonambulatory victims.

11-29. United States Army reserve units, while designed for overseas deployment, have the capability to provide domestic-response casualty decontamination in support of CM. These units are not designed or intended to replace functions carried out under the Incident Command System or functions normally performed by the emergency first-responder community. Instead, these units provide additional capability as needed to support CM. They are not designed for a rapid response, but can be mobilized and deployed within days. The basic functions performed by these units include the following:

- Receive the mission, activate the mobilization plan, and initiate unit movement.
- Conduct decontamination site selection, perimeter, and setup.
- Receive and process casualties from a WMD event.
- Establish a triage site and triage casualties from a WMD event.
- Provide critical medical intervention for casualties suffering from the effects of a CBRN event.
- Provide force protection for individuals working within the decontamination line.
- Establish the domestic decontamination site.
- Conduct casualty gross decontamination.
- Determine the level of decontamination effectiveness on a casualty.
- Conduct nonambulatory casualty gross decontamination.
- Establish a personal property and equipment line and perform decontamination procedures.
- Establish and maintain a hazardous waste site in support of casualty decontamination.
- Establish and maintain a contaminated water collection site in support of casualty decontamination.
- Conduct hazardous wastewater sampling to determine neutralization effectiveness.
- Control runoff of contaminated water in support of casualty decontamination.
- Conduct rehabilitation procedures.

11-30. The U.S. Army Reserve CBRN company can decontaminate 40 ambulatory and 20 nonambulatory patients in one hour and is composed of—

- One hundred fifteen personnel.
- Three decontamination platoons.
- One reconnaissance platoon.
- Three sets of mass casualty decontamination equipment.

UNITED STATES COAST GUARD

11-31. The USCG is the lead federal agency for maritime security. The USCG's homeland security mission is to protect the U.S. maritime domain and the U.S. maritime transportation system, and deny their use and exploitation as a means for attacks on U.S. territory, population, and critical infrastructure. Additionally, USCG prepares for and, in the event of attack, conducts hazard response operations.

11-32. The USCG's National Strike Force's capabilities and responsibilities are available for responding beyond port areas. The strike teams are regularly deployed throughout the U.S. on behalf of both USCG and Environmental Protection Agency on-scene coordinators. The on-scene coordinators can coordinate all federal containment, removal, and disposal efforts and resources during an incident in a coastal zone. Further, the strike teams are key tactical response units for the Environmental Protection Agency to call upon when responding under the National Response Framework Emergency Support Function #10, HAZMAT which provides federal support to state and local governments in response to an actual or potential discharge and/or release of HAZMAT following a major disaster or emergency.

11-33. The potential exists that the USCG on-scene coordinators could very well be the first federal presence in a WMD scenario. Coast Guard on-scene coordinators have a preestablished response organization in coastal areas (including rivers and great lakes) with state and local responders, as well as fire and police. The USCG on-scene coordinators have experience coordinating support services (National Oceanic and Atmospheric Administration scientific support coordinators, CDC, and the like) and other government agencies with response capabilities into a cohesive command.

UNITED STATES NAVY MEDICINE ROLE

11-34. The Navy medicine's tactical medical capabilities, medical and scientific expertise, and federal coordinating centers contribute significantly to homeland security. This includes tactical medical capabilities that can be provided by the FDPMU.

11-35. The FDPMU mission is to enhance HSS by anticipating and rapidly assessing, preventing, and reducing or controlling health threats in a theater by characterizing those health threats and focusing the efforts of other organic preventive medicine assets to reduce or mitigate the hazards.

11-36. The FDPMU is a Joint service asset. It provides specialized preventive medicine support to forward deployed U.S. forces and JTF commanders. It is mobile, agile, and rapidly deployable with state-of-the-art detection and diagnostic equipment that yields real-time analytical capabilities. The FDPMU has a very small footprint, has self-sustaining consumables for up to 60 days, and has the flexibility to task organize to meet any contingency from small-scale humanitarian support to major combat operations. It is adaptable to operate from fixed or mobile land bases to maritime platforms; however, it requires joint functions and command, control, communications, and computers integration within the theater.

UNITED STATES MARINE CORPS ROLE

11-37. In response to Presidential Decision Directive 39, the Commandant of the Marine Corps created the Chemical-Biological Incident Response Force (CBIRF) to counter CBRN adversary threats. The force is completely self-contained and self-sufficient, capable of deploying anywhere in the world on short notice.

11-38. The CBIRF is capable of rapid response to CBRN threats. Should an incident occur, CBIRF would immediately deploy to the affected site and provide a number of significant capabilities to include coordinating initial relief efforts, security, detection, identification, expert medical advice, mass casualty triage, treatment, decontamination, and stabilization from point of injury until evacuation occurs. The CBIRF

has robust reconnaissance, as well as technical rescue capabilities. The CBIRF provides decontamination only for equipment organic to the unit.

11-39. When directed, the CBIRF forward deploys and/or responds to a credible threat of a CBRN incident in order to assist local, state, or federal agencies and designated CDRs in the conduct of CM operations. The CBIRF consists of specially trained personnel and specialized equipment suited for operations in a wide range of contingencies. Through detection, decontamination and emergency medical services, the CBIRF capabilities are intended to minimize the effects of a CBRN incident.

Note. The CBIRF is operationally controlled by USNORTHCOM. If coordination is required during a response, USNORTHCOM will establish the requirement and method.

UNITED STATES AIR FORCE ROLE

11-40. Operation Noble Eagle is part of the overall plan to protect North America from airborne attack. Under the auspices of North American Aerospace Defense Command, USAF supports the defense plan by organizing, equipping, and operating the air defense forces. The North American Aerospace Defense, a binational command of U.S. and Canadian forces keeps an eye out for missiles and other nonaircraft related issues. The combined air operations center acts as a “battlefield” headquarters for the entire CONUS airspace.

11-41. Air Force home station medical response (for example, in-garrison) to CBRN incidents (also known as Medical Countermeasures-CBRN) includes the capabilities listed below—

- Patient Decontamination (886A)—capable of being operational in 20 minutes of activation. System is a four lane tent with supplies to decontaminate up to 100 casualties without resupply.
- Nursing Services (886D)—augments AS 886L and provides equipment and supplies for medical units that have inpatient treatment capabilities.
- Pharmaceutical Team (886E)—provides medication and first responder antidotes for CBRN threats.
- Bioenvironmental Engineering Surveillance Team (886H)—capable of using equipment to perform health risk assessments for CBRN threats and TIC/TIMs. This team also has sampling and analysis capability.
- Laboratory Biological Detection Team (886I)—About half (50 percent) of our CONUS installations and most of our OCONUS locations provide a capability through polymerase chain reaction (Joint Biological Agent Identification and Diagnostic System) for field confirmation identification of biological agents.
- Field Response (886J)—refers to the immediate medical CBRN response capability provided by AS 886J supplies.
- Triage (in-place) (886K)—includes primary triage of self-presenters to the MTF before patient decontamination; evidence preservation at the medical decontamination zone; re-triage of decontaminated casualties; postevent prophylaxis dispensing; and documentation and reporting of asset status through medical readiness decision support system and defense medical logistics standard support after the incident.
- Clinical (886L)—includes treatment of CBRN casualties; evidence preservation at the medical unit; treatment of decontaminated casualties arriving at receiving medical units; clinical sample collection; disposition of casualties after emergency treatment; assisting in coordination with civilian treatment facilities on patient-specific clinical information; hospitalization of victims or disposition to self- or home-care; preparation for medical evacuation; crisis and military community counseling; assistance in mass, pre- and postevent prophylaxis dispensing or vaccination; and documentation and reporting of asset status through medical readiness decision support system and defense medical logistics standard support after the incident.

- Manpower/Security (886M)—responsible for providing security and manpower for the patient decontamination team and for ensuring that all entrances to the medical unit are locked to prevent contaminated patients from entering.
- Public Health (886P)—provides support activities at the scene of the biological event, at the installation's medical unit, and other locations on the installation (such as shelters and food-serving facilities). Each public health team must maintain, in ready status, the knowledge, skills, equipment and supplies required for initial response to a biological event, including investigating food-borne illness outbreaks, performing vector-borne disease surveillance, and performing epidemiologic analysis to identify suspected biological agents.

Note. The USAF home station medical response program is now transitioning from capability development to capability sustainment. Each installation can now tailor their capability to better match local threats and the unit's ability to respond to CBRN events on the installation.

11-42. The AFMS CBRN Force Module can also provide in-garrison CBRN response capabilities, if needed. They integrate, coordinate, deploy, and provide Joint and Air Force force commanders and lead federal agency with trained and ready forces, prepared to execute specialized CBRN operations. It provides overarching expeditionary CBRN capabilities, with the capacity to execute simultaneous missions within CONUS and OCONUS. These teams are rapidly deployable, equipped with rugged and specialized equipment and ready to support the DOD worldwide.

11-43. The USAF is part of the WMD-CST. The WMD-CST is composed of personnel from both the Army and Air National Guard with a variety of specialties.

OTHER DEPARTMENT OF DEFENSE RESPONSE ASSETS (NOT INCLUSIVE)

11-44. This section and Appendix C will discuss other DOD response/support assets.

ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE

11-45. The Armed Forces Radiobiology Research Institute is a triservice laboratory chartered by the U.S. Congress and is charged with executing the DOD Medical Radiological Defense Research Program. The Armed Forces Radiobiology Research Institute maintains a Medical Radiobiology Advisory Team that provides state-of-the-art medical radiobiology advice supporting a nuclear accident response. This team consists of physicians and scientists working in radiobiology research. Their mission is to provide the medical units/teams responding to radiobiological emergencies with the most current medical guidance regarding the treatment of radiation casualties. This advice is derived from validated, military-relevant radiobiology research and is within reasonably accepted standards of care.

CHEMICAL STOCKPILE EMERGENCY PREPAREDNESS PROGRAM

11-46. The Chemical Stockpile Emergency Preparedness Program is a joint Federal Emergency Management Agency and Army program that provides emergency preparedness assistance and resources to communities surrounding the Army's chemical warfare agent stockpiles. Through this program, the Army provides technical assistance and required resources in developing and implementing emergency-response plans and related preparedness capabilities, integrating the on- and off-post planning process.

SERVICES MEDICAL RESPONSE CAPABILITY

11-47. Each of the Services has additional specialized forces that can be deployed to support the Homeland Defense mission. For detailed information on Services' capabilities, see Appendix C.

Chapter 12

Collective Protective Shelter Systems

GENERAL

12-1. Most hospital sections operate in sheltered areas (tentage or hard-walled shelter) where some protection is provided against vapor, liquid, and particulate (fallout) hazards. Sealing all openings can increase the temporary protection from such hazards; all entries and exits must be curtailed while operating in this mode. Liquid agents will eventually seep through the tent fabric and create a vapor hazard inside the shelter. Locating equipment, such as trucks, under trees or other cover provides similar effects.

12-2. Setting up MTFs in existing structures (concrete or steel buildings) provides greater protection from hazards and eliminates many decontamination problems. However, without means to seal openings, CW agent vapors can enter the structure. The addition of CB filtration systems with airlocks, that provide overpressure, can provide maximum protection for occupants. Entry and exit procedures must be established to prevent contamination being introduced by personnel and patients entering. Without CPS systems, hospitals may operate for a limited time in a nonpersistent agent environment, but are incapable of operating in a persistent agent environment.

12-3. Chemical-biological filters for fixed-site hospital ventilation systems will be a critical item of supply. Controlled entry and exit points with sufficient space to permit placement of litter patients and/or numbers of personnel that permit purge of vapors will have to be established. All windows, doors, and other points that may have air leaks will have to be sealed (use tape and plastic sheeting) to enable the facility to have a positive overpressure to keep CB agents out.

12-4. Liquid CW agents can penetrate the TEMPER in about 6 hours or GP tentage in a shorter period of time. These agents will penetrate the wrappings on medical supplies and equipment; especially, sterilized equipment and supplies, paper-wrapped cotton sponges, and open or lightly closed medications/solutions. They can also contaminate water/food supplies. Therefore, equipment and supplies must be stored in protected areas or under protective coverings. Some of the factors to consider when deciding to set up a CPS system:

- Without a CPS system, treatment procedures involving open wounds or the respiratory tract in the presence of a CB agent hazard is limited. Exposing open wounds and the respiratory tract to the agent increases the effects of these agents on the patient.
- Without hardened protection, the MTF, staff, and patients are susceptible to the effects (blast, thermal, radiation) of nuclear weapons.
- Medical treatment facility electrical and electronic medical equipment is vulnerable to the effects of the electromagnetic pulse produced by nuclear weapons. The electromagnetic pulse is not harmful to humans, animals, or plants, but is very damaging to electronic equipment.
- Medical treatment facility equipment is very difficult to decontaminate. Aging (allowing the agent to off-gas) may be the only means of decontamination.
- Concealment and good operations security will help prevent identification of a unit.

12-5. Dispersion is a defensive measure employed by commanders; however, hospital operations limit the value of this technique. One technique that may be used is locating sections of the hospital, such as the motor pool, personnel billets, laundry, and logistical storage a greater distance from the MTF complex than normal. This will increase dispersion without severely compromising the hospital mission.

12-6. The MOPP ensemble does not protect against all radiation effects of nuclear weapons. However, it provides some protection against alpha- and beta-radiation burns. By covering all body surfaces, especially hairy areas, MOPP greatly expedites the decontamination process.

TYPES OF COLLECTIVE PROTECTIVE SHELTER SYSTEMS

12-7. The CPS is a survivable, mobile shelter system, which includes both soft-wall and rigid-wall shelters. These systems are survivable against chemical, biological, radiological particles, and other threats. To continue the HSS mission under CBRN conditions, MTFs must search out contamination free areas or employ CPS systems. Roles 1 and 2 MTFs may be able to locate contamination free areas; however, due to the mobility limitations of hospitals, they must always be prepared to operate under CB conditions if the area is under attack.

BATTALION AID STATION, FORWARD SURGICAL TEAM, AND MEDICAL COMPANY COLLECTIVE PROTECTIVE SHELTER SYSTEMS

12-8. The CBPS (M8 and M8E1) is a highly mobile vehicle-mounted rigid-wall shelter with an attached chemical and biologically protected airbeam supported tent. The M8E1 will soon replace some of the M8 versions of CBPS. The CBPS provides an environmentally controlled work area that filters out CBRN agents. It will not protect personnel or patients from the thermal, blast, and initial radiation effects of nuclear weapons; however, it will provide some protection against fallout effects. The CBPS system is employed at the BAS, medical company (brigade support battalion) and medical company (area support) Role 2 MTFs, and FSTs. The CBPS is designed to be used at deployed Roles 1 and 2 MTFs. The CBPS (M1 System) is permanently integrated with a mobile dedicated platform and is attached to the hard-walled box on the rear of a high mobility multipurpose wheeled vehicle (see Figure 12-1). The M8E1 version of CBPS is attached on the rear of a mobile tactical vehicle.

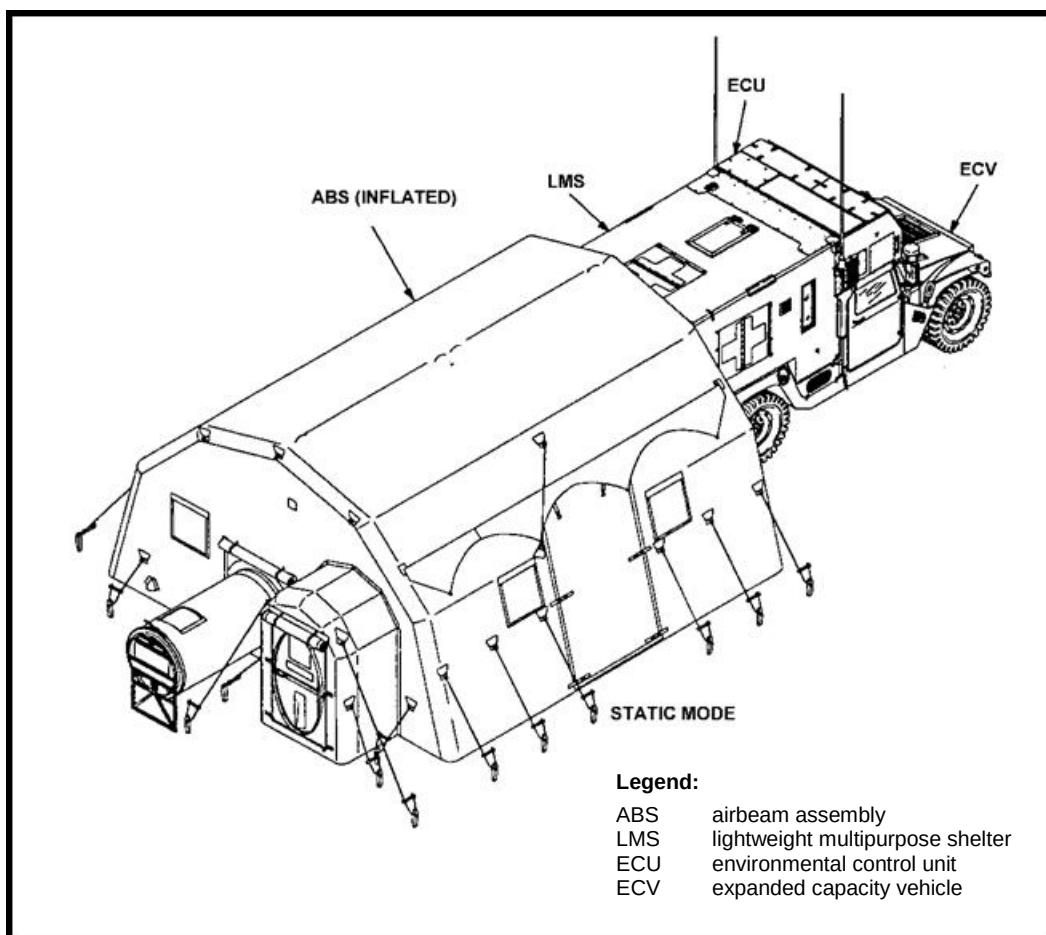


Figure 12-1. Chemical biological protective shelter system

- The BAS has one CBPS system per treatment team; the medical company (brigade support battalion) and medical company (area support) Role 2 MTFs have four CBPS systems; while the FST has three CBPS systems. Systems can also be issued to other selected medical treatment teams. When employed at the medical company (brigade support battalion), the patient holding team will require GP tents to hold their required number of patients.
- Patients held inside the CBPS are those that have been decontaminated and admitted into the system for treatment or are recovering from the treatment procedures and are awaiting evacuation.
- Any patients held in the GP tent must remain in MOPP Level 4 (the GP tent does not have collective protection); these patients are those that are expected to RTD within 72 hours.

Notes. 1. Normally, patients will not be held at the medical company (brigade support battalion) Role 2 MTF under CBRN conditions unless evacuation cannot be accomplished. They should be RTD or evacuated to a clean MTF as soon as the mission permits.

2. The CBPS can also be employed as the medical company (brigade support battalion) Role 2 MTF in the conventional mode. Employment in either mode still requires GP tentage for patient holding to meet total patient holding requirements.

12-9. The M20/M20A1 simplified collective protection equipment (CPE) is another system that is available to provide collective protection to existing structures. It consists of a chemically protected room liner, a CB filter blower, and an ambulatory airlock. However, it does not have a litter airlock making it unsuitable for litter patient care. The M20/M20A1 may be used to protect medical staffs at the medical company (brigade support battalion) Role 2 MTF, FST, and hospitals, patients held in the GP tents at the medical company (brigade support battalion) Role 2 MTF and in the minimum care wards and staff quarters of the hospitals. Thus, providing additional CB protection for staffs and patients.

EMPLOYMENT OF THE CHEMICAL BIOLOGICAL PROTECTIVE SHELTER SYSTEM

12-10. Establish a Role 1 MTF/BAS in a CBPS. One CBPS per treatment squad in a Role 1 MTF/BAS is used for conventional operations in a split-team mode. When operating in a squad configuration and in the conventional mode, two CBPS systems may be complexed to provide more workspace. However, the treatment squad is not staffed to operate the two systems in the CB mode.

12-11. When the two systems are not complexed, the treatment squad must operate in the CB mode and must use only one system. Although each treatment team of the BAS has a CBPS; only one system is set up when operating in the CB mode. This is due to the lack of authorized personnel to operate all systems at one time in the CB mode. Eight medical personnel are required to operate the BAS (employing one CBPS) in the CB mode. At least eight nonmedical personnel are required to perform patient decontamination under medical supervision.

12-12. By setting up one system in the CB mode, it provides the BAS the ability to retain its flexibility in order to maintain its support mission of being where it is needed and when it is needed. The CBPS can be used as the treatment shelter in the conventional mode as well. When the treatment squad is operating in the split-team mode, each team will have a CBPS for use as its treatment shelter. When operating one system in the CB mode, the other system provides a replacement in the event it is damaged beyond repair. This ensures continued HSS to the command.

12-13. When setting up the PDS, the contaminated ambulance point, contaminated triage point, patient decontamination area, and contaminated treatment area is established on the downwind (prevailing wind) side of the CBPS. An overhead cover of plastic sheeting (approximately 20 foot wide by 50 foot long) is set up over the PDS, the hot line, and the clean treatment/waiting area. The cover must overlap the airlocks. The clean treatment/waiting area should have an area at least 20 foot wide by 15 foot long to allow space for placing patients into the litter airlock without crossing the hot line.

12-14. A second area covered with 20 foot by 25 foot of plastic sheeting (the evacuation holding area) is set up beside the shelter on the opposite side from the generator. The clean treatment area is separated from the decontamination area by a hot line with a shuffle pit. Only clean (decontaminated) patients or personnel are allowed to cross the hot line into the clean treatment area or are admitted into the CBPS. Each CBPS

provides a minimum of 300 square feet of work area. Figure 12-2 presents one layout of a BAS using the CBPS. See TM 10-5410-228-10 for complete details on setting up, operating, and maintaining the CBPS.

Note. The overhead cover is not needed when the wind speed exceeds 10 knots per hour. The plastic will not stay in place.

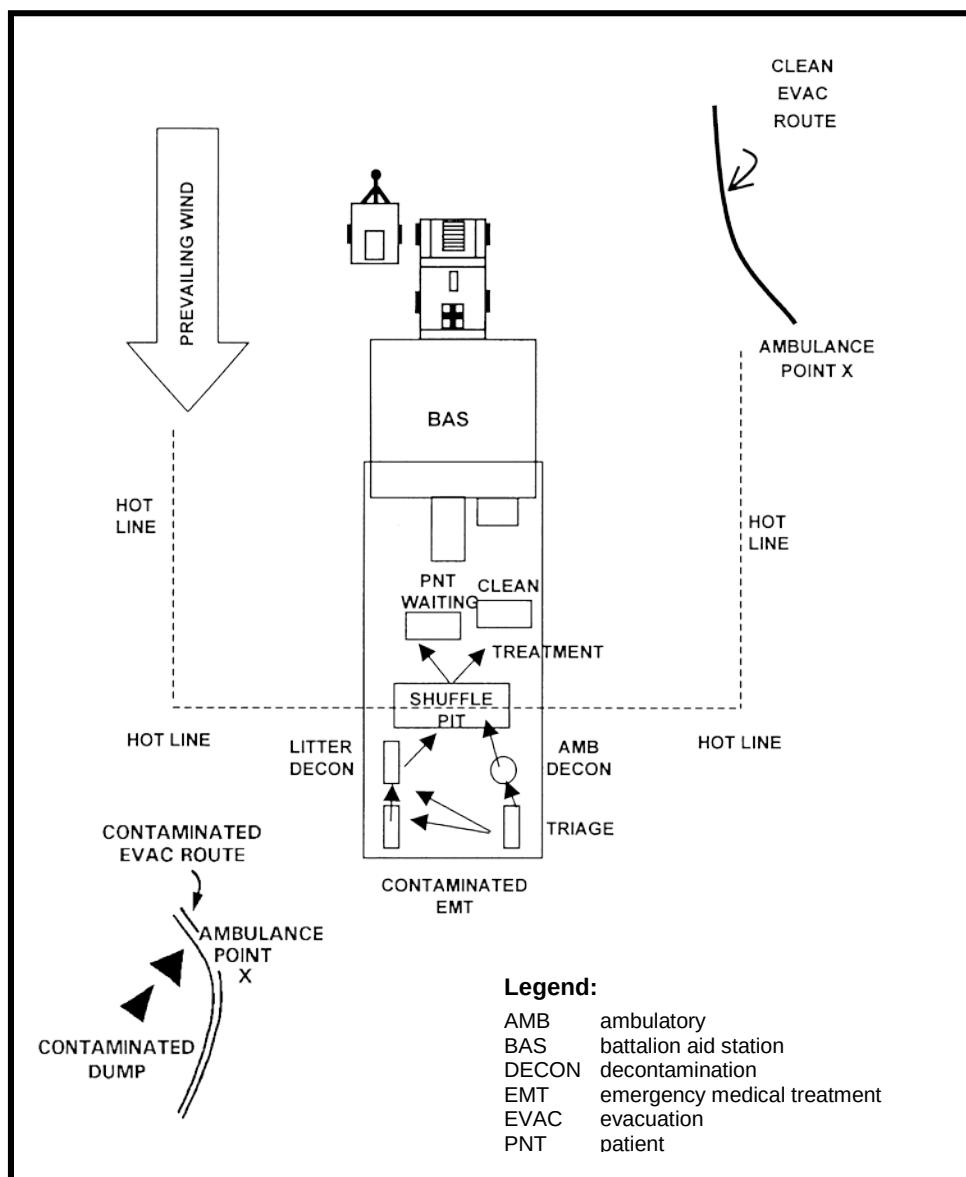


Figure 12-2. Battalion aid station using the chemical biological protective shelter

BRIGADE SUPPORT MEDICAL COMPANY ROLE 2 MEDICAL TREATMENT FACILITY IN A CHEMICAL BIOLOGICAL PROTECTIVE SHELTER

12-15. To establish a medical company (brigade support battalion) Role 2 MTF using the CBPS, four shelters are set up. The four shelters are complexed as shown in Figure 12-3. With four CBPS systems set up and operational, a total of 1,200—1,600 square feet (the M8E1 will provide 400 square feet more) of work area is available. The contaminated triage, decontamination, and contaminated treatment areas are separated from the clean treatment/waiting area by a hot line with a shuffle pit. Overhead covering is provided as described for the BAS. Patients are admitted through the EMT litter or ambulatory airlock. Patients are

released through the patient holding airlocks. This aid in controlling entry and exits; thus preventing the introduction of contamination into the systems. At least eight nonmedical augmentation personnel from supported units are required to perform patient decontamination under medical supervision at the medical company (brigade support battalion) Role 2 MTF.

12-16. In the event that the overpressure system fails on a system that is in use with entry/exit airlocks, move to the available shelter with an entry/exit airlock in the same direction for use as the entry/exit until the failed system can be restored. See the following examples:

- Example 1: At the BAS Role 1 MTF, if the EMT system fails, move to the advanced trauma management shelter to receive patients until the EMT system has been restored.
- Example 2: At the medical company (brigade support battalion) Role 2 MTF, if the patient hold system fails, move exits to the dental/laboratory/x-ray shelter until the patient hold system can be restored.
- Example 3: At the FST, if the postoperative system fails, use the preoperative shelter until the postoperative system can be restored. These options will allow patient care operations to continue until the failed system can be restored.

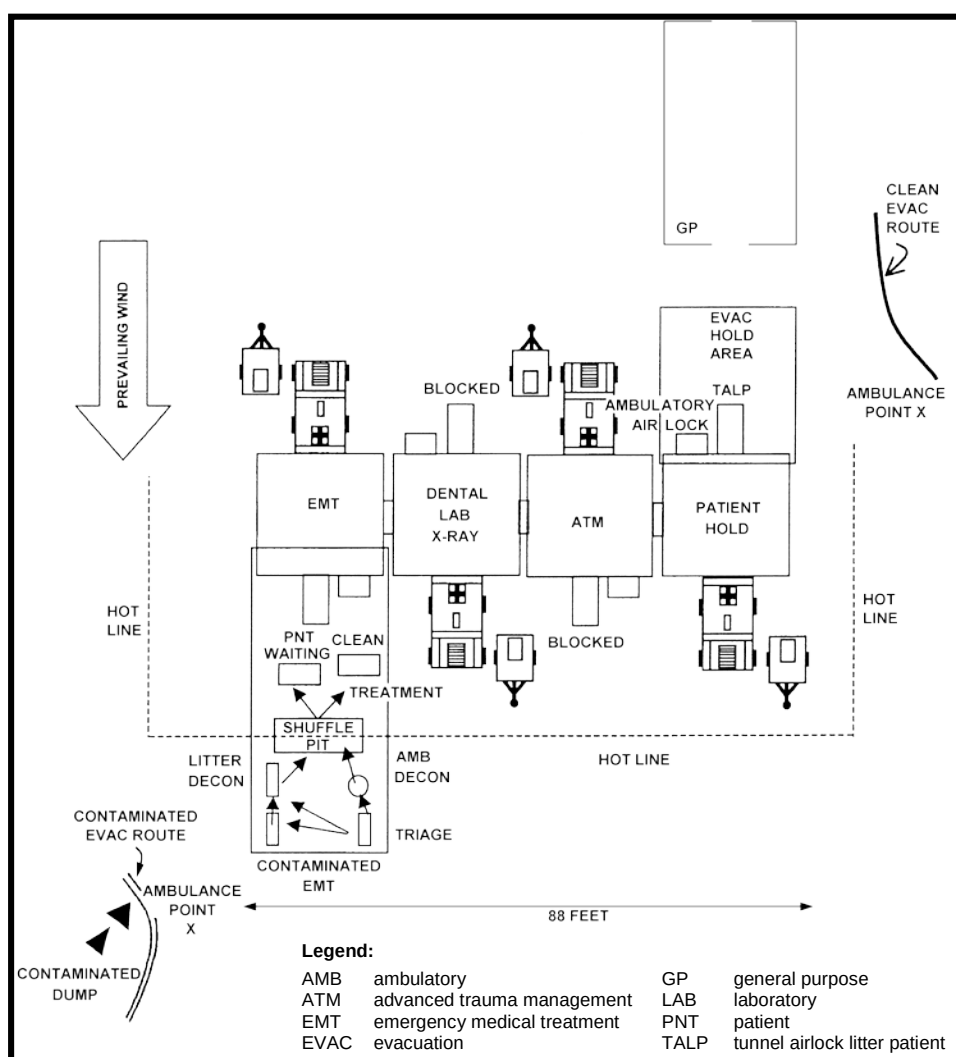


Figure 12-3. Chemical biological protective shelter configuration as a medical company (brigade support battalion/area support) Role 2 medical treatment facility

FORWARD SURGICAL TEAM IN A CHEMICAL BIOLOGICAL PROTECTIVE SHELTER

12-17. To establish an FST using the CBPS system (M8 or M8E1), follow the procedures for the medical company (brigade support battalion) Role 2 MTF except only three CBPS systems are set up. With three CBPS systems set up and operational, a total of 900—1,200 square feet (the M8E1 will provide 400 square feet more) of work area is available (see Figure 12-4).

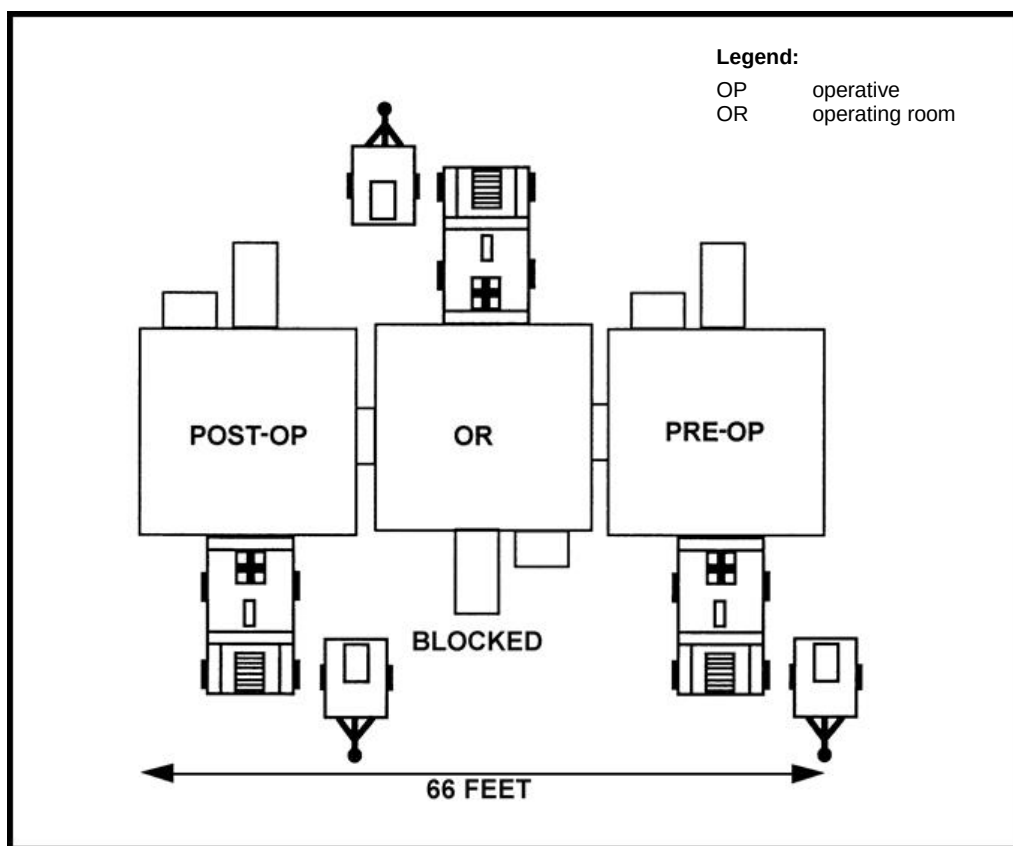


Figure 12-4. Forward surgical team configuration for operations in conventional mode

12-18. When the FST is located forward in support of a medical company and operating in the CB mode, the FST systems are connected to the Role 2 MTF of the supported medical company (brigade support battalion). Figures 12-5 and 12-6 (page 12-8) show the FST and medical company (brigade support battalion/area support) Role 2 MTF connected.

12-19. When operating in the CB mode with the medical company (brigade support battalion), all patients are received through the EMT airlock of the medical company (brigade support battalion) Role 2 MTF. The patients are triaged in the medical company (brigade support battalion) Role 2 MTF and, based upon their injuries, they are routed to the treatment area of the Role 2 MTF or to the FST for surgical care. Patients released from the FST for evacuation are placed in a PPW and processed through the litter airlock in the FST recovery section. Patient decontamination is performed at the PDS operated by the medical company (brigade support battalion) Role 2 MTF. The FST cannot operate in a CB environment without being complexed with the medical company (brigade support battalion) Role 2 MTF. They do not have any patient decontamination capabilities.

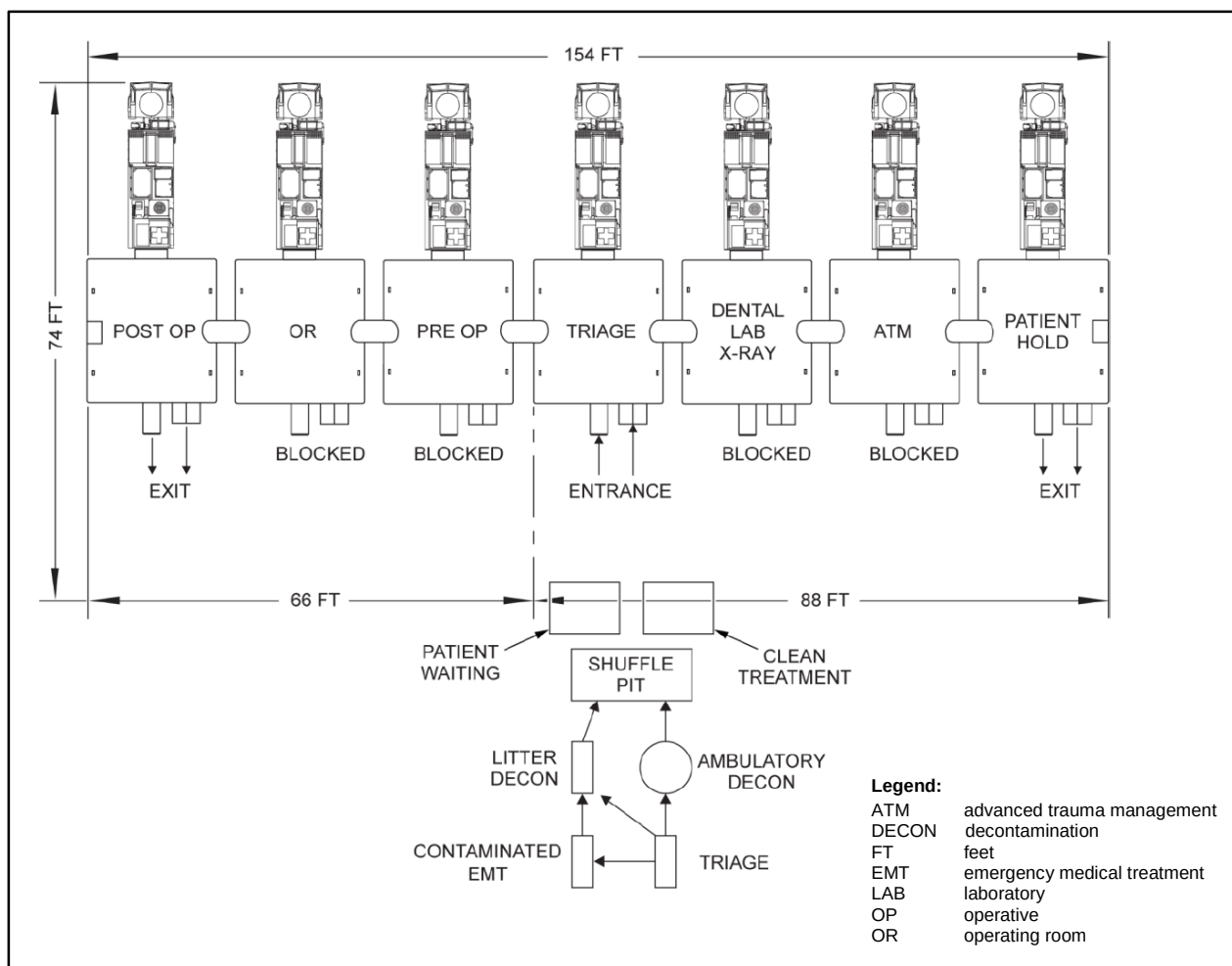


Figure 12-5. Forward surgical team and medical company (brigade support battalion/area support) Role 2 medical treatment facility configuration (M8E1) for operations in a chemical, biological, radiological, and nuclear environment

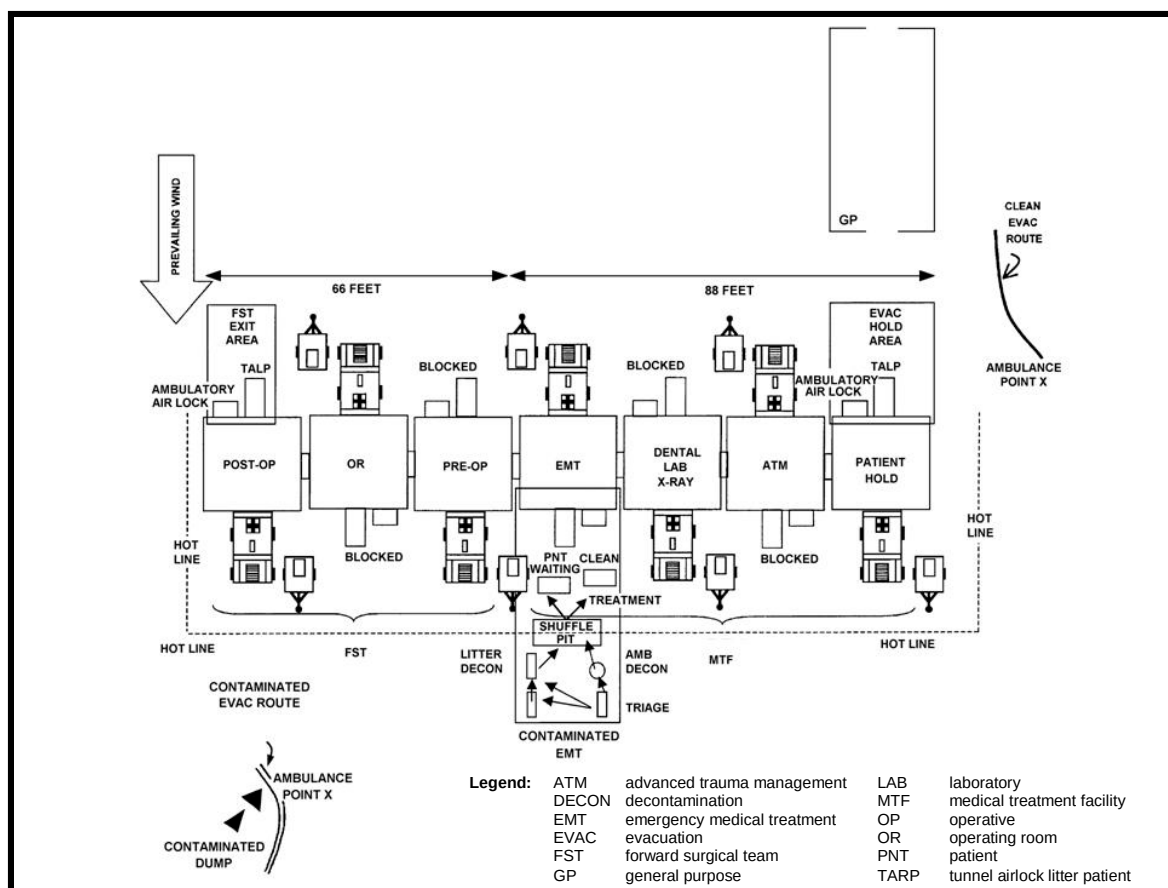


Figure 12-6. Forward surgical team and medical company (brigade support battalion/area support) Role 2 medical treatment facility configuration (M8) for operations in a chemical, biological, radiological, and nuclear environment

COLLECTIVELY PROTECTED FIELD HOSPITAL

12-20. When operating under a CBRN threat or when a CBRN attack is imminent, the medical personnel must prepare for continuation of its mission. Should an attack occur or a downwind hazard exist, the medical personnel must seek out a contamination free area to establish a clean treatment area or must establish collective protection to continue the mission.

Chemically Protected Shelter Liner Kit for Deployable Medical System

12-21. The M28 CPE is a highly transportable CPS used in conjunction with the TEMPER and the AMEDD Shelter System. The modular system consists of agent resistant liner sections, protective entrance, tunnel airlock litter patient, hermetically sealed CBRN filter canister, recirculation filter, and a support kit containing a motorized blower and ancillary equipment. These components are available separately as spare parts or packaged together into six basic M28 CPE configurations. A *Type II* M28 CPE liner configuration, developed exclusively for the USAF, uses a slightly different liner interface design. The Type II liner components are currently available as spare parts only.

12-22. In addition to the basic M28 CPE components are vestibule liners, which allow interconnection of liner systems to create a larger protective area. Used in combination with ISO adapters, vestibule liners allow the addition of ISO shelters to the protective area. Also available is the CPE supply airlock, which provides a capability to bring palletized supplies or large equipment into the protective area.

12-23. Basic M28 CPE components, in combination with vestibule liners, ISO liner adapters, and the CPE supply airlock provide a variety of options for configuring shelter complexes. Two examples of such shelter complexes are the Army's CPDEPMEDS, combat support hospital and the Air Force's Collectively Protected Expeditionary Medical Support (CPEMEDS).

12-24. The Collectively Protected Small Shelter System provides chemical and biological agent protection inside the shelter to create a *shirt-sleeve* environment unencumbered by the stresses of IPE. Its major components are—

- Field Deployable Environmental Control Units.
- Four hundred cubic feet per minute fan filter assemblies.
- Modified M28 CPE liner sections.
- Bump through door airlocks.
- Five hundred eighty fan filter assemblies for the bump through door airlock.
- Two hundred fan filter assemblies M98 gas particulate filter sets.

12-25. The system is packaged into kits that are lighter in weight compared to other transportable CPSs.

12-26. The Collectively Protected Small Shelter System when properly employed provides a toxic-free area in which personnel can conduct operations, maintain critical equipment, rest, eat, and sleep. The Collectively Protected Small Shelter System can be complexed together to increase the capacity to suit operations. It is equipped with airlocks; decontaminated personnel move into the system without introducing contaminants. These systems are transportable and are compatible with 463L pallets. They are used near mission critical facilities to protect and provide rest and recuperation for sortie generators and command and control for key leadership. The main user of this system is the USAF.

12-27. The CPS integrates into the medium Modular General Purpose Tent System and provides a clean-air shelter for use against CW and BW agents and radioactive fallout. Its major components are—

- Modified M28 CPE protective liner and floor.
- Two hundred cubic feet per minute hermetically sealed filter canister.
- M28 support kit (includes blower).
- Recirculation filter assembly.
- Accessory kit.
- Tunnel airlock litter patient.
- Integrated airlock.

12-28. The main user for this system is the USMC and it provides chemical, biological and radioactive particle collective protection to operating forces in threat areas while deployed. The liner system—

- Can be fully operational in an uncontaminated environment in 30 minutes with four personnel.
- Provides (approximately) 240 square feet of floor space, occupying one-half of the Modular General Purpose Tent System. Depending on mission requirements, one or two liner systems may be used.
- Is used as environment protection for rest and relief, command and control, support or maintenance, and medical.
- Has a flexible configuration.
- Can accommodate external environmental control units.

12-29. The shipboard CPS Backfit Program was created to provide additional collective protection capabilities to existing amphibious class ships allowing personnel to perform mission critical operations in a CBRN environment. Its major components are—

- M98 Gas-particulate filter sets.
- Pre-filter bags and filter housings.
- Van-axial fans.
- Fan rooms.
- Airlocks.
- Pressure gauges.

- Zone pressure relief valves.
- Zone alarms and control panels.
- Contamination station.

12-30. The program installs additional CPS toxic free zones in critical areas including medical, command and control, rest, and recuperation, and casualty collecting areas. Personnel working in these protected areas do not have to wear IPE during or after a CBRN attack. The CPS allows additional toxic free zones that allow the ship's personnel to operate in a chemical, biological, and radiological environment. The CPS has a 3 plus year filter life. The LHA/LHD class ships are now capable of receiving and treating contaminated casualties in a collectively protected environment. The main user of this system is the USN.

Chemically Protected-Deployable Medical System

12-31. Deployable medical systems (DEPMEDS) was developed in the 1980s to standardize a hospitalization system. The DEPMEDS hospitals are assembled from standard functional modules. These modules are housed in rigid aluminum ISO-standard shelters, including radiology, laboratory, pharmacy, central material services rooms, and operating rooms. Some of the auxiliary functions are housed in vans as well as TEMPER and AMEDD Shelter System units.

12-32. The CPDEPMEDS is a containerized set and a complex of TEMPER, passageways and expandable shelters that provides Army DEPMEDS-equipped combat support hospital with the capability to sustain operations in a CBRN environment. The result will be a functional barrier against harmful warfare agents or fallout that allows the hospital to treat casualties without the use of protective gear or causing further harm.

12-33. The DEPMEDS-equipped patient care areas of the U.S. Army Medical Reengineering Initiative combat support hospital will employ the CPDEPMEDS. The CPDEPMEDS program has converted all MF2K CPDEPMEDS to the Medical Reengineering Initiative configuration. In this configuration, equipment is provided to protect all beds in each hospital size. It will not protect personnel or patients from the thermal, blast, and initial radiation effects of nuclear weapons; however, it will provide some protection against fallout effects. The system includes—

- Chemically/biologically protected liners for TEMPER and passageways.
- Chemical biological-filtered and conditioned (heated or cooled) air via Field Deployable Environmental Control Unit or H80 Army standard heater.
- Chemically/biologically protected ambulatory, litter, and supply airlocks.
- Chemically/biologically protected latrines.
- Chemically/biologically protected seals for ISO shelters.
- Chemically/biologically protected water supply system.

12-34. In the Medical Reengineering Initiative configuration, CPDEPMEDS can be issued and deployed in an 44-bed configuration early entry hospital element which consists of equipment in three 20 foot MILVAN containers, one 100 kilowatt generator, and one 3-in-1 expandable ISO shelter (containerized latrine).

12-35. The 44-bed hospital can grow to an 84-bed hospital with a 40-bed CPDEPMEDS augmentation kit, which consists of equipment in one 20 foot MILVAN container and one 100 kilowatt generator. The 44-bed and 40-bed augmentation use the AMEDD Shelter System tentage.

12-36. The CPDEPMEDS can also be issued and deployed in an independent 164-bed configuration which consists of equipment in six 20 foot MILVAN containers, two 100 kilowatt generators, and one 3-in-1 expandable ISO shelter (containerized latrine). The 164-bed configuration uses TEMPER tentage.

12-37. The 44-bed hospital, 40-bed augmentation, and the 164-bed hospital can be combined into one 248-bed hospital. There are a number of recommended layouts, but it is up to the commander to determine the final hospital layout.

The Collectively Protected Expeditionary Medical Support

12-38. The CPEDMEDS provides an air-transportable medical facility that allows the medical personnel and patients to work without individual chemical and biological protective gear. The CPEDMEDS uses the

Collectively Protected Small Shelter System with the associated CPE to chemically and biologically “harden” the shelter. The components are kitted by increment ranging from one collectively protected shelter to a multi-shelter hospital complex. See AFTTP 3-42.71 for details regarding EMEDS increments and capabilities.

Note. In concert with the Joint Expeditionary Collective Protection (JECPP), the USAF is transitioning to a single-skin shelter solution for collective protection.

12-39. The CPEMEDS can be supplemented based on mission needs with collective protection hospital surgical expansion package and collective protection hospital medical expansion package. The collective protection hospital surgical expansion package adds a 32-foot soft-sided shelter and a hard sided ISO shelter, tactical, expandable, two sided. These additions increase the toxic-free surgical capability. The collective protection hospital medical expansion package adds four soft-sided shelters, which increases the toxic-free inpatient ward space to three shelters with an additional shelter for postoperative patients.

12-40. The CPEMEDS uses the Lightweight Environmental Control Unit, one per tent. One fan filter assemblies (400 cubic feet per minute) is used per tent and one fan filter assemblies (580 cubic feet per minute) is used for the bump through door airlock. The 200 cubic feet per minute M98 gas particulate filter sets are used in all the applications.

12-41. The CPEMEDS +25 has the capability to provide 24-hour sick call, 25 inpatient beds, and emergency medical care to a population at risk of 5,000–6,500. The CPEMEDS provides a contamination free environment where medical treatment can be rendered to personnel without the encumbrance of IPE.

12-42. When the threat of CBRN action is anticipated in the AO, the CPEMEDS components must be set up as the EMEDS is being established. The system cannot be set up in a hospital that has already been established. The collective protection liners must be installed during the EMEDS erection process. To establish CPS in an EMEDS-equipped hospital, follow the procedures as described in the Operation and Maintenance Manual for CPEMEDS. Copies can be downloaded from the Air Combat Command Surgeon General-Manpower and Equipment Force Packaging Web site.

The Collectively Protected Expeditionary Medical Facility

12-43. The collectively protected expeditionary medical facility will integrate environmentally controlled collective protection into the Navy’s expeditionary medical facility fleet hospital configuration. Fleet hospitals are first and foremost land-based hospitals, medically and surgically intensive. They are transportable and designed for sustained operations of 60 days or greater and are deployable in a variety of operational scenarios. The fleet hospital can be mobilized in two primary formations: a 500-bed hospital or a 20- to 116-bed expeditionary medical facility. The expeditionary medical facility maybe utilizing a new style of deployable medical unit, the BASE-X Expedition Shelter and will require the integration of the M28 CPE.

The Joint Expeditionary Collective Protection Program

12-44. The JECPP program is a joint service program with participation by the Army, Air Force, Navy, and Marines. The JECPP provides the warfighter with percutaneous, respiratory, and ocular protection from CB warfare agents, radiological particles, and selected TIMs. The JECPP is the next generation lightweight, modular, easily transportable, self-supporting CPS that will provide relief from psychological and physiological stresses during sustained operations in a contaminated environment. The Joint expeditionary forces are required to be prepared to operate on the sea, littoral, land, and in the air, often for extended periods in austere, expeditionary, and possibly chemical, biological, and radiological/TIM contaminated environments.

12-45. The JECPP collectively protects expeditionary forces by providing a versatile, transportable, capability to convert common structures and tentage into a collectively protected space or establish a stand-alone CPS. This capability will be adapted in remote locations and harsh environments where sustainment/support is challenging and fixed-site collective protection is limited or nonexistent.

12-46. The JECF supports common, overlapping functions associated with operational activities, such as electrical power, sanitation, eating-drinking, cooling-heating, floor space, entry/exit, and contamination control. The JECF provides flexibility by reducing the need to deploy, move, and maintain large, heavy, and complex CPS systems. When employed in a command and control scenario, JECF allows command and control to continue without degradation. When employed in a rest and recuperation scenario, JECF provides rest and recuperation for both personnel required to wear IPE and MWDs. It allows personnel to remain unencumbered while eating, drinking, sleeping and attending to bodily functions. When employed in the medical scenario, JECF provides a toxic-free environment for receiving, treating, and holding human and MWD casualties. For protection of critical equipment scenarios, JECF provides a toxic free environment allowing personnel performing sensitive operations to work unencumbered by IPE.

EMPLOYMENT OF THE CHEMICALLY PROTECTED DEPLOYABLE MEDICAL SYSTEMS AND SIMPLIFIED COLLECTIVE PROTECTIVE SHELTER SYSTEMS

12-47. When the threat of CBRN action is anticipated in the AO, the CPDEPMEDS components must be set up as the combat support hospital is being established. The system cannot be set up in a hospital that has already been established. The M28 liners must be installed during the DEPMEDS erection process. The M28 liners are part of the CPDEPMEDS components being installed in the DEPMEDS. To establish CPS in a DEPMEDS-equipped hospital, follow the procedures as described in TM 10-5410-283-14&P. Figure 12-7 on page 12-14 presents a layout of the patient care area of the DEPMEDS-equipped portion of an 84-bed Medical Reengineering Initiative hospital. Figure 12-8 on page 12-15 presents a layout of the patient care area of the DEPMEDS-equipped portion of a 164-bed Medical Reengineering Initiative hospital.

12-48. When employing CPDEPMEDS, provisions for waste disposal and protected water and food supplies within the system are established. Additionally, Class VIII supplies must be protected from contamination. Supplies not in use or needed in the protected operational areas are stored in medical chests, shipping containers, or wrapped in layers of plastic that are inside covered areas, such as closed MILVAN containers or tents.

12-49. When contamination is present, only open these storage areas for operational area emergency resupply. Use plastic sheeting or other leak-proof material to provide an additional barrier between the supplies and the contamination. Wrap supplies in plastic or other barrier material for movement from the storage area to the resupply airlock of the CPDEPMEDS.

12-50. A water supply system with distribution hoses is established inside the CPDEPMEDS areas. Pumps continuously circulate the water from the storage tank through the hose system back to the storage tank. The continuous circulation ensures that the chlorine residual is maintained in the water supply. Personnel in areas that are not included in the continuous flow system must draw water from the system and carry it to their work areas in 5-gallon water cans or other containers. Water resupply is accomplished by passing a hose through the utility port at the end of the TEMPER and M28 liner for connection to the water transport vehicle. The ends of both hoses must be decontaminated with a 5 percent chlorine solution before connecting them together. The vehicle must have a tank or water supply container that is CBRN protected to ensure that the water supplied is free of CBRN contamination.

12-51. Rations, as determined by the hospital commander, should be available within the protected area for personnel and patients. Under emergency conditions the commander can authorize feeding patients ready to eat field rations/meals for limited periods of time (up to 72 hours), if they are able to chew and swallow. However, attempts must be made to ensure the required types of rations for patient feeding are available in the CPS. The rations can be stored in any available space; however, the rations must be protected from exposure to possible contaminants, especially liquids. Ration control measures are established to ensure that the rations are only consumed as provided for in the hospital tactical SOP.

12-52. Two CB protected latrine systems are included in the CPDEPMEDS. The latrines contain bedpan wash areas. The waste from the latrines is collected in an outside receiving container.

12-53. Solid waste (including medical) must be placed in plastic bags. Seal the top of the bags to prevent spillage, odors, or spread of infections/disease. Never overfill the bags; always leave enough room in the bag to make a good seal. Place the sealed bags in the supply airlock. Inside personnel ensure that the inner door to the airlock is closed. Outside personnel check to ensure that the inner airlock door is closed before

opening the outside door. Remove the bags and take them to the designated waste collection/disposal site. Disposal may be by burial on-site or by transport to a designated disposal facility.

Note. Service or unit-specific waste disposal procedures should be followed.

12-54. All liquid waste produced within the CPDEPMEDS is collected through a piped liquid waste system to a central collection container. The waste container for the latrines may be used to collect the liquid waste from the operational areas of the CPDEPMEDS.

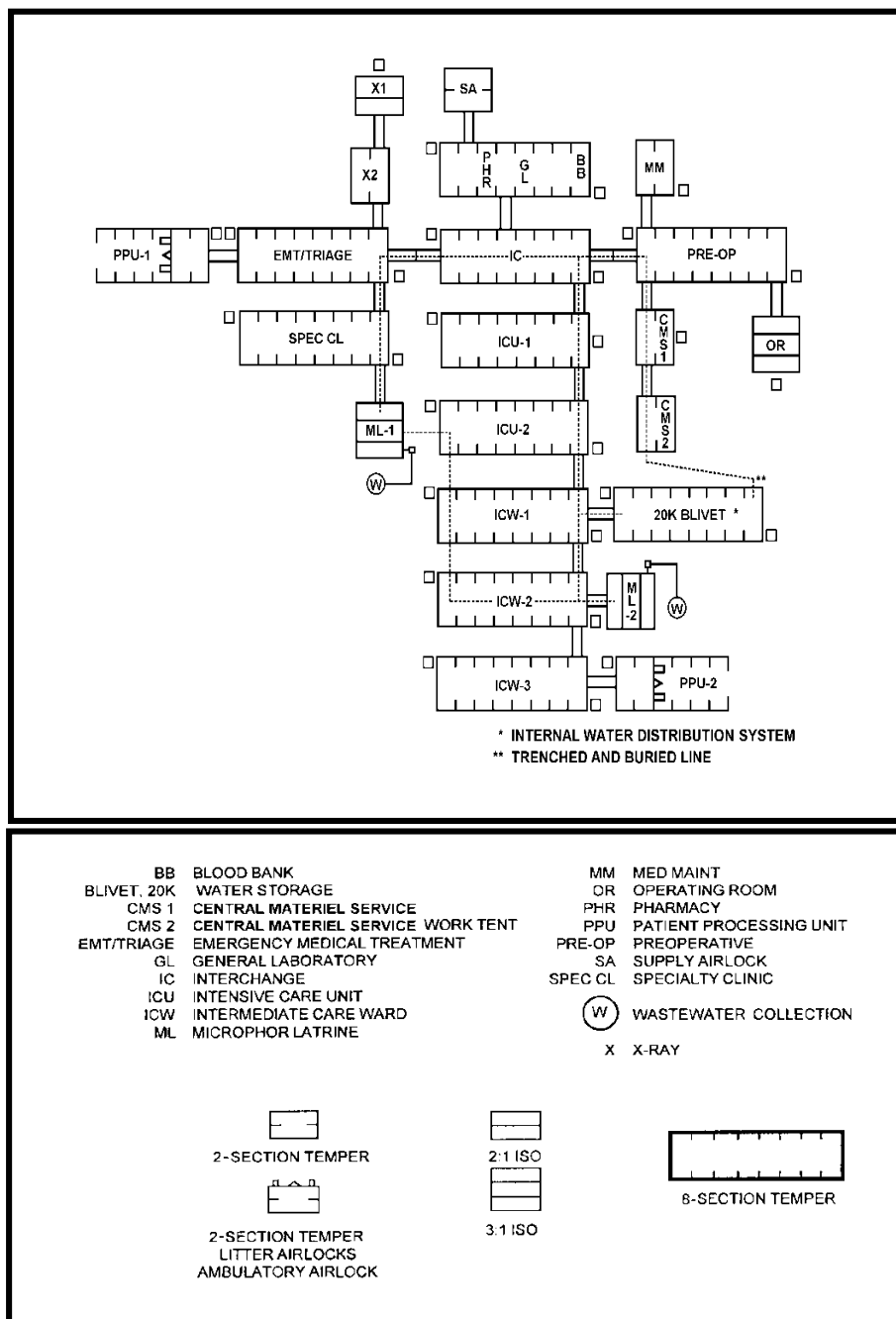


Figure 12-7. Sample layout of an 84-bed medical reengineering initiative hospital employing chemically protected deployable medical system

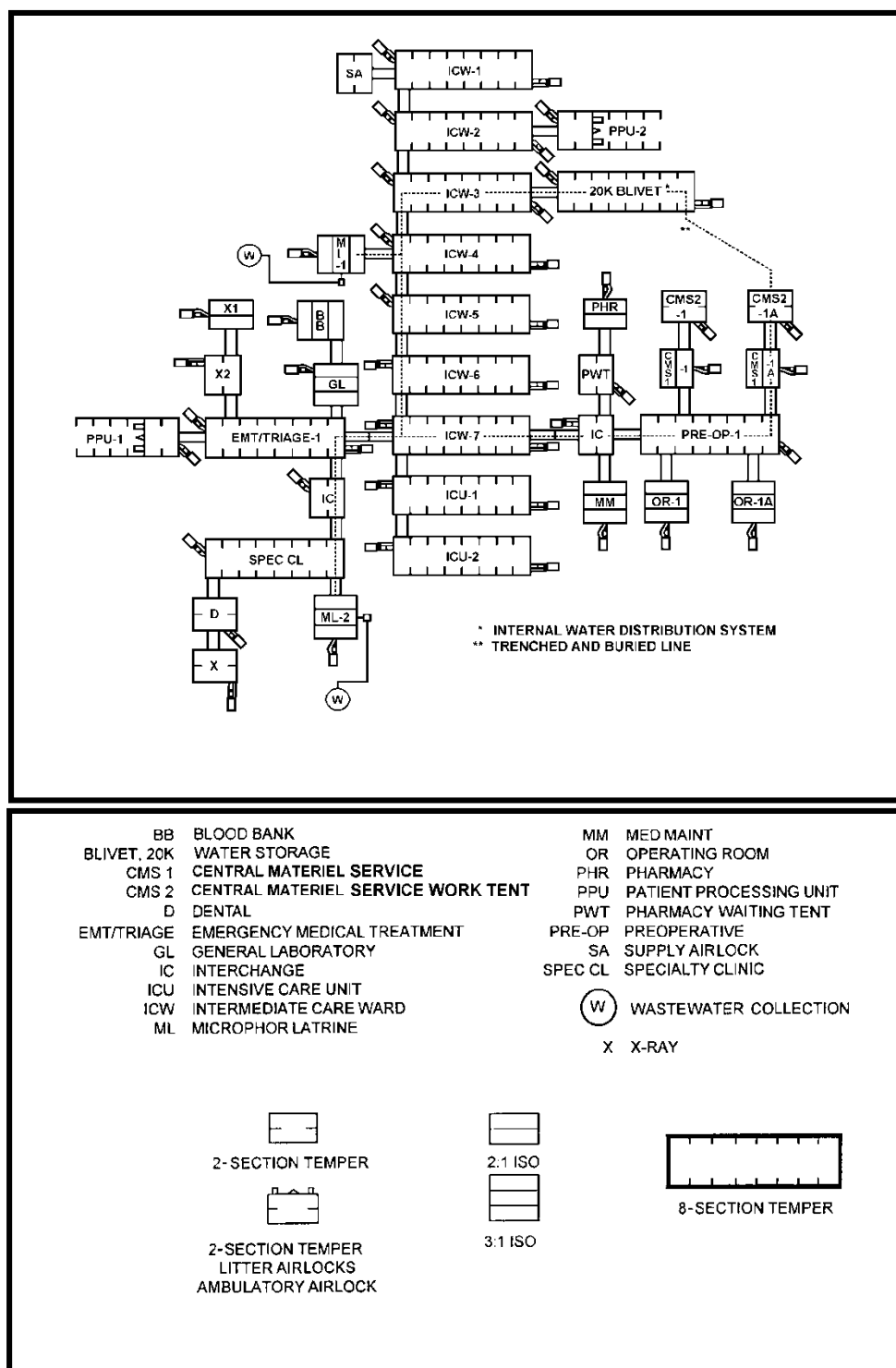


Figure 12-8. Sample layout of a 164-bed medical reengineering hospital employing chemically protected deployable medical system

Chemically/Biologically Protecting the International Organization for Standardization Shelter

12-55. To chemically/biologically protect the ISO shelters, seal all seams and openings of the ISO to prevent the entry of CB agents. The seals connecting the various sides and floor of the shelter must be of CB

protected material; thus providing a seal to the shelter. When the seals are not of a CB protected material, the seams must be taped to provide a CB protected barrier over the soft seals. Any openings not being used for introduction of support power lines, water lines or wastewater lines must be sealed to prevent entry of CB agents. All access panels must be securely closed to prevent entry of vapors.

Chemically/Biologically Protecting the Vestibules

12-56. The vestibules connect TEMPERs to TEMPERs, ISOs to ISOs, and ISOs and TEMPERs. To harden the vestibules, install the CB liners inside and fasten the ends to the liners of the TEMPER or to the doors of the ISOs. Vestibule liner connectors are provided for use at the entry of each ISO.

Chemically/Biologically Protecting Air Handler Equipment

12-57. The Field Deployable Environmental Control Unit is a chemically/biologically protected environmental control unit. It is a heat pump (reversing mechanical refrigeration system) intended for use in cooling, heating, dehumidifying, filtering, and circulating air for portable shelters, tents, and vans in order to satisfy equipment and personnel climate control requirements. The system can be operated without the CB filters. When required to operate in the CB mode, the fresh air intake on the Field Deployable Environmental Control Unit is closed and the CB filter blower is turned on drawing fresh air through the filters to support the Field Deployable Environmental Control Unit and to provide clean air for the CPS. Additionally, recirculation filters are placed within the shelter system to remove any agent that may have entered through any of the entry/exit areas or through breaches in the shelter system.

12-58. When heaters are required, they must be chemically/biologically protected to prevent entry of contamination. The CB filter units are connected to the fresh air intake side of the heater and the heated air discharge side of the heater is connected to the air supply of the TEMPER/ISO. For more information on Field Deployable Environmental Control Unit, refer to TM 9-4120-411-14/TO 35E9-314-1.

ESTABLISH COLLECTIVE PROTECTIVE SHELTER USING THE M20 SIMPLIFIED COLLECTIVE PROTECTIVE SHELTER SYSTEM

12-59. The M20 simplified CPE is used to establish a CPS within a room of opportunity or inside a tent; however, the available space will be limited by tent poles and other components of the tent. Currently, this system only provides ambient temperature air.

12-60. The M20 simplified CPE provides a clean-air shelter for use against chemical and BW agents and radioactive particles. It is lightweight and mobile and it allows unit commanders to convert existing structures into protected working or rest area. The M20 simplified CPE can be used as a temporary rest and relief shelter (for example, as a break area for medical personnel) or as a command and control center. It provides a contamination-free environment in which 10 Service members can work, eat, or rest without wearing an IPE. The M20 simplified CPE can be erected without the liner using only the protective entrance and blower compartment. Places such as a bank vault or warehouse freezer are examples of where an M20 without liner can be placed. Any cracks or holes will need to be sealed in the doorway. A bib section is available that will fit between the protective entrance and the frame of any door, and when taped down, seals the entrance from outside contamination. Entry and exit restrictions remain the same. For guidance on maintenance and parts of the simplified CPE see TM 3-4240-288-12&P/NAVPAC P-475. The M20 does not have a litter airlock. Only staff or ambulatory patients can enter.

PATIENT DECONTAMINATION

12-61. Patients admitted into the MTF must be free of contamination. Therefore, a PDS must be established near the MTF. The PDS should be provided with an overhead cover as described for the CBPS system, except that it does not overlap the entry to the hospital. Also, consideration must be given to the location of other operations at the hospital site when establishing the casualty decontamination area. However, the area must be close enough to the entry/exit of the CPS to protect the patients from the environment and reduce their exposure to recontamination. The entry/exit area must have overhead cover to protect patients awaiting access to the CPS. See Chapter 5 for setting up a PDS and for decontamination procedures.

OPERATIONS, ENTRY, AND EXIT GUIDELINES

12-62. The following are the operations, entry, and exit guidelines to prepare a unit SOP for the operation of CPS systems. When using these guidelines, the following should be considered:

- Location of the shelter (flat, hilly, or rocky ground).
- General climate of the AO (high and low temperature variations during operation).
- Information on setting up, striking, and operating the CPS is contained in the equipment publications.
- Where applicable, special procedures are provided in these publications for setting up in both clean and CB vapor hazard areas. The CPDEPMEDS is not set up in a CB vapor hazard area. The commander will determine which procedures to use.
- During operations, periodic checks are made of the atmosphere within the shelter. These checks are made by using available chemical agent detection equipment and material to determine if chemical agent penetration has occurred. Should chemical agent penetration occur, all personnel must mask; then ensure that patients are protected until the agent has been purged from the shelter.

Decontamination of Entrance Area

12-63. Normally, the MTF will not operate in a CB vapor hazard environment. However, if the MTF must remain in an area on a temporary basis and liquid agent contamination is present, the immediate area around the entrance must be decontaminated. To decontaminate the area around the entrance, use one or more of the following methods:

- Turn over about 2 inches of soil.
- Remove the top 1-inch layer of soil containing the liquid agent. Use a detector to check the area after the topsoil is removed to ensure complete agent removal.
- Add several inches of clean soil or sand.
- Mix 2 parts calcium hypochlorite to 3 parts soil into the top ½ to 1 inch of soil.

12-64. All personnel (staff and patients) must be decontaminated before they are permitted entry into the CPS. Use chemical detection equipment to check for the presence of contamination on individuals and their equipment; also check for presence of contamination on individual weapons if they are allowed in the CPS. Normally, weapons will not be allowed in the patient care areas, but will be stored outside near the entry/exit point. Thorough decontamination is critical in preventing contamination transfer into the CPS.

12-65. When a chemical agent is detected, follow the procedures in Chapter 5 for patient decontamination and FM 3-11.4/MCWP 3-37.2/NTTP 3-11.27/AFTTP (I) 3-2.46 for other personnel and equipment decontamination before entering the CPS. All contaminated clothing and equipment are placed in the contaminated dump. If weapons are evacuated with the patient, they are decontaminated and held by the MTF (administrative personnel or hospital supply) for disposition instructions.

12-66. Decontamination must be thorough; procedures must be strictly followed. Failure to do so can contaminate the interior of the MTF and injure medical treatment personnel; thus reducing their mission support capabilities.

WARNING

1. Always purge the airlock before opening the inner door, if the outer door has been opened.
2. When operating in a toxic environment, never open the outer and inner doors of the airlocks at the same time.

Entry/Exit for the Collective Protective Shelter System

12-67. This section discusses entry and exit for the CPS system.

Ambulatory Personnel

12-68. Entry procedures are discussed below:

- Ambulatory patients and others remove their MOPP (except their mask), duty uniform, and boots outside the airlock/personnel processing unit. This procedure reduces the amount of possible contamination entering the airlock.
- A check is made to ensure that the ambulatory airlock/personnel processing unit is empty and the inner door is closed.
- The individual enters the airlock/personnel processing unit and closes the outer door.
- The airlock/personnel processing unit is purged for 3 minutes. At the end of the purge cycle, the individual checks for contamination. If contaminated, the individual must return to the outside and decontaminate his skin; then return to the airlock/personnel processing unit and repeat the purge cycle and contamination check. If no contamination is detected, the individual removes the protective mask and then removes the filter from the mask. The filter is then disposed of in the designated contaminated trash bag. The protective mask is placed in a separate clean plastic bag. The plastic bag is sealed and labeled. The individual opens the inner airlock/personnel processing unit door and enters the CPS; the plastic bag is carried into the shelter with the individual. Ensure that the patient has a new mask filter replacement prior to leaving the CPS.

Note. Extra protective masks and protective mask filter canisters must be on hand at the CPS to replace wet or contaminated filter canisters for the ambulatory patients and/or medical personnel.

12-69. Exit procedures are discussed below:

- A check is made to ensure that the ambulatory airlock/personnel processing unit is empty and the outer door is closed.
- The individual enters the airlock/personnel processing unit and closes the inner door.
- The individual puts on his protective mask (ensure mask filter has been replaced); then exits through the outer door.
- The individual puts on his duty uniform and boots then assumes the established MOPP level before departing the immediate area of the exit door.

WARNING

Do not open the outer door until after donning the protective mask.

Notes. 1. If ambulatory patients that enter the CPS system become litter patients, they must be placed in PPW when released since the MTF does not have replacement MOPP ensembles for patient issue.

2. Exits between patients must be spaced so that at least a 3 minute purge of the airlock/personnel processing unit is accomplished before the inside door is opened. Only open the doors long enough to permit passage.

Litter Patients

12-70. Entry procedures are discussed below (these procedures also apply when using the Tunnel Airlock Litter Patient):

- An outside medical personnel notifies an inside medical personnel that a litter patient is ready for admission.
- The inside medical personnel ensure that the inner litter airlock door is closed. The outside medical personnel open the outer airlock door and place the litter on the litter rails/stands when using the tunnel airlock litter patient or on the floor; the patient is pushed into the airlock headfirst; then the outer door is closed. After a purge time of 3 minutes, medical personnel inside the CPS opens the inner door to ensure that the patient is free of contamination. The patient is checked by placing the detector near absorptive surfaces, such as the patient's hair. If no contamination is detected, the medical personnel remove the patient's protective mask and then remove the filter from the mask. The filter is then disposed of in the designated contaminated trash bag. The protective mask is placed in a separate clean plastic bag. The plastic bag is sealed and labeled and placed in between the patient's legs or, when using the tunnel airlock litter patient, beside the patient's head or on the litter where it is accessible to the patient. The inside medical personnel removes the patient from the airlock and position him on treatment litter stands, or moves him to the treatment area.
- Patients received at the treatment facility in the PPW are checked for contamination; if they are free of contamination, they may be processed through the litter airlock in the PPW. The inside medical personnel ensure that the inner litter airlock door is closed. The outside medical personnel open the outer airlock door and place the litter on the litter rails/stands when using the tunnel airlock litter patient or on the floor and push the patient into the litter airlock headfirst, then close the outer door.
- Purge the airlock for 3 minutes. After the purge time, medical personnel inside of the CPS open the inner airlock door and use the detector to check the patient to ensure that he is free of contamination. If no contamination is found, the inside medical personnel remove the patient from the airlock. As the patient is removed from the airlock, the PPW is opened and rolled inside out so that any desorbing vapors are adsorbed by the charcoal layer. The inside medical personnel remove the patient from the airlock and position him on litter stands. The patient is transferred to a clean litter; then moved to the treatment area.
- The receiving litter and PPW are returned to the outside. The PPW must be disposed of in the contaminated waste dump. Decontaminate the litter and return it to the litter pool.

Note. Should contamination be found when monitoring the airlock, repeat the purge cycle, and then retest for contamination. All vapor hazards must be eliminated before the patient is moved into the CPS. Repeating the purge cycle may NOT be possible if the patient is in need of immediate lifesaving care. The patient may have to be returned to the outside treatment area for immediate care.

12-71. Exit procedures are discussed below:

- The litter patient is placed in a PPW. A battery-operated blower unit with a CB filter is attached to the PPW to provide fresh air to the patient; thus reducing the heat load on the patient and the carbon dioxide buildup inside the PPW.
- An inside medical personnel notifies an outside medical personnel that the patient is ready to exit the shelter. Outside medical personnel ensures that the outer airlock door is closed. The patient is placed in the litter airlock feet first. The inner airlock door is closed. The outside medical personnel opens the outer door and removes the patient.
- Staff, visitors, or ambulatory patients exit through the ambulatory airlock. Before entering the airlock, each individual must ensure that the outer airlock door is closed. The individual enters the airlock and closes the inner door; puts on his protective mask and exits through the outer door. The individual puts on his duty uniform and boots, and then assumes the established MOPP level before departing the immediate area of the exit door.

WARNING

**Do not open the outer door until the inner door has been closed.
Do not allow patients in PPW to remain in direct sunlight for more
than 5 to 10 minutes. Remaining in direct sunlight can cause
severe heat load on patients.**

Note. Exits must be spaced at least 3 minutes apart to allow for a complete purge cycle of the airlock.

Resupply of Protected Areas

12-72. Resupply of protected areas is accomplished by placing contamination-free supplies or equipment on a litter and passing it through the litter airlock, or processing it through the supply airlock. The supply airlock must be purged for 3 minutes. The supplies must be checked for contamination before they are removed and placed within the CPS. The supply airlock must be purged for the stated time as outlined in the supporting TM; usually 45 minutes. Again the supplies must be checked for contamination before they are removed and placed within the CPS.

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Appendix A

Chemical, Biological, Radiological, and Nuclear Casualty Estimation

GENERAL

A-1. Medical planners' estimates (such as casualty, logistics, evacuation, and personnel cross leveling) must be modified for the CBRN environment. The NATO planning guide for the estimation of CBRN casualties can be found in STANAG 2553.

CASUALTY ESTIMATES

A-2. A number of decision support tools have various levels of capability to estimate the number and types of casualties from non-CBRN to CBRN events. Data from these models can be used to develop medical estimates.

This paragraph implements STANAG 2553.

A-3. The casualty estimate assists planners, logisticians, and other staff officers by allowing effective quantification of contingency requirements for medical force structure, specialty personnel, medical materiel, and patient transport or evacuation. The following are some of the considerations when using casualty estimates:

- Operational planners may use casualty estimates to provide coordinating instructions to units or to assess unit casualty distributions when evaluating courses of action resulting from variations in a number of parameters, such as medical countermeasures.
- Logistics planners may use casualty estimates to determine logistical requirements, both medical and non-medical, for the management of CBRN casualties.
- Personnel planners may use casualty estimates to determine personnel replacement requirements.
- Medical planners may use casualty estimates to identify medical resource requirements, such as pharmaceuticals, medical devices, medical supplies, bed types, and personnel specialties, for each role of medical treatment.
- Commanders and command surgeons may also use casualty estimates to evaluate medical courses of action.

A-4. The joint tool approved for calculating medical requirements is the Joint Medical Planning Tool (JMPT) and medical planners' toolkit (MPTk). The Services are responsible for generating their respective casualty estimates and tracking casualty rates for contingency operations. In the USAF, this is the responsibility of the planning and operations communities.

JOINT MEDICAL PLANNING TOOL

A-5. The Naval Health Research Center developed the JMPT. The JMPT is a computer-based simulation tool that models patient flow from the point of injury through more definitive care. It supports research, medical systems analysis, operational risk assessment, and field medical services planning.

A-6. The JMPT is based on empirical data, including over 400 patient conditions and their associated medical treatment tasks, times, consumable supplies, and equipment necessary to accomplish patient care. It includes algorithms that calculate died of wounds due to treatment delay and complications. The JMPT spans the spectrum of theater-based levels of care and emulates all Service MTFs and their respective functional areas, including the number and type of personnel, and the type, speed, and capacity of transportation assets. The JMPT uses discrete-event stochastic processes to model patient arrivals, treatments, and outcomes as

patients move from the point of injury through the network of MTFs and eventual RTD or evacuation from theater.

A-7. The JMPT is fully integrated with the MPTk. The JMPT consists of four functional components: patient stream generation, medical treatment, transportation, and report generation. Users define the scenario by specifying scenario length, MTF laydown, transportation assets, and casualty load. The JMPT generates a wide variety of system-defined reports that provide detailed information on casualty generation, care provision, and transportation metrics in both tabular and graphic formats.

A-8. This application is one element of an integrated, clinically based, end-to-end medical materiel requirements planning process that incorporates the clinical practice guidelines, the patient encounter and clinical workload forecasts, and the medical materiel data linking them together. This modeling and simulation process enables collaboration by integrating clinical and logistics data, permitting identification of capabilities, operational requirements, patient stream, and material item estimates. Benefits of JMPT are—

- Assists military medical planners and logisticians to evaluate the medical support mission.
- Helps determine whether a particular MTF meets the needs of a specific patient stream; how the relocation of an MTF affects patient treatment; and how supply, personnel, and transportation assets are used. Further, it facilitates comparisons of proposed care facility networks.
- Supports both deliberate and crisis-action planning.

MEDICAL PLANNERS' TOOLKIT

A-9. The MPTk is a powerful suite of tools developed to support the joint medical planning community. This suite of tools provides planners with an end-to-end solution for medical support planning across the range of military operations from combat to humanitarian assistance missions.

A-10. The MPTk combines the Patient Condition Occurrence Frequency tool, the Casualty Rate Estimation Tool, and the Expeditionary Medicine Requirements Estimator into a single desktop application. This allows the user to manage the frequency distribution of probabilities of illness and injury, estimate of casualties in a wide variety of military scenarios, and estimate level three theater-medical requirements. When used collectively, the tools provide matchless data and versatility to enhance medical planners' efficiency.

JOINT EFFECTS MODEL

A-11. The Joint Effects Model (JEM) provides a standardized representation of CBRN hazards areas and effects before, during, and after an incident to influence and minimize effects on current operation.

A-12. The JEM is a web-based software program. It is the only accredited DOD computer-based tactical and operational hazard prediction model capable of providing common representation of CBRN and TIM hazard areas and effects. It may be used in two variants: as a stand-alone system or as a resident application on host command, control, communications, computers, and intelligence systems. It is capable of modeling hazards in various scenarios, including counterforce, passive defense, accidents, incidents, high-altitude releases, urban environments, building interiors, and human performance degradation.

A-13. The JEM supports, interfaces, and communicates with the JWARN, associated weather systems, intelligence systems, and various databases. The JWARN receives data from sensor platforms or manually. This data is formatted by JWARN and made available to JEM. The analyzed data and resulting hazard predictions is transmitted to JWARN in order to provide hazard warning to forces and the facilities that are potentially affected. Planning for such events is accomplished by chemical staff sections at the tactical, operational, and strategic levels of Army and Joint forces using the planning modes of the JEM.

A-14. The JEM is a resident on all air defense artillery and command, control, communications, computers, and intelligence systems and stand-alone personal computers and laptop computer systems of the CBRN staff sections within the chemical brigade, echelons above brigade, JTF, and unified combatant commands. It interoperates with the Army Battle Command Systems. It provides forces with an integrated comprehensive analysis and response capability, which will minimize the effects of hostile air and missile attacks employing CBRN agents. In addition, automatic or manual input weather data can be used as necessary/required.

A-15. The output of JEM depicts the transport and diffusion of CB agents and radiological nuclear materiel under specific meteorological conditions on user-selected mapping products. It computes other effects (absorption, adsorption, desorption), chemical reaction, decay, or neutralization and determine the toxic hazard for a given breathing rate, skin exposure, or protection level. It displays graphical output and map the hazard onto a population density.

A-16. The JEM can also be used as an operational planning tool designed to allow the chemical staff and with coordination, the medical staffs at operational and strategic theater levels of war to conduct analysis of potential impact of toxic industrial hazards and CBRN threats on critical locations (such as aerial port of debarkation/sea port of debarkation and other fixed-sites) and population base on friendly operations. Such information will be useful to the commander in formulating the CBRN defense plans and in selecting defensive posture and procedures, as well as asset allocation for such operations.

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Appendix B

Health Service Support Chemical, Biological, Radiological, and Nuclear Annex to an Operation Order

GENERAL

B-1. Throughout the operations process, commanders integrate their own assessments with those of the staff and subordinate commanders. The primary tools for assessing progress of an operation include the operation order (OPORD), the common operational picture, personal observations, running estimates, and the assessment plan.

PURPOSE

B-2. To establish standardized procedures for medical staff officer planning, preparing for, detecting, reporting, and providing preventive/protective measures for CBRN/TIM hazards. To establish planning procedures for conducting HSS in CBRN/TIM environments. Also, to establish procedures for providing technical guidance/support to leadership before, during, and after a CBRN/TIM event. See Figure B-1 (on pages B-4 through B-6) for an example of an OPLAN/OPORD and refer to FM 6-0 for more information on annexes.

PROCEDURES

B-3. Medical staff officers prepare the list of equipment and procedural guidelines for HSS operations under CBRN/TIM conditions. *(Provide a list of radiological detection devices, chemical agent detection/identification kits/devices, components of biological sample collection, and shipping containers. Provide guidelines/references for operating detection/identification devices.)*

PLANNING ACTIONS FOR USE BEFORE A CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR/TOXIC INDUSTRIAL MATERIAL EVENT

B-4. Provide preventive/protective measures that the leadership can employ to reduce the health effects of a CBRN/TIM event. Also, provide preventive/protective measures that leadership can employ to reduce the health effects of existing CBRN/TIM hazards/contamination in an AO. Provide HSS leadership with procedures that can be employed to protect their unit and patients.

PLANNING ACTION FOR USE DURING A CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR/TOXIC INDUSTRIAL MATERIAL EVENT

B-5. Provide preventive/protective measures that the leadership can employ to reduce the health effects of a CBRN/TIM event. Provide HSS leadership with procedures that can be employed to protect their unit and patients.

PLANNING ACTIONS FOR USE AFTER A CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR/TOXIC INDUSTRIAL MATERIAL EVENT

B-6. Provide preventive/protective measures that line leadership can employ to reduce/mitigate the health effects of a CBRN/TIM event on the force. Provide HSS leadership with procedures that can be employed to mitigate the effects on their unit and patients.

PLANNING ACTIONS FOR PREVENTIVE MEDICINE/PUBLIC HEALTH SUPPORT FOR CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR/TOXIC INDUSTRIAL MATERIAL EVENT

B-7. Provide types and numbers of preventive medicine units/personnel required to perform preventive medicine missions during such events. Describe mission requirements for units/personnel preparing for and reacting to the event. Describe types of samples required and how samples must be collected, preserved, packaged, and shipped to supporting medical laboratory for analysis. Describe detection/monitoring equipment required for the event.

PLANNING ACTIONS FOR VETERINARY SUPPORT FOR CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR/TOXIC INDUSTRIAL MATERIAL EVENT

B-8. Provide types and numbers of veterinary units/personnel required to perform the veterinary service missions during such events. Describe mission requirements for units/personnel preparing for and reacting to the event. Describe types of samples required and how samples must be collected, preserved, packaged, and shipped to supporting medical laboratory for analysis. Describe food contamination and decontamination procedures. Describe detection/monitoring equipment required for the event. Describe mission requirements for decontamination and treatment support of MWDs and other GOAs in a CBRN environment.

PLANNING ACTIONS FOR MEDICAL LABORATORY SUPPORT FOR CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR/TOXIC INDUSTRIAL MATERIAL EVENT

B-9. Provide requirements for medical laboratory support for a CBRN/TIM event. Describe types of laboratory test/procedures required to provide command verification on the use of a suspect CBRN device/weapon. Provide medical laboratory reporting requirement. Provide report to command surgeon; JTF/Service component commander; senior commander in affected operational area. Obtain medical intelligence of specific biological threats (both endemic and potential hostile use) to enable the laboratory to properly plan for assays to include.

PLANNING ACTIONS FOR MEDICAL LOGISTICS SUPPORT FOR CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR/TOXIC INDUSTRIAL MATERIAL EVENT

B-10. Determine requirements for HSS support units and personnel. Describe types of Class VIII supplies required to support HSS response to an event. Numbers of chemical agent patient decontamination/treatment MESs, number of packets of chemical agent pretreatment tablets required, and chemoprophylaxis required for personnel exposed to a biological agent.

PLANNING ACTIONS FOR COSC/BEHAVIORAL HEALTH SUPPORT FOR CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR/TOXIC INDUSTRIAL MATERIAL EVENT

B-11. Provide requirements for COSC/BH support units/personnel. Describe where and how COSC/BH personnel will provide their support in response to the event.

PLANNING FOR MEDICAL TREATMENT OF CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR/TOXIC INDUSTRIAL MATERIAL EVENT CASUALTIES

B-12. Provide requirements for air and ground evacuation assets and treatment (including emergency dental care) support units/personnel. Provide requirements for nonmedical personnel to perform patient decontamination at the PDS and MTF. Describe where and how evacuation and treatment personnel will provide their support in response to the event, to include supervision of patient decontamination procedures.

COORDINATION REQUIREMENTS

B-13. Provide requirements for support such as who should transport/escort samples from unit of origin to the supporting medical laboratory and on to the CONUS definitive laboratory. Provide requirements for

numbers of personnel required to perform patient decontamination at supporting MTFs. Describe decontamination support requirements for medical units; especially hospitals and major medical logistics facilities.

REPORTS

B-14. Describe types of reports required and frequency of reporting on CBRN aspects of CBRN/TIM events. Reports should provide, at a minimum, aspects of event and recommended preventive/protective actions needed to prevent or minimize casualties.

[CLASSIFICATION]	Copy <u> </u> of <u> </u> copies Issuing Headquarters Place of issue Date- time group of signature Message reference number
Name of OPLAN and OPLAN [number] [(code name)] [(classification of title)] <i>Number plans and orders consecutively by calendar year. Include code name, if any.</i>	
(U) References: <i>List documents essential to understanding the OPLAN or OPORD. List references concerning a specific function in the appropriate attachments.</i> (a) <i>List maps and charts first. Map entries include series number, country, sheet names, or numbers, edition, and scale.</i> (b) <i>List other references in subparagraphs.</i>	
(U) Time Zone Used Throughout the OPLAN/OPORD: <i>State the time zone used in the area of operations during execution. When the OPLAN or OPORD applies to units in different time zones, use Greenwich Mean (ZULU) Time.</i>	
(U) Task Organization: <i>Describe the organization of forces available to the issuing headquarters and their command and support relationships. Refer to Annex A (Task Organization) if long or complicated.</i>	
1. (U) Situation <i>(Provide information essential to understanding the HSS plan).</i> a. (U) <u>Area of Interest</u> . <i>(Describe the area of interest/CBRN environment/situation). Refer to Annex A (Task Organization) if long or complicated.</i> b. (U) <u>Area of Operations</u> . <i>(Describe the command surgeon's area of responsibility. A map may also be included as an attachment).</i> (1) (U) <u>Terrain</u> . <i>(Describe the aspects of terrain that impact HSS operations. A map may also be included as an attachment).</i> (2) (U) <u>Weather</u> . <i>(Describe the aspects of weather that impact HSS operations).</i> c. (U) <u>Enemy Forces</u> . <i>(Emphasis on capabilities bearing on the plan by adversary groups, insurgents, host nation forces, or other opposition groups or political factions found in a particular country).</i> d. (U) <u>Friendly Forces</u> . <i>(Emphasis is also placed on CBRN HSS functions and responsibilities for higher and adjacent units).</i> (1) (U) <u>Higher Headquarters Mission and Intent</u> . <i>Identify and state the mission and commander's intent for headquarters two levels up and one level up from the issuing headquarters.</i> (a) (U) <u>Higher Headquarters Two Levels Up</u> . <i>Identify the higher headquarters two echelons above (for example, Joint Task Force-18).</i> 1. (U) <u>Mission</u> . 2. (U) <u>Commander's Intent</u> . (b) (U) <u>Higher Headquarters</u> . <i>Identify the higher headquarters one echelon above (for example, 1st [U.S.] Armored Division).</i> 1. (U) <u>Mission</u> . 2. (U) <u>Commander's Intent</u> .	
[page number] [CLASSIFICATION]	

Figure B-1. Sample format for the health service support plan for chemical, biological, radiological, and nuclear operations

[CLASSIFICATION] OPLAN/OPORD [number] [(code name)]—[issuing headquarters] [(classification of title)] (2) (U) <u>Missions of Adjacent Units</u>. <i>Identify and state the missions of adjacent units and other units whose actions have a significant impact on the issuing headquarters.</i> e. (U) <u>Interagency, Intergovernmental, and Nongovernmental Organizations</u>. <i>(Identify and state the objective or goals and primary tasks of those non-Department of Defense organizations that have a significant HSS role within the AO).</i> f. (U) <u>Civil Considerations</u>. <i>(Describe the critical aspects of the civil situation that impact HSS operations. Are HSS facilities and support available?)</i> g. (U) <u>Attachments and Detachments</u>. <i>(List units attached to or detached from the issuing headquarters. State when each attachment or detachment is effective).</i> h. (U) <u>Assumptions</u>. <i>(List all assumptions, including common HSS assumptions that, should they occur or not occur as expected, would invalidate the entire plan).</i> 2. (U) <u>Mission</u>. <i>(Statement of the overall HSS mission and type of activity to be supported).</i> 3. (U) <u>Execution</u>. <i>(Describe how the commander and command surgeon intends to accomplish the mission in terms of the commander's intent, an overarching concept of operations, schemes of employment for each warfighting and medical function, assessment, specified tasks to subordinate units, and key coordinating instructions in the subparagraphs below).</i> a. (U) <u>Commander's Intent</u>. <i>Commanders develop their intent statement personally. The commander's intent is a clear, concise statement of what the force must do and conditions the force must establish with respect to the enemy, terrain, and civil considerations that represent the desired end state. It succinctly describes what constitutes the success of an operation and provides the purpose and conditions that define that desired end state. The commander's intent must be easy to remember and clearly understood two echelons down. The commander's intent includes:</i> Purpose—an expanded description of the operation's purpose beyond the "why" of the mission statement. Key tasks—those significant activities the force as a whole must perform to achieve the desired end state. End state—a description of the desired future conditions that represent success. b. (U) <u>Concept of Operations</u>. <i>The concept of operations is a statement that directs the manner in which subordinate units cooperate to accomplish the mission and establishes the sequence of actions the force will use to achieve the end state. It is normally expressed in terms of the commander's desired operational framework. It states the principal tasks required, the responsible subordinate units, and how the principal tasks complement one another. Normally, the concept of operations projects the status of the force at the end of the operation. If the mission dictates a significant change in tasks during the operation, the commander may phase the operation. The concept of operations may be a single paragraph, divided into two or more subparagraphs, or if unusually lengthy, summarize here with details. If the concept of operations is phased, describe each phase in a subparagraph. Label these subparagraphs as "Phase" followed by the appropriate Roman numeral, for example, "Phase I." If the operation is phased, all paragraphs and subparagraphs of the base order and all annexes must mirror the phasing established in the concept of operations. The operation overlay and graphic depictions of lines of effort help portray the concept of operations.</i> c. (U) <u>Scheme of Movement and Maneuver</u>. <i>Describe the employment of maneuver units in accordance with the concept of operations. Provide the primary tasks of maneuver units conducting the decisive operation and the purpose of each. Next, state the primary tasks of maneuver units conducting shaping operations, including security operations, and the purpose of each. For offensive tasks, identify the form of maneuver. For defensive tasks, identify the type of defense. For stability tasks, describe the role of maneuver units by primary stability tasks. If the operation is phased, identify the main effort by phase. Identify and include priorities for the reserve. Refer to Annex C (Operations) as required.</i> [page number] [CLASSIFICATION]
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Figure B-1. Sample format for the health service support plan for chemical, biological, radiological, and nuclear operations (continued)

[CLASSIFICATION] OPLAN/OPORD [number] [(code name)]—[issuing headquarters] [(classification of title)] 4. (U) <u>Sustainment.</u> <i>Describe the concept of sustainment, including priorities of sustainment by unit or area. Include instructions for administrative movements, deployments, and transportation—or references to applicable appendixes—if appropriate. Use the following subparagraphs to provide the broad concept of support for logistics, personnel, and health service support. Provide detailed instructions for each sustainment subfunction in the appendixes to Annex F (Sustainment).</i> a. (U) Logistics. <i>Refer to Annex F (Sustainment) as required.</i> b. (U) Personnel. <i>Refer to Annex F (Sustainment) as required.</i> c. (U) Health Service Support. <i>Refer to Annex F (Sustainment) as required.</i> 5. (U) <u>Command and Signal</u> a. (U) <u>Command.</u> (1) (U) <u>Location of Commander and Key Leaders.</u> <i>State where the commander and key leaders intend to be during the operation, by phase if the operation is phased.</i> (2) (U) <u>Succession of Command.</u> <i>State the succession of command if not covered in the unit's SOPs.</i> (3) (U) <u>Liaison Requirements.</u> <i>State liaison requirements not covered in the unit's SOPs.</i> b. (U) <u>Control.</u> (1) (U) <u>Command Posts.</u> <i>Describe the employment of command posts (CPs), including the location of each CP and its time of opening and closing, as appropriate. State the primary controlling CP for specific tasks or phases of the operation (for example, "The division tactical command post will control the air assault").</i> (2) (U) <u>Reports.</u> <i>List reports not covered in SOPs. Refer to Annex R (Reports) as required.</i> c. (U) <u>Signal.</u> <i>Describe the concept of signal support, including location and movement of key signal nodes and critical electromagnetic spectrum considerations throughout the operation. Refer to Annex H (Signal) as required.</i> ACKNOWLEDGE: <i>Provide instructions for how the addressees acknowledge receipt of the OPLAN or OPORD. The word "acknowledge" may suffice. Refer to the message reference number if necessary. Acknowledgement of an OPLAN or OPORD means that it has been received and understood.</i> [Commander's last name] [Commander's rank] <i>The commander or authorized representative signs the original copy. If the representative signs the original, add the phrase "For the Commander." The signed copy is the historical copy and remains in the headquarters' files.</i> OFFICIAL: [Authenticator's name] [Authenticator's position] <i>Use only if the commander does not sign the original order. If the commander signs the original, no further authentication is required. If the commander does not sign, the signature of the preparing staff officer requires authentication and only the last name and rank of the commander appear in the signature block.</i> ANNEXES: <i>List annexes by letter and title. Army and joint OPLANs or OPORDs do not use Annexes I and O as attachments and in Army orders label these annexes "Not Used." Annexes T, X, and Y are available for use in Army OPLANs or OPORDs and are labeled as "Spare." When an attachment required by doctrine or an SOP is unnecessary, label it "Omitted."</i> [page number] [CLASSIFICATION]

Figure B-1. Sample format for the health service support plan for chemical, biological, radiological, and nuclear operations (continued)

Appendix C

Service-Specific Chemical, Biological, Radiological, and Nuclear Defense Capabilities

GENERAL

C-1. This appendix contains brief descriptions of Service-specific CBRN defense capabilities (not all inclusive).

UNITED STATES ARMY CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR DEFENSE CAPABILITIES

C-2. This section discusses U.S. Army CBRN response capabilities (not inclusive).

United States Army Specialized Medical Response Capability

C-3. The U.S. Army Specialized Medical Response Capability (SMRC) provides a rapidly available asset to compliment the need to cover the range of military medical response locally, nationally, and internationally. These teams are organized by the U.S. Army Medical Command and its subordinate commands; they are not intended to supplant table of organization and equipment units assigned to U.S. Army Forces Command or other Army commands.

C-4. Upon receipt of a validated tasking from Medical Command, subordinate commands will deploy requested SMRCs in the CONUS and OCONUS to provide medical augmentation to local, state, federal and defense agencies or medical teams responding to disasters, civil-military cooperative actions, humanitarian assistance, WMD incidents; and CBRNE incidents and emergencies. For incidents and emergencies occurring on a military installation, the MTF commander may request SMRC support directly from the regional medical command.

C-5. The regional medical command commander can immediately deploy a SMRC in support of the MTF and notify the Medical Command Operations Center as soon as possible. Subordinate commands will anticipate the use of SMRC personnel and equipment to support OCONUS missions. Reaction time and length of OCONUS missions will vary based on the situation. The SMRCs will be capable of rapidly deploying year round in support of emergency incidents and specifically at the request of the proper federal authorities when cleared through the chain of command. The SMRCs will respond to the senior U.S. military commander having operational control on the ground. Due to possible extended distances to mission location site, OCONUS SMRC missions will require preparation time and coordination to sustain personnel for periods of up to seven days.

C-6. The types of SMRCs include—

- Health Systems (SMRC-HS).
- Investigational New Drug (SMRC-IND).
- Radiological Advisory Medical Team (SMRC-RAMT).
- Theater Lead Agent for Medical Materiel-Forward (SMRC- a theater lead agent for medical materiel-Forward).
- Medical Command, Control, Communications, and Telemedicine (SMRC-MC3T).
- Behavioral Health/Religious Support (SMRC-BH/RS).
- Burn (SMRC-B).
- Public Health (SMRC-PH).

C-7. The U.S. Army Medical Command determines the composition of each team and identifies the specialty specific equipment required to accomplish the mission. The composition of the team is task-organized based on the situation and medical risk analysis in order to provide the appropriate level of response

and technical augmentation to civil and military authorities. This information is provided to its subordinate commands through appropriate command policy statements, directives, or the SOP. These teams may be comprised of active duty military, DOD civilians, or contractors, as determined by the commander.

Preventive Medicine Services

C-8. On the operational environment, preventive medicine services will be in greater demand than at any other time, especially under BW conditions. Preventive medicine personnel will be called upon to assist the commander in determining the health hazards associated with nuclear fallout; the safety of drinking water in a CBRN environment; as well as determining when to use prophylaxis, pretreatments, immunizations, and other preventive medicine measure associated with CBRN warfare. Preventive medicine personnel must be aware of the health threat in the AO. They must continually update their medical and OEH surveillance activities to identify disease trends (endemic and epidemic), potential disease vectors, and the susceptibility of personnel to these diseases.

C-9. Under CBRN conditions, diseases may manifest that exist in the area, but were not being transmitted to personnel. However, due to the reduced health status of personnel from exposures to or from stress-related CBRN conditions, the personnel begin to suffer their effects. The appearances of diseases or arthropods not known to exist in the AO are indicators that BW agents have been used. The preventive medicine section of medical brigades and Medical Command receive supporting laboratory BW samples reports. They analyze, consolidate, and report finding to support their headquarters, subordinate commands, and adjacent commands.

Preventive Medicine Section

C-10. The preventive medicine sections of the medical companies perform analysis on water sources and supplies to determine the presence or absence of CBRN/TIM contamination. Based upon their findings, the water is released for consumption or is restricted from use until it is treated (usually by water production personnel using the reverse osmosis water purification unit). They also collect arthropods, water, and ice samples for suspect BW agent contamination for supporting medical laboratory analysis. As appropriate, they might monitor, analyze, and report medical laboratory findings on CBRN samples and monitor chain-of-custody documentation. They conduct medical and OEH surveillance activities. They conduct limited entomological surveys to determine the existence of disease-vectoring arthropods in the AO. They inspect food service facilities to determine the extent, if any, of CBRN contamination. They evaluate the unit's—

- Immunization status.
- Compliance with prophylaxis for specific diseases (such as antimalarial tablets) for nuclear radiation exposure (such as granisetron for nausea and vomiting) (see ATP 4-02.83/MCRP 4-11.1B/NTRP 4-02.21/AFMAN 44-161(I)), and for BW agents (such as ciprofloxacin for postexposure chemoprophylaxis for anthrax) (see ATP 4-02.84/MCRP 4-11.1C/NTR 4-02.23/AFMAN 44-156_IP).
- Compliance with pyridostigmine bromide pretreatment tablets (preexposure prophylaxis for Soman nerve agent), if warranted.
- Application of personal hygiene and field sanitation procedures (see TC 4-02.3).

C-11. Based upon their findings, they provide recommendations for corrective actions to the commanders. They assist in training U.S. Army unit field sanitation teams (see ATP 4-25.12); however, they are not members of the unit field sanitation team. They conduct medical and OEH surveillance activities for their command (see FM 4-02.17).

Preventive Medicine Detachment

C-12. The preventive medicine detachment provides preventive medicine services on an area support basis to units within their assigned AO. These services include, but are not limited to—

- Conducting water surveillance including CBRN contamination.
- Collecting water samples suspected of CBRN/TIM contamination for analysis by supporting medical laboratory.
- Performing food service sanitary inspections.
- Conducting medical and OEH surveillance and providing epidemiological consultation.
- Conducting pest (arthropod and rodent) surveys and surveillance.
- Conducting arthropod control operations.
- Conducting occupational and industrial hygiene surveys.
- Advising commanders on the application of preventive medicine measure.
- Training the supported units' field sanitation teams.

The United States Army Medical Research Institute of Chemical Defense

C-13. The USAMRICD is actively engaged in support to homeland defense. The Institute stood up a course to prepare international partners to respond effectively to incidents involving WMD, and the Public Health Service includes the Medical Management of Chemical and Biological Casualties Course as required training for its Emergency Management Teams. The USAMRICD is actively engaged with both the military and the civilian medical and first responder communities in order that they are fully equipped and confident in their ability to medically manage chemical agent incidents. As the DOD's lead laboratory for the development of medical countermeasures against chemical threat agents, this organization is increasingly called upon to provide expert analytical and consultative services related to medical chemical defense research and to the medical management of chemical casualties.

The United States Army Medical Research Institute of Infectious Diseases

C-14. The USAMRIID has active research programs to develop medical solutions—vaccines, drugs, diagnostics, and information—to protect Service members and civilians from biological and infectious threats. The USAMRIID's unique capabilities include biosafety Levels-3 and -4 laboratories, expertise in the generation of biological aerosols for testing candidate vaccines and therapeutics, and fully-accredited animal research facilities. The USAMRIID works alongside the CDC and the World Health Organization and supports the Federal Bureau of Investigation, Department of Homeland Security, and other agencies in their role as a national reference laboratory with expertise in extremely dangerous biological agents.

Area Medical Laboratory

C-15. The AML's mission is to identify and evaluate health hazards in the AO through unique medical laboratory analyses and rapid health hazard assessments of CBRN, endemic disease, and occupational and environmental health threats. It can deploy worldwide as a unit or by task-organized teams to provide theater validation level laboratory capabilities in support of FHP and force protection missions. For more information on the AML, refer to Chapter 8.

The Mortuary Affairs Center

C-16. The Mortuary Affairs Center provides expert advice and assistance, in conjunction with the medical and medical examiners' offices, on managing and handling of contaminated HR.

UNITED STATES MARINE CORPS CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR DEFENSE CAPABILITIES

C-17. This section discusses U.S. Marine Corps response capabilities (not inclusive).

Chemical-Biological Incident Response Force

C-18. The CBIRF is an organic element of the II Marine expeditionary force, Marine Forces Command. All requests for support/training must be processed through the chain of command.

C-19. When directed, the CBIRF forward-deploys and/or responds to a credible threat of a CBRN incident in order to assist local, state, or federal agencies and designated CCDRs in the conduct of CM operations by providing capabilities for agent detection and identification; casualty search, rescue, and personnel decontamination; and emergency medical care and stabilization of contaminated personnel.

C-20. The CBIRF's mission is lifesaving. They conduct crisis management/rescue and recovery operations in the aftermath of CBRN incidents. The particular emphasis is on turning contaminated victims into clean patients.

C-21. The CBIRF consists of Marines, Sailors, civilian employees, and contractors. For garrison/training purposes, it is organized into three permanent companies: headquarters and service company and two reaction force companies. For operations, CBIRF will task-organize as required. For immediate response, it has two standing task-organized incident response forces (IRFs). If the situation dictates the standing force can be modified to either reduce or expand on the capabilities below.

All Hazard Reconnaissance

C-22. These are task-organized teams capable of detecting and identifying CW agents, TICs, BW agents, and radiological hazards. These personnel are capable of operating in PPE Levels A, B, C, and D.

Casualty Search and Extraction

C-23. The initial teams consist of downrange personnel for the specific purpose of locating and extracting victims from a contaminated area. These extractors are qualified in all levels of PPE. Extract teams have all terrain vehicles with trailers, wheeled stretchers and extrication devices for victim transportation.

Medical

C-24. The medical team consists of a physician (emergency or occupational medicine), physician's assistant, independent duty corpsman, and eight additional corpsmen. The medical team initiates treatment in the hot or warm zone (scenario dependent). Members are capable of operating in Levels B, C, and D PPE. Treatment continues through decontamination triage to medical stabilization. Each IRF has trauma supplies for approximately 50 critical or 100 moderate-to-minor patients and carries the equivalent of 1,500 nerve agent antidote.

Decontamination

C-25. Decontamination personnel rapidly establish a mass decontamination line and establish zone monitoring to ensure zone integrity. When established, the full decontamination line can process 65 to 75 nonambulatory, 200 to 225 ambulatory, and 30 to 45 response force per hour.

Technical Rescue

C-26. This team is comprised of personnel certified in confined space, collapsed structure, trench, advanced rope, and vehicle rescue. The team can conduct operations in Levels B, C, and D.

Explosive Ordnance Disposal

C-27. The explosive ordnance disposal (EOD) team is capable of operations in PPE Levels A, B, C, and D. All personnel are trained extensively in rendering safe improvised explosive devices with emphasis on chemical and biological improvised explosive devices. The team has standard EOD response equipment, as well as a remote ordnance neutralization system robot, a foam mitigation system, and a search and reconnaissance suit-5 and EOD-8 bomb suit.

Command, Control, Communications, Computers, and Intelligence

C-28. Communications equipment and technicians provide continuous secure/nonsecure voice, facsimile, radio, and data connectivity to the IRF. The communications equipment ranges from individual handheld very-high or ultrahigh frequency radios to mobile satellite terminals. The IRF is supported by a mobile command center and a tactical command center that link the IRF to its home-base operations post and other national and local emergency response organizations.

Logistics

C-29. The IRF arrives as a self-sustaining force. All functions of logistics are resident within the IRF. In addition, the support staff has contracting officials that possess the capability to put large support contracts into immediate action. The only resource the IRF requires at the incident site is a water source.

C-30. The first concept of the CBIRF is based on a no notice response where an attack has been conducted and the first responders are requesting help. Under that concept, CBIRF employs the IRF. The IRF, as described above, is a task-organized force on two hours alert. An assessment team can deploy within one hour.

Vehicle/Fixed Wing Option

C-31. Within two hours of the alert, IRF can be mounted on commercial vehicles and be ready to deploy by road march. If air deployment is required, it deploys to the aerial port of embarkation. All vehicles are packed to embarkation specifications, so if C-5 or C-17 aircraft are available, the vehicles simply drive onto the aircraft after joint inspection. If these aircraft are not available, the IRF can palletize its equipment in one hour. The cargo is then transportable by any commercial or military cargo aircraft. If the cargo is transported on pallets, there must be trucks provided at the aerial port of debarkation to transport the equipment and personnel to the incident site. Under this concept, as soon as the IRF deploys, a second IRF is formed. This can be completed in about 4 hours.

Landing Craft, Air Cushion Option

C-32. The IRF can deploy from its base headquarters in its response vehicles and be prepared for pickup via *landing craft, air cushion* within 2 hours of notification when pre-configured with the Personnel Transport Module. This response force comes with full IRF capabilities, self-sustainment by ground, and can deploy to the incident site regardless of road congestion.

Helicopter Option

C-33. Depending on the incident location, a smaller task-organized CBIRF element may deploy by CH-53, MV-22 or UH60 (Blackhawk) helicopter. The helicopter-borne IRF consists of a reduced IRF capability that can be ready to deploy from its base headquarters within 2 hours of notification. This force enables rapid response to greater distances with dedicated helicopter support.

C-34. The second CBIRF concept is based on forward deploying a task-organized IRF to a predesignated staging site in response to a credible threat or an approved request for support. Normally these are designated special event homeland security operations. Under this concept, CBIRF task-organizes the deploying element for the specific mission.

C-35. The IRF carries enough PPE to allow for three entries into the contaminated area by all members of the team. In addition, CBIRF maintains additional PPE in warehouses at its base headquarters. Upon deployment of the IRF, the logistics personnel will prepare additional PPE for immediate resupply.

C-36. The CBIRF is a lifesaving organization and time is crucial. The CBIRF always maintains task-organized, multivehicle IRF, on a two hours alert. If required, the IRF can be reinforced by a second IRF within four hours. The CBIRF can provide two full IRFs or one IRF and one mission-tailored force for independent operations.

C-37. The CBRN control centers will form the hub for all CBRN defense operations. For additional information on USMC CBRN defense capabilities, refer to MCWP 3-37.

UNITED STATES NAVY CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR DEFENSE CAPABILITIES

C-38. This section discusses U.S. Navy CBRN response capabilities (not inclusive).

Naval Medical Research Center

C-39. The mission of the NMRC is to defend members of the armed forces against a biological threat; therefore, rapid biological-detection methods are essential for prompt medical intervention and successful mission accomplishment. To provide for such needs, the NMRC (Biological Defense Research Directorate) has formed a scientific research program for the development of rapid detection and identification methods for BW agents. Scientists at NMRC also developed real-time Polymerase Chain Reaction based diagnostics for confirmatory testing. These confirmatory assays are based on the deoxyribonucleic acid sequence of a particular biological agent. Biological Defense Research Directorate's anthrax assays are the standard assays for the CDC. The final step in the confirmation process, definitive testing, can then be done at the NMRC laboratories in their Bio-Safety Level 3 facility.

Biological Defense Research Directorate

C-40. The Naval Medical Research Center Biological Defense Research Directorate has mobile biological field laboratories for the diagnosis and detection of infectious diseases including biowarfare agents. Laboratory testing platforms are based on molecular, immunological and serological assays produced in our ISO accredited production laboratories. The mobile labs are comprised primarily of commercially available scientific lab equipment. Highly specific lateral flow immunoassays against biowarfare agents are prepared in our ISO laboratories. Depending on the mission and/or infectious disease agent, the field laboratory can process approximately 100 samples per day.

United States Navy Explosive Ordnance Disposal Unit

C-41. The mission of the USN EOD unit is to eliminate hazards from ordnance that jeopardize operations conducted in support of the national military strategy by providing specially trained, combat-ready, highly mobile forces. Navy EOD units are employed in a variety of operations, across a wide spectrum of warfare areas, in the execution of this mission.

C-42. The Navy EOD unit's capabilities are structured for a relatively small footprint and rapid response. The EOD units can split into smaller units to respond to multiple EOD incidents/tasks, which are within the capabilities of a smaller force.

C-43. Each unit is trained in a variety of mobility and survivability skills enabling it to operate in a variety of environments both afloat and ashore. The EOD units are capable of responding to underwater and surface ordnance and CBRN threats. They can also provide support for diving and demolition, intelligence collection, aircraft and ordnance recovery, range and underwater clearance, riverine operations, Chief of Naval Operations projects, special warfare operations, and other special operations.

Forward-Deployable Preventive Medical Unit

C-44. The FDPMU is designed to assess, prevent, and reduce health threats in support of deployed operating forces. Other missions for the FDPMU include humanitarian assistance, CM, and disaster relief operations. Capabilities can include chemical, biological, and radiological agent detection and identification, as well as toxic environmental chemical detection and identification.

C-45. The FDPMU's are capable of deploying within 96 hours, can serve as a joint force asset to provide specialized preventive medicine, and CBRN response services in support of HSS to CDRs and JTF commanders. Its capabilities are—

- Conducts medical and disease vector surveillance operations.
- Provides endemic and infectious disease assessment.
- Supports first responders with on-site and deep reachback analytical, consultative capabilities.

- Provides rapid detection of chemical, biological, and radiological or environmental hazards to minimize casualty flow.
- Provides realistic CBRNE/WMD medical scenario training and exercises.

C-46. The FDPMU may be employed as part of a forward deployed *afloat platform*. The FDPMU is comprised of a 13-member team with five functional detection/analysis components—

- Preventive medicine.
- Disease vector control.
- Microbiology.
- Logistics support.
- Chemical.

UNITED STATES AIR FORCE DEPLOYABLE TEAMS RELATED TO THE MEDICAL CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR DEFENSE

C-47. The USAF deploys various teams to provide a comprehensive health CBRN response and defense capability at a bed-down location in a threat environment. Each team is designated by a UTC that delineates its manpower and equipment set. These are independent, scalable, deployable and tailorable, based on expected threat and/or operational needs, while providing a portfolio of wide-range CBRN capabilities. Those UTCs with surveillance, assessment, and analysis capability may support an air expeditionary task force or JTF directly as a stand-alone team as part of an EMEDS facility or Air Force Theater Hospital. The UTCs with a patient-directed focus (such as EMDT) primarily support the deployed USAF medical unit. Some examples of USAF medical UTCs that play a role in the CBRN arena are discussed below.

Preventative Aerospace Medicine Counter Chemical, Biological, Radiological, and Nuclear Team (FFPM6/7)

C-48. This team is a high-CBRN-threat increment to the core PAM team (UTCs FFPM1-5), and is composed of six persons: one bioenvironmental engineer, one bioenvironmental engineering craftsman, and four bioenvironmental engineering journeyman. The FFPM6 is supported by an equipment UTC, FFPM7. The team provides increased wing survivability through human health protection, supports medical facility operations, and works to prevent acute/chronic health hazards resulting from operations in CBRN threat environments. The team also provides increased survivability through CBRN response, surveillance, detection, quantification, assessment, risk communication and abatement. It advises combatant commanders on CBRN health effects, threat impact, protective action posture, recovery activities and human health assessments. The team also performs environmental sampling/analysis for FHP purposes. The FFPM6 participates in the confirmatory process for suspected biological threat agents, monitors & documents personnel exposures to CBRN agents and supports de-MOPP, de-mask and chemical/radiological clearance missions. The FFPM6 team can be location independent, but is scalable with integration of the FFPM1-3 team within 8 hours after arrival of personnel and equipment. The FFPM6 can also deploy as part of the AFMS CBRN Force Module in conjunction (threat/operation depended) with the PAM, BAT, AFRAT and TET teams to provide greater synergistic effects against CBRN threats. Details for the FFPM6 are contained in the FFPM6 CONOPS. The FFPM6 may deploy in tailored fashion to meet unique theater requirements (for example, distributed operations or PAM team augmentation).

Biological Augmentation Team (FFBAT)

C-49. The BAT is a two-person, rapidly deployable laboratory team made up of one laboratory officer and one laboratory technician. It is supported by equipment UTC FFBA1, Medical Biological Augmentation Equipment. This team provides theater validation/identification of biological agents and pathogens of operational concern. It may be rapidly deployed with any JTF, air expeditionary task force, and/or EMEDS medical facility, depending on mission needs. Team members analyze samples and interpret results using advanced microbiological diagnostic capabilities. The BAT diagnostic tools can identify naturally occurring and potentially introduced pathogens in clinical samples and other environmental media. The BAT provides a preventative capability and provides diagnostic data to support early warning of pathogen exposures, as well as assessment of extent and type of microbial contamination in various substances (food, air, water,

or soil). The BAT can also deploy as part of the AFMS CBRN Force Module in conjunction (threat/operation depended) with the FFGL1, PAM, AFRAT and TET teams to provide greater synergistic effects against CBRN threats.

Infectious Disease Team (UTC FFHA2)

C-50. The infectious disease team provides expert support for confirmation, containment, and control of infectious conditions. It is composed of one physician, one infection control nurse, and one public health technician. The infectious disease team works with preventive medicine teams and TETs to prevent, identify, and treat illness associated with BW.

C-51. The infectious disease team will need the support of an EMEDS+10/25/Air Force Theater Hospital and additional personnel and equipment sets to diagnose and treat infectious patients. Isolation of infected or suspected infected patients will require a separate isolation facility. Large scale contagious/biological outbreaks will require deployment of the Medical Contagious Casualty Management Equipment Package (UTC FFCCM), and UTCs FFEW1, Medical Hospital Expansion Package-Personnel Increment 1, and FFEW, Medical Hospital Expansion Package-Equipment. The Medical Critical Care Team (UTC FFCCU), and its equipment package FFCC1 can be deployed to enhance critical care capability. It provides support personnel and equipment for an additional four critical care beds. Additional critical care capability requires the deployment of UTC FFCCV, Medical 4-Bed intensive care unit Expansion Team, or additional FFCCU teams and equipment.

C-52. The infectious disease modules (FFHA2, FFCCM) should not be deployed with any MTF that does not have microbiologic capabilities, unless that capability is available and the specimens can be shipped in-theater.

Preventive and Aerospace Medicine Team (FFPM1/2/3)

C-53. The PAM team's mission is to identify, prevent, and monitor DNBI. The core PAM team consists of nine personnel broken into three personnel UTCs and supported by two equipment UTCs to provide expertise throughout the spectrum of preventive medicine activities. The increments can be deployed together or in stages. The first (FFPM1) and second (FFPM2) increments provide the initial capability. The third increment (FFPM3) provides expanded capabilities and sustainment for extended operations, when the population at risk is between 3,000 and 6,500, or in support of an EMEDS +10 or +25. The FFPM4 is an equipment-only package that provides portable advanced echelon equipment and is normally deployed with the FFPM1. The FFPM5 is an equipment only package that provides infrastructure and additional equipment in support of a standalone PAM team. In high CBRN-threat environments, the PAM Counter-CBRN Team (UTCs FFPM6/FFPM7) augments the core PAM Team. The PAM can also deploy as part of the AFMS CBRN Force Module in conjunction (threat/operation depended) with the BAT, AFRAT, and TET teams to provide greater synergistic effects against CBRN threats.

C-54. The PAM Team 1 (FFPM1), also known as the PAM advanced echelon, is composed of one public health officer, one bioenvironmental engineer, one aerospace medicine specialist, and one independent duty medical technician. It deploys with the lead wing advanced echelon team when supporting an air expeditionary force or the Air Expeditionary Wing. The team is designed to travel light and be extremely mobile so it can perform its preventive medicine mission in a timely manner to meet the needs of the entire air expeditionary force population at the bed-down location. Therefore, the team will require expeditionary combat support, including access to transportation to accomplish its mission successfully.

C-55. The PAM Team 2 (FFPM2) supplements the PAM advanced echelon team. It is made up of one bioenvironmental engineering technician and one public health technician. The PAM Team 3 (FFPM3) is composed of two bioengineering technicians and one public health technician.

Theater Epidemiology Team (FFHA1)

C-56. The TET provides theater-level support to the USAF component command surgeon or JTF surgeon. It is collocated with the theater surgeon or appropriate headquarters element. It is supported by equipment UTC FFHAE, Medical Theater Epidemiological Equipment Package. The team provides threat assessments of environmental and occupational factors, evaluates infectious disease risks and disease/DNBI rates from

all sources, and recommends interventions to minimize degradation of combat strength. It coordinates with other medical and line force protection teams and with federal and international agencies. It is composed of five individuals: a preventive medicine physician, a public health officer, a public health technician, a bioenvironmental engineer, and a bioenvironmental engineering technician. The TET can also deploy as part of the AFMS CBRN Force Module in conjunction (threat/operation depended) with the FFGL1, PAM, AFRAT and BAT teams to provide greater synergistic effects against CBRN threats. Details for the TET are contained in TET CONOPS.

Air Force Radiation Assessment Team (FFRN1/2/3/4/7)

C-57. The AFRAT provides manpower and equipment for rapid, global response to radiation/nuclear accidents and incidents. It provides subject matter experts to support planning, surveillance, analysis, and assessment to mitigate radiation health and operational risks resulting from radiation/nuclear events in a scalable/incremental fashion. The AFRAT also provides specialized equipment to support radiological/nuclear field surveillance, monitoring, and analysis. It provides support to commanders and other decisionmakers during contingency planning, response, and post contingency/recovery operations. The entire complement of AFRAT UTCs responds to major radiation or nuclear events, while the AFRAT component teams are designed to provide tailored support to planning, prepositioning, operational, or recovery contingency requirements. The AFRAT can also deploy as part of the AFMS CBRN Force Module in conjunction (threat/operation depended) with the FFGL1, PAM, BAT, and TET teams to provide greater synergistic effects against CBRN threats.

C-58. The team is subdivided into ten UTCs consisting of four personnel and equipment rapid-response basic teams, three manpower augmentation teams, and three augmentation team equipment packages. The core rapid response basic UTCs consist of a radiation technical consultant team (FFRN1: RAD/NUC Crisis advanced echelon Team), a radiation field data collection and assessment team (FFRN2: RAD/NUC Surveillance Team), a radioactive material sample analysis laboratory team (FFRN4: RAD/NUC Laboratory Team), and a personnel radiation monitoring team (FFRN6: RAD/NUC Dosimetry Team). The core teams are each augmented by a manpower team and equipment package for extended duration and/or large scale contingency operations. The FFRN2 is augmented by FFRN3 (RAD/NUC Surveillance Augmentation Team) and FFRNA (RAD/NUC Surveillance Augmentation Equipment Package). The FFRN4 is augmented by FFRN5 (RAD/NUC Laboratory Augmentation Team) and FFRNB (RAD/NUC Laboratory Augmentation Equipment Package). The FFRN6 is augmented by FFRN7: RAD/NUC Dosimetry Augmentation Team, and the FFRNC: (RAD/NUC Dosimetry Augmentation Equipment).

C-59. The division of AFRAT into the basic teams allows for a scalable/tailored response to a given incident dependent on type, scope, and available response resources. With these four functionally-distinct teams, the AFRAT can support specific functions or is capable and trained to respond as a combined team to support large scale contingency operations. The four basic team UTCs are designed for rapid response with 72-hour continuous operation with no resupply.

TECHNICAL REACHBACK

C-60. Technical reachback is the capability to contact technical subject matter experts when an issue exceeds the on-scene subject matter experts' capability. Reachback should be conducted using established unit protocols. Many of the reachback resources listed in Table C-1 on page C-10 have other primary missions and are not specifically resourced for reachback. Issues may include nonstandard agent decontamination of CBRN and TIMs. This information could include persistency, medical effects, and decontamination or protection requirements.

Table C-1. Technical reachback points of contact

Organization	Telephone
Armed Forces Radiobiology Research Institute (AFRRI)	1-301-295-0530 (24/7)
Army Public Health Command (APHC) (Provisional)	1-800-222-9698 (24/7)
Centers for Disease Control and Prevention (CDC)	1-800-232-4636 (24/7)
Defense Threat Reduction Agency (DTRA)	1-877-240-1187 (24/7)
National Response Center	1-800-424-8802 (24/7)
Naval Medical Research Center	301-319-7403 (24/7)
United States Air Force School of Aerospace Medicine	1-888-232-3764 (24/7)
United States Army Medical Research Institute of Chemical Defense (USAMRICD)	1-410-436-3277 Duty hours 1-410-436-3276 Off-duty hours
United States Army Medical Research Institute of Infectious Diseases (USAMRIID)	1-301-619-4027 (24/7)

Appendix D

Veterinary Guidelines for Food Contamination and Decontamination

GENERAL

D-1. Stored, transported, and prepared food is susceptible to CBRN contamination throughout the theater of operations. Planning for any battle or operation must include food protection from contamination; food contamination detection; and contaminated food disposition (decontaminate or destroy).

D-2. There are three primary countermeasures to overcome or reduce the CBRN hazard to food—

- Contamination avoidance.
- Chemical, biological, radiological, and nuclear agent detection.
- Chemical, biological, radiological, and nuclear agent decontamination.

D-3. The priorities for conducting CBRN countermeasures are—

- Contamination avoidance. This includes using natural and fabricated barriers to prevent, or significantly reduce the spread of contamination. Also, using specific procedures for entry and exit between contaminated and uncontaminated areas reduce the potential for spreading contamination. Use of these barriers and procedures may reduce the subsequent need for detection and decontamination.
- Detection, measurement, and identification. These activities are essential for determining the presence, extent, and nature of CBRN contamination. This information is essential in identifying the existence of uncontaminated supplies, or decontamination requirements.
- Decontamination. This process removes the contaminant and provides food that is safe for consumption.

D-4. Decontamination efforts require an extensive amount of labor, time, and supplies. The use of hasty decontamination is emphasized. That is, decontaminate just enough to sustain operations and keep fighting, rather than to make a contamination-free environment. Normally, decontamination efforts will be limited to the packaging and packing materials. Food decontamination will only occur in critical situations where other food supplies are not available. Most decontamination is performed in or very near the theater of operation. Before beginning decontamination procedures, divide exposed food items into groups based on protection of item at time of exposure. The following groups establish priorities based on ease of decontamination and the ability to monitor the food.

- Group I - Canned or packaged items exposed only to a chemical agent vapor.
- Group II - Canned or packaged items that are contaminated on the outside with a liquid chemical agent, a biological agent, or radioactive fallout.
- Group III - Unpacked or poorly packaged items that have been exposed to any CBRN agent.
- Group IV - Food contaminated through the food chain.

PROTECTION OF FOOD FROM CONTAMINATION

D-5. An adequate defensive posture for a chemical attack will also protect food against biological contamination and radiation fallout.

D-6. Operational rations include, but are not limited to, field ready to eat meals; unit group ration, A; unit group ration, heat and serve; and medical diet supplement.

D-7. Packaging materials and storage methods normally protect these rations. The packaging and packing of operational rations protect the contents from deterioration. As a result, the contents are protected from

moisture, to include chemical liquids, chemical vapors, and biological agents. Operational rations delivered to a theater of operation will usually have increased levels of packaging and/or packing protection. Operational rations are substantially protected while contained in the shipping cases, especially if protected with an overlay of fiberboard, shrink wrap, or film wrap.

D-8. Enclosed storage is used whenever possible. Refrigerated warehouses, cold storage rooms, and even prefabricated refrigerators and trailers provide excellent protection. Underground shelters, caves, and tunnels that can be made airtight provide maximum CBRN protection. Buildings provide protection depending on how well they can be closed and sealed. The basement of a building is a good storage place. However, keep in mind that chemical vapors tend to seek out low-lying areas. Storing rations indoors will protect them from liquid droplet and fallout contamination unless the building is damaged by an attack. Complete protection against chemical vapors is only offered by airtight closed spaces like cold storage facilities.

D-9. Chemical protective measures are to be integrated into daily logistical operation to avoid the contamination of operational rations. Maximum use is made of alarm and detection equipment, overhead shelter, shielding materials, and protective covers. Back up stocks of operational rations should be dispersed to minimize the risk of destruction or contamination.

D-10. A CBRN protective cover or similar equipment will help greatly. The CBRN protective cover is discarded and replaced upon becoming contaminated; it reduces overall decontamination requirements; and it improves the survivability of supplies and equipment. The CBRN protective cover provides 24-hour protection against liquid chemical contamination. Detection paper used on the CBRN protective cover will rapidly identify a contaminated cover.

BULK AND FRESH FOODS

D-11. Field expedient or improvised storage may be the only choice available under high-risk conditions. Expedient storage for food supplies may be a natural or man-made depression lined to protect contents against moisture, and then covered with earth and sod. The earth gives good protection against all forms of chemical or biological contamination and nuclear fallout.

D-12. Foods are only stored outdoors or in partially protected areas when absolutely necessary. Only cases of foods packed in cans, bottles, or airtight foil or film wraps, and foods packed in sealed boxes or multilayered wrappings can be subjected to exposed storage. Partial protection is provided by open sheds, temporary roofing, or tents. When subsistence must be stored in the open, give as much protection as possible. Protection material may include CBRN protective covers, tarpaulins, tarpaulin sheds, or any other available covering such as plastic sheeting. Tarpaulins and other treated or waterproof coverings do not prevent contamination by chemical vapors, but they do reduce contamination from liquid agents. Canvas will keep out more than 95 percent of liquid contamination for a short period of time after the attack. The canvas must be removed soon after the attack to prevent the agent from seeping through onto the subsistence; placement of spacers between the covering and the food will greatly reduce this problem. Even the thinnest material will offer some protection and is better than nothing at all. Therefore, food supplies must be covered by whatever material is available.

RADIOLOGICAL/NUCLEAR

D-13. This section discusses food contamination caused by a radiological/nuclear incident.

Contamination

D-14. Following a nuclear detonation, food can become contaminated in three ways:

- *Direct contamination*—results by fallout collecting on plants, animals, and stored food (surface contamination). Fallout has two effects. First, it produces a gamma radiation field over the fallout area. Second, it contaminates the surface of anything on which it is deposited. The whole-body gamma irradiation hazard to an individual far outweighs any potential hazard from food contamination. The basic rule is: If you can safely be in the area to salvage the food, then the food salvaged is safe to use (although slightly contaminated).

- *Indirect contamination*—this form of contamination can be spread throughout the food chain. Humans can ingest contamination by eating plants that have absorbed radioactive isotopes; products (milk or meat) from animals allowed to graze on contaminated pastures; or fish from contaminated water.
- *Induced radiation*—it is possible that food will be exposed to sufficient neutron flux (an increase in the number of free neutrons) as the result of a nuclear explosion to produce considerable induced radioactivity in food without it being destroyed by blast and heat. This is possible with enhanced radiation weapons in the energy range of 1 kiloton where the radiation kill radius exceeds the blast destruction zone. The elements that are most prominently involved are sodium, potassium, sulfur, copper, bromine, zinc, and especially phosphorous. Thus, in an area of induced radiation, foods requiring the most caution are dairy products, high salt content foods, dry beans, raisins, and ready-mixed cake and biscuit flours. The radioactivity has a short half-life; therefore, the radiation will decay very rapidly. It should be possible to consume foods containing induced radiation within a week or two. Cans, particularly those with “C” enamel may incur a high level of induced radiation (from zinc in the enamel, not from iron in the can). Glass, because of its high salt content, will show very high levels of activity. Clear glass will turn brown. Container radioactivity has no bearing on the food, it is safe to use. The radioactivity is not transferred to the contents. No significant toxic by-products are formed in the exposed canned food.

D-15. Consumption of food contaminated with radioactive fallout may cause a risk of radiation injuries from internal radiation; that is, radiation from radioactive sources within the body. Most isotopes will pass through the digestive tract or be excreted very quickly. However, the intestinal tract may receive a considerable dose. Some isotopes are more hazardous because they are absorbed from the digestive tract and enter the metabolism of man and animals—

- Strontium-89 (Sr-89) and Strontium-90 (Sr-90) are beta emitters and have half-lives of 51 days and 28 years, respectively. Therefore, Sr-90 is the greatest radiation hazard in the long-term. These two isotopes are absorbed in the body and used in the same way as calcium. They accumulate in bone, where bone marrow with its blood forming cells is vulnerable. Milk and other dairy products are the primary sources of Sr-89 and Sr-90 in the human diet.
- Iodine-131 (I-131) is a beta and gamma emitter and has a short physical half-life of approximately 8 days. It is efficiently absorbed and used by the body. Iodine-131 will contaminate plants that will be eaten by grazing animals. Smaller amounts can also be absorbed by breathing contaminated air. Cattle will excrete a large amount of I-131 in milk. Milk and other dairy products are the primary sources of I-131 intake. One can also get smaller amounts by eating contaminated fruits and vegetables. Iodine-131 will be concentrated in the thyroid gland. The intake of I-131 will have its greatest impact the first few days to weeks following a nuclear explosion.
- Cesium-137 (Cs-137) is a beta emitter and has a half-life of 30 years, but is eliminated relatively quickly from the body. The biological half-life is 70 to 140 days. Cesium-137 is found in most tissues of the body, but it will concentrate in muscle tissue. Cesium-137 is absorbed and used the same way as potassium. Meat and milk are the primary sources of Cs-137. High precipitation, lack of minerals in the soil, and extensive cultivation increase the plants’ absorption of Cs-137, causing the contamination of plant products.

D-16. Operational rations are safe when surface decontamination is performed before breaking the package. Operational rations stored close to ground zero may become radioactive from induced radiation. It is more likely, however, that the food will be damaged or destroyed by the blast and thermal effects of the nuclear explosion.

D-17. Bulk and fresh food stored in the open without protection will be contaminated. Decontamination is very difficult and time-consuming. Efforts should be made to ensure proper packing to prevent food contamination from radioactive fallout. Packing made from hard and nonporous materials, such as plastic or multilayer cardboard with a smooth surface, should be used. In addition, storage facilities should be enclosed to avoid the entry of fallout. Any material used as a protective cover will give some protection against nuclear fallout. Protection against induced radiation, blast, and thermal effects requires a hardened shelter or underground storage.

D-18. Food supplies require protection throughout the chain of production or procurement. Protection of the civilian-based food supply includes countermeasures along the production chain. Meats and milk are the most vulnerable products because of the possibility for concentration of radioactive isotopes (Strontium, Cesium, and Iodine). The primary (possibly the only) protection of animal products is to keep the animals indoors and to avoid contaminated fodder. Immediate slaughter of food animals is recommended if there is a shortage of uncontaminated fodder. Crops that have not yet been harvested cannot be protected.

Inspection and Monitoring

D-19. Fallout close to ground zero, especially after a surface burst, may be visible as dust. The presence of dust is an immediate indicator of contamination. Fallout on unprotected food produces a grittiness that is unpleasant and warns against eating the food. The degree and means of food protection (packaging and storage facilities) must be considered. Food in a building that remains intact should not receive enough contamination to be dangerous when eaten.

D-20. Veterinary units have radiation detectors to conduct ground or aerial surveys for gamma radioactive contamination levels in an area. The measurement of the external gamma radiation in the fallout area is an indication, but not a quantitative measure, for the degree of hazard from food contamination. Food monitoring is conducted in an area with low background radiation. If the storage area is contaminated, the food must be moved to a cleaner area for monitoring. With radiation detectors, the initial food monitoring is performed with the probe cover in place and the probe passed approximately 6 inches from the surface. If the reading is twice the background dose rate, the food is considered contaminated. If the reading is not above the background level but contamination is still suspected, place the probe closer to the food with the beta probe cover off. Monitor meat and fish with the probe cover off; pass the probe approximately one-half inch from the surface of the food.

D-21. Monitoring food contaminated through the food chain is more complicated; depending on the detection instrument used, special procedures must be followed. Gamma and beta emitting radionuclides in small volumes may be detected using Radiation Detection, Indication, and Computation sets; however, alpha emitting ones cannot. They are rough instruments and may be used only for screening surface contaminated food. To evaluate the hazards; the isotopes contributing to the radioactivity must be identified. Surface contaminated food will contain a mixture of isotopes with some more hazardous than others, depending upon whether they are used by the body. Milk will contain mostly I-131, Cs-137, Sr-89, and Sr-90. Meat and fish will contain mostly Cs-137. To verify I-131, Cs-137, Sr-89, and Sr-90 contamination, samples must be sent to laboratories equipped to analyze the samples.

D-22. All newly selected food supplies must be surveyed. Begin continuous monitoring immediately following receipt of a fallout warning, or when increased levels of radiation are detected by periodic monitoring.

D-23. Periodic monitoring is needed to establish baseline levels of background radiation in the environment and various food products. This monitoring is performed during peacetime, when possible, and throughout the time U.S. forces are deployed in the theater of operation.

Decontamination

D-24. There are two methods for nuclear decontamination: aging and removing. Aging is the process of allowing natural radiation decay to occur. The time necessary for this decay to take place depends upon the isotopes present; each has a different decay rate (half-life). Aging may not be possible when there is a short food supply. In some instances, such as with induced radioactivity, it may be the only way to decontaminate. Removing nuclear contamination from areas, personnel, food, or moving equipment to another location eliminates the immediate hazard. See Table D-1 on page D-6 for additional information on food items

and decontamination. To determine which decontamination method is required, food supplies are divided into groups as follows:

- Group II—Food in sealed and dust-proof packing such as cans, jars, fiberboard, and cellophane. These products are easily decontaminated by removing the radioactive dust covering the packing; brush, wash with soap and water, or remove the packing (depending on the type of packing material). If radiation is still detected after removing the dust, repeat the brush/wash procedure and monitor the food again. If radiation is still present, the food itself is then considered radioactive (induced radiation) and is unfit for consumption. Decontamination of induced radiation is possible only through aging. After aging one to two weeks, the food should be safe for consumption. After surface decontamination, the contents are safe to eat unless the food has induced radiation.
- Group III—Unprotected food. The method chosen to decontaminate unprotected food items will depend upon whether or not the food supply is critical. If the food supply is not critical, the contaminated items are isolated and allowed to decontaminate by aging. If the food supply is critical, food with surface contamination can, in principle, be decontaminated by removing the contaminated surface, or by washing.

D-25. Some products can be decontaminated by washing, peeling, or trimming the outer skin or leaves as follows:

- Decontaminate potatoes and hard-skinned fruits and vegetables by washing or scrubbing under running water, followed by peeling or scraping, then washing again. Potatoes, carrots, beets, and turnips can be washed at the supply depot. However, do not wash beans, rice, and onions until they are delivered to the field kitchen; washing reduces their storage quality and shelf life.
- Decontaminate cucumbers, tomatoes, cherries, cranberries, grapes, pears, plums, and thin-skinned squash by soaking in a water or detergent solution and rinsing with vigorous agitation or brushing.
- Apricots, peaches, most berries, asparagus, broccoli, and leafy vegetables cannot be satisfactorily decontaminated because of fuzzy surfaces, irregular shapes, or small size, which makes washing difficult. Citrus fruits, pineapples, corn, peas, beans, melons, pumpkins, cabbage, and nuts can be peeled.
- Fresh meat, sausages, and fish can be decontaminated by several washings with cold water. The exterior layer of the food item is removed if radioactivity is still present. There is, however, a risk of contaminating the inner parts of the foodstuff in the process. Cooking with several changes of water is the last step in decontamination.
- Decontaminate hard cheeses, margarine, and butter by cutting off the outer layer to a depth of 2.5 to 3 cm. Let cooking oils stand for 3 to 5 days, then pour off the contaminated layer; use a funnel to control spillage.
- Nonperishable items that are hard to decontaminate, such as flour, sugar, and salt, can be set aside allowing natural radioactive decay. When supplies are short, dilute the contamination by mixing with uncontaminated food. This will reduce the total amount of radioactive exposure in foods prepared using these contaminated items.
- Decontaminate air permeable, double-sacked goods by removing the outer sack. If the inner sack is free of radiation, double sack the food again to restore protection. However, when contamination is present on the inside bag, the food in contact with the bag is likely to be contaminated. Three methods can be used to handle this type of contaminated product. The easiest method involves spraying the bag of dry goods (except sugar or salt) with water. This will wet a layer of the food inside the bag. The wet layer can be removed when the bag contents are emptied. The uncontaminated contents are scooped back into clean packaging. Another method involves using melted paraffin to uniformly coat the outside of the bag. The paraffin solidifies after 30 to 40 minutes, and then the bag with the radioactive contamination can be removed from the contents. Although this method will seal the radioactive substance in the wax, it probably will not remove the layer of contaminated food product inside the bag. For the third method, form a piece of sheet metal into a cylinder the same height as the bag and 4 to 6 cm smaller in diameter. Insert the cylinder into the bag, then remove the top 3 to 4 cm of the contaminated product. Carefully scoop the remaining product out into a clean sack. With the cylinder still in place, fold the bag down catching the contaminated product on plastic sheeting, or a tarpaulin. When using this method,

mixing the contaminated portion with the uncontaminated portion is a problem. Check for contamination remaining in the product.

- Boiling or cooking has no effect on radioactive contamination.

Table D-1. Decontamination of food supplies

<i>Surface or material</i>	<i>Type of contamination</i>		
	<i>Chemical</i>	<i>Biological</i>	<i>Nuclear</i>
Canned, bottled or protected by impermeable container. Not canned or impermeable container.	Immerse in boiling, soapy water for 30 minutes and rinse spray with chlorine solution and rinse. Wash in hot, soapy water, rinse and aerate. Food known or suspected to be contaminated should not be consumed until approved by veterinary personnel.	Wash with soap and water then immerse in disinfectant solution. (immerse in boiling water for 30 minutes, food disinfectant, or 1/3 canteen cup of household bleach in 10 gallons of water).boil in water 15 minutes; not effective on toxins and some spores. Immerse in 5% sodium carbonate (4 pounds washing soda in 10 gallons water), rinse with potable water. Immerse in household bleach solution (1/2 gallon bleach in 25 gallons water) for 30 minutes then rinse and aerate for 10 minutes. Immerse in calcium hypochlorite solution (1/2 pounds in 25 gallons water) 20 minutes, then rinse. Immerse in chlorine solution (1 pound in 25 gallons water) 30 minutes, then rinse. Immerse in 2% peracetic acid for 10 minutes, rinse, and aerate for 10 minutes. Boil in water 15 minutes. Cook. Immerse in or spray with 2% household bleach solution. Packaged, peeled, or pared food may be immersed or sprayed.	Wash with soap and water, rinse. Brush and/ or wash contamination from container surface with copious amount of water, wash or trim contamination from unpackaged food.

D-26. Group IV—Food contaminated through the food chain. It is not practical to decontaminate this food. Meat and milk are the two most common foodstuffs contaminated in this way. The following is some key information to know regarding milk and meat:

- Milk may be decontaminated to a safe level by a complicated ion exchange process. The I-131 activity will decline rapidly during storage of milk and milk-products, although the Cesium and Strontium activity will remain almost constant for years. In an area with high-level fallout, milk is withdrawn from human consumption. The duration of withdrawal will be dependent upon the type of fallout and levels.
- Meat may be decontaminated to a safe level by soaking in water or brine. Cesium is loosely bound in the meat. By repeated soaking of meat cut in small pieces, most of the Cesium activity will be removed. Traditional meat preserving, such as salting with brine, will remove up to 60 to 70 percent of the Cesium activity (see Table D-2).
- Fruits, vegetables, root crops, and grain products may also contain hazardous amounts of radioactivity if ingested.

D-27. Food animals that have been exposed to fallout should be considered for consumption and slaughtered using routine inspection and slaughter procedures. In those cases where the animal has been exposed to fallout, but is not scheduled for immediate slaughter, the radiation burden can be reduced by moving the animal to an uncontaminated area (barn if available) and washing it with soap and water. Mild radiation sickness does not necessarily mean that the animals cannot be used for food. If the animals have been exposed to an internal radiation hazard, the meat can be eaten if the internal organs are discarded. Chickens that have eaten radioactive material may lay contaminated eggs, but most of the radioactivity will be concentrated in the shells. The white and yolk will be free of harmful amounts of radiation and can be eaten. Chickens will not lay eggs if the radioactive body burden is large enough that their eggs are unfit to eat.

Table D-2. Traditional salt preserving brine

MEAT, WHOLE 4 to 5 Kilogram. 25% NaCl (SALT) Brine. Five-liter brine per kilogram. Keep meat in brine for 3 weeks, temperature below 10°C. Soak in water for 1 to 2 days. 65 to 70% of CS activity will be removed.
MEAT, CUT 1 to 2 Kilogram. 25% NaCl Brine. Five-liter brine per kilogram. Keep meat in brine for 4 days. Soak in water for 4 hours. 65 to 70% of CS activity will be removed.
MUTTON/LAMB RIB Piece of rib 1 to 5 Kilogram. 25% NaCl Brine. 5-liter brine per kg. Keep in brine for 2 days. Soak in water for 2 hours. Air-drying for 10 days. Soak in water for 2 hours. Boil in water for 3 hours. 85 to 90% CS activity will be removed.
DECONTAMINATION OF COARSELY CHOPPED MEAT. 0.9% NaCl solution. 2-liter solution per kg. Soak in NaCl solution for 10 min. 60 to 70% CS activity will be removed. Repeated procedures will remove the same percentage of CS activity. Six times repeated treatment will remove nearly 100% of CS activity.

Considerations When Decontamination is Not Possible

D-28. When food cannot be decontaminated, sealing the product in a wrapping material or container may be needed. Sealing the product can reduce or shield the emanation of the contamination and/or fix the contamination in place. The hazard from contaminated food is small compared with that from external gamma radiation. Hungry people or animals should not be denied food because of possible fallout contamination. It is not practicable or desirable to preset maximum permissible limits of gross fallout radioactivity as a basis for judging whether or not food should be used. Common sense must be applied in establishing priorities for distribution of available food. For example, use the least contaminated and the most protected food first; hold milk products for 1 to 2 weeks before use.

BIOLOGICAL

D-29. This section discusses food contamination caused by a biological incident.

Contamination

D-30. Biological warfare agents exist in the form of toxins and microorganisms. The normal packaging and packing of food (to protect against moisture, dust, and bacterial or other contamination) provides protection against most biological agents. The exception may be toxins and biologically derived substances. However, the protective methods used for chemical agents will also protect against toxins and derived substances. Food in freezers, refrigerators, and in refrigerated trucks or rail cars will be safe if these containers remain sealed until the outer surfaces are decontaminated—

- It is unlikely that a biological agent will affect the appearance, taste, or smell of the food enough for the change to be apparent.
- Packaging and packing materials are not life supportive to pathogenic agents and are, therefore, self-decontaminating with the exception of spore-forming organisms.
- Most operational rations are packaged in metal containers, or encased in heavy aluminum laminated plastics that can withstand boiling water; also, they are impervious to arthropod penetration. This food is highly resistant to biological agents.
- The use of unpackaged items (unwrapped meats, fresh fruits, and vegetables) should be restricted; use only operational rations. Unprotected fresh food stored in the open and close to the source of dissemination will become contaminated.

Detection

D-31. Rapid identification of agents used is absolutely essential to implement effective countermeasures. Agent identification must be achieved quickly; it is the first step in answering critical management questions. What adjustments must be made in food preparation and distribution? What are the essential countermeasures? What is the expected outcome of the incident?

D-32. Samples of food that are suspected of being contaminated are transported to the designated supporting laboratory. Samples must be accompanied by a description of the samples, the sample collection procedures, and the circumstances, which prompted the collection. The designated medical laboratory in the theater of operation will provide a field confirmation identification of the agent(s). Designated CONUS laboratories accomplish definitive identification.

Note. New biological detection equipment is under development that will enable units to conduct presumptive identification of BW agents. However, samples must also be collected and processed as previously described.

Decontamination

D-33. Food contaminated with toxins is handled in the same manner as food contaminated with chemical agents. Food contaminated with microorganisms is handled in the same manner as when contaminated with the more common foodborne disease-producing microorganisms.

D-34. Several methods are available to decontaminate food items contaminated with biological agents. The following decontamination methods are considered to be the minimum.

D-35. Group II food that is sealed in containers that are resistant to the passage of biological agents requires only that the exterior of the container be decontaminated. Decontamination of these items is as follows:

- For containers made of metal, glass, plastic, or porcelain, perform the following steps:
 - Thoroughly wash the container in potable water and soap, or in a disinfectant solution. If the water used for washing is contaminated, the soap and water wash may increase, not reduce, the contamination hazard. After which, the food containers are immersed in a disinfectant solution for 30 minutes (see Table D-3 on page D-10); then rinsed with potable water, if available and time permits.
 - Place the containers in boiling soapy water for 15 minutes; then rinse with potable water.

Notes. 1. The chemical field decontamination kits do not meet the requirements to decontaminate food supplies exposed to biological agents.

2. The same procedures should be followed even if there is only suspicion of a BW attack.

- Thoroughly wipe containers that will not withstand soaking with a cloth soaked in a chlorine detergent solution. Remove the food from the container and place it in Group III.
- Metal or glass containers determined to have trichothecenes (yellow rain) present can be decontaminated using chlorine solution. Allow a contact time of 5 to 30 minutes for the chlorine solution to neutralize the toxin. Then rinse the container with potable water.

D-36. Group III food items that are not protected by the packaging material are decontaminated or disposed of as follows:

- Decontaminate foods that can be peeled or pared by immersing them in a disinfectant solution for 30 minutes, and then rinsing them with potable water (see Table D-3 on page D-10). Peel or pare the items after decontamination, then wash and, if appropriate, cook before eating.
- With the exception of certain heat-stable toxins, heat is the most practical means of decontaminating food. Several heating methods may be used, but the method chosen depends upon the type of food to be decontaminated. The key is to apply as much heat as possible without rendering the food unfit is as follows:
 - Cook in a pressure-type cooker with 15 pounds of pressure at 250°F (121°C) for 15 minutes.
 - Cook in a low-pressure cooker at 228°F (109°C) for 1 hour.
 - Bake bread or related items at 400°F (204°C) for 40 minutes.

CAUTION

Bread made with toxin-contaminated flour (especially with trichothecenes) is still toxic.

1. Bake or roast meat at 325°F (163°C) for 2 hours.

2. Boil for at least 15 minutes when no other method is available.

D-37. Although decontamination methods are provided above, vegetables such as lettuce, broccoli, and cauliflower, or unwrapped meats that have been exposed to biological agents should not be eaten.

D-38. Foods, such as butter, ice cream, and bread that will not withstand any of the above treatments must be destroyed.

D-39. Established meat inspection procedures are followed when animals exposed to biological agents must be used for food. The meat must be thoroughly cooked.

Table D-3. Chlorine solutions for decontamination of biological warfare agents

<i>Chlorine source</i>	<i>Mixture to produce 200 parts per million solution of available chlorine</i>
Household bleach	½ gallon/25 gallon water
High-test hypochlorite (calcium hypochlorite)	½ pound/25 gallon water
Supertropical bleach	½ pound/25 gallon water

CHEMICAL

D-40. This section discusses food contamination caused by a chemical or TIM incident.

Contamination

D-41. Contamination of foodstuffs by a chemical agent may occur at any point on the battlefield. This contact may render the food unpalatable also. In many cases, decontamination is difficult, thus, emphasis must be placed on protection. Keep food supplies covered at all times. Take special precautions to protect food that is not packed in protective packages. Unprotected food, forage, and grain supplies may be so contaminated that their consumption will produce gastrointestinal irritation, or systemic poisoning. Nerve agents, vesicants, and arsenicals are the most dangerous. Field concentrations of phosgene, hydrocyanic acid, irritants, and smokes will seldom be high enough to cause serious food contamination. The effect of cyanogen chloride on food is not known. As a precaution, foods exposed to cyanogen chloride should be considered toxic.

D-42. The effects of chemical agents on food depend on the nature of the agent and the type of the food. The extent to which chemical agents penetrate food also depends on the amount, form of dispersal (liquid [droplet size], or vapor) and duration of exposure. Nerve agents and mustard will penetrate deeply into unprotected fatty foods and will readily penetrate granular products such as grain and sugar. Liquid food products can be completely contaminated. Arsenicals readily hydrolyze to poisonous arsenical oxides in some foods. Foods can be divided into three categories based on their water content, fat content, and crystalline structure as follows:

- Foods having high water content, a low fat content, and/or a crystalline structure (fresh vegetables, fruits, sugar, salt, and eggs) will absorb mustard and nerve agents, either as a liquid or as a vapor. Nerve agents will be hydrolyzed slowly.
- Foods having a low fat content and an irregular (amorphous) structure (flour, bread, grain, rice, cereals, dried fruits, dried vegetables, tea, coffee, peas, and beans) readily absorb mustard and nerve agents in liquid form. As a vapor, these agents are absorbed to some extent, but are easily removed by airing.
- Foods having a low water content and a high fat content, such as butter, fat, fatty oils, ham, cheese, milk, bacon, fatty meat, and fish, absorb mustard and nerve agents such that removal of the agents is virtually impossible.

D-43. Chemical agents can be physically and chemically absorbed into food. In addition to the toxic effect, they often adversely affect taste, smell, and the appearance of the food. However, chemical agents can cause the food to become very toxic without causing any other changes in the food. Table D-4 shows the effects of a number of chemical agents on food. Since food can be contaminated without any outward change in appearance, the possibility of contamination must be assumed in a chemical agent environment. Treat the food with the same precautions as established for known contaminated items.

D-44. The protective properties of packaging materials are dependent upon a number of factors. The factors include the form of the agent (liquid versus vapor); concentration and exposure time; weather (temperature, wind speed, and humidity); and packaging material (the type of material, thickness, and the presence of folds, tears, and small holes). Even the thinnest material will offer some protection and is better than nothing at all. Therefore, always cover food supplies with whatever material is available. Table D-5 on page D-12 summarizes the protection values of various packaging materials against vapors and liquids.

D-45. Operational rations are substantially protected while contained in the shipping cases and especially if stored in the original palletized unit load with an overlay of fiberboard, shrink wrap, or film wrap.

The worst case is pallets of subsistence contaminated by liquid droplets during an attack. After the attack, high vapor concentrations will exist in the vicinity of the palletized loads. If the outer barrier is permeable such as fiberboard, it is possible that a liquid agent can seep through the overlay fiberboard and contact the shipping containers in liquid form. Normally, with seepage resistant materials, such as shrink wrap as the outer barriers, only the vapors of the agent are found within the pallet.

D-46. While field ration meals are stored, the food is protected by up to six layers of material. Multilayer barriers result in a complex diffusion process of the agent from the outside towards the interior. Vapor penetration into nonhermetically sealed spaces is a simple gaseous diffusion process. Permeation through packaging is a much more complex process regardless of whether the challenge is a liquid or a vapor—

- Liquid is adsorbed into permeable materials such as fiberboard or chipboard. With permeation-resistant materials (such as shrink wrap), the agent dissolves into, seeps through, and then desorbs from the barrier material. Shrink wrap provides adequate protection. Fiberboard sheathing provides adequate protection against mustard agents, but not against nerve agents.
- The low-density polyethylene used to construct the menu bag can absorb chemical agents and possibly toxins. If the menu bag is removed from the shipping container and is exposed to liquid contamination, enough agents may pass through the bag to create a health hazard. Keep field ration meals in the shipping container until issued to the Soldier. The menu bags should then be kept under the same degree of protection as the Soldier.
- The aluminum-laminated materials used to construct the field ration meals (retort and nonretort) pouches protect food from chemical contamination if hermetically sealed. The only item in the field ration meal bag that is not adequately protected is the spoon.

D-47. Mylar and cellophane are resistant to chemical agents.

Table D-4. Effects of chemical agents on food

<i>Agent</i>	<i>Influence on</i>			<i>Residual toxicity</i>
	<i>Taste</i>	<i>Smell</i>	<i>Color</i>	
Mustard	Bad	Bad	Discolors meat	+
N-Mustards	Bad	Bad	Doesn't discolor meat	+
Arsenicals	Acid	Bad	Discolors meat and vegetables	+, Arsenic
Nerve Agents	Bad	None	None	+
Phosgene	Acid	None	?	-After weathering
Cyanogen Agents	Bitter	Bad	None	-After weathering
Irritants	Acid	Bad	None	+
Smoke	Acid	Bad	?	-
White Phosphorous	?	?	?	+
Legend: + Indicates the presence of residual toxicity. - Denotes that residual toxicity is not present. ? The influence has not been determined.				

Table D-5. Protection from chemical contamination by packaging methods and materials

	<i>Chemical vapors</i>	<i>Liquids</i>
Bottles and cans		
Airtight bottles	Complete	Complete
Sealed metal cans	Complete	Complete
Glass bottles	Good	Good
Metal containers	Good	Good
Boxes		
Cardboard	Moderate	Moderate
Wooden crates	Moderate	Poor or none
Wrappings		
Metal foil laminates	Complete	Complete
Paper	Poor	None
Textile	None	None
Waxed paper	Good	Moderate
Multilayer bags	Good	Moderate
Cellophane	Good	Good
Cellophane, wet	None	None
Canvas	Poor	Poor

Detection

D-48. Currently, a field method for detecting chemical agent contamination in food does not exist. Contamination is not always spread evenly throughout food; this makes it impossible to take a single sample and determine the presence or absence of chemical agents in the entire lot. Additionally, standardized laboratory tests have not been developed for determining levels of chemical agents in food. Until a specific method to detect chemical agents in food is available, reliance will have to be made upon determination of contamination, or lack thereof, on the packaging material; the integrity of the packaging material; the protective qualities of the packaging material; and the penetration characteristics of the suspected chemical agents.

D-49. Food may become toxic without any change in outward appearance. Never taste or smell food to determine if contamination is present in food.

D-50. Veterinary and subsistence units have equipment available to detect chemical agents in the field. All subsistence in a chemical attack area is considered contaminated until a survey can be conducted, preferably by veterinary and chemical personnel. Personnel must be at MOPP Level 4 while conducting the survey. Concentrate the initial portion of the survey on the adequacy of the storage facility and other protective measures in preventing chemical agent contact with subsistence items. The area surrounding the storage facility is examined for the presence of animals, rodents, birds, and arthropods acting unusual, or dead in unusual numbers. If animals are present and assistance is required in identifying the CBRN agent, specimens can be collected and submitted to the AML. Damage such as broken windows, holes, or loss of structural integrity of the storage facility is noted. This information combined with knowledge of the agent form (liquid or vapor), type of agent (which will indicate the degree of persistency), and approximate time of attack will provide a risk assessment. Liquid agents should not significantly penetrate an intact facility, but may produce vapor contamination by off-gassing.

Decontamination

D-51. Decontamination is only required for contamination remaining 10 minutes or longer. Decontamination efforts on subsistence items will normally be limited to removal of the containers and carton overwrap material.

D-52. The need for decontamination is primarily dictated by the type of chemical agent used. The method of decontamination selected will depend upon the type of packaging material used and the urgency with which the food is required.

D-53. Food supplies in storage are not likely to be seriously contaminated if reasonable protection precautions are taken. For this reason, large supplies of food are not to be condemned as a whole simply because they have been exposed to possible chemical contamination. A prompt and careful survey of the supplies may reveal that only a few items have been contaminated to a level that decontamination is required. Prompt segregation of the heavily contaminated portions will prevent, or minimize, contamination of the remainder. Foods without protective packages constitute the major difficulty.

D-54. Individual decontamination is performed by each Soldier on those subsistence items in his possession at the time of the attack. Individual decontamination is limited to operational rations that are in original, intact containers. Unit-level decontamination is performed by unit personnel under the supervision of unit CBRN personnel. Support decontamination is attempted at major subsistence storage facilities. Again, decontamination is limited to packing material. Decontamination of food itself is only attempted in emergency situations when alternative supplies are not available.

D-55. Start decontamination operations with the easiest method and proceed to the most difficult. This allows for the removal of a relatively large portion of the contamination in a minimum of time. The simplest procedure is to allow the materials to age and air (*weather*). Substantial self-decontamination will occur with most agents. Exceptions are thickened mustard, thickened GD, and VX. Table D-6 provides the length of time for which contaminated subsistence supplies may present a contact hazard. Weather elements that affect decontamination are—

- Warm temperatures speed liquid agent off-gassing and hasten the dispersion of chemical agents into the air.
- High winds rapidly disperse chemical agent vapors and speed off-gassing from surfaces.
- Moisture causes chemical agents to react with water to form nontoxic or less toxic chemicals.
- Heavy rain or rain of long duration can aid decontamination by mechanically removing chemical agents.
- Even in cold weather, direct sunrays warm surfaces above the air temperature and hasten the off-gassing and decomposition of chemical agents.

D-56. Active decontamination is attempted only when weathering will not decontaminate the packaging material in sufficient time. Decontamination procedures can be enhanced by using heat to vaporize the chemical agent; by reaction with decontaminants; or by removing with hot soapy water. Decontamination considerations are—

- The simplest (standard) decontamination materials are water and detergents. An effective decontaminant is hot water used with the addition of soap or detergent and scrubbing. Commercial abrasive powdered cleansers are effective decontaminants for many surfaces (metal, glass, Formica), but not wood or soft plastics.
- Water can be used to flush chemical agents from surfaces. High-pressure application produces a better cleansing action than low pressure. If the surface has absorbed the agent, flushing will remove the surface contamination, but will not affect the agent that is absorbed.
- Soaking contaminated items in boiling water is an excellent decontamination method for some agents. Water alone will not be sufficient to decontaminate all chemical agents. Soaking in warm or cold water may reduce the contamination slightly; however, the hazard may not be reduced sufficiently even after prolonged soaking. If hot water is not available, or if it might cause damage to the item, other methods of decontamination should be considered, such as decontaminating solutions or a caustic solution followed by thorough rinsing.
- Fibrous materials such as cloth and canvas are best decontaminated by washing and scrubbing.
- Glass, metal, porcelain, and plastic surfaces are best decontaminated by using hot water or hot soapy water. Some toxic materials are readily removed with no more than slight abrasion or brushing.
- Painted, varnished, and waxed surfaces are generally smooth and nonporous. Dust and liquids are readily removed by wiping, brushing, or vacuuming. Absorbed materials are removed by hot

water, detergent, or complexing agents. None of these surfaces stand up well to heavy abrasive techniques. Agents can be attacked and removed by caustics, acids, and organic chemicals. Some of these surfaces readily absorb agents, so weathering following decontamination is advisable.

- Rubber is a porous material that can absorb agents. It is not easily decontaminated by abrasive techniques. Warm, soapy water used with brushing is effective since it removes some absorbed contamination. Strong acids, alkalis, and organic solvents may deteriorate and decompose rubber articles.

D-57. Operational rations are the primary rations issued; always issue uncontaminated stocks first. This allows for decontamination of contaminated stocks without interrupting supply support. Normally, contaminated stocks are not issued. The decision to issue contaminated items is based on the tactical situation, criticality of the items, type and extent of contamination, and the time and resources available for decontamination. Decontamination efforts on subsistence items are limited to the containers and carton overwrap material. Some factors to consider are—

- The field ration meals retort and nonretort food pouch may be decontaminated with soap and water wash. The chemical agents will be removed by the solutions.
- Semipermeable materials (polyethylene menu bag, shrink wrap, and film wrap) may have chemicals deposited not only on the surface, but also dissolved into the matrix of the material. The chemicals can be removed from the surface by washing with hot soapy water, but contaminant dissolved in the material is not removed. The remaining agent can only be removed by weathering which can be accelerated through the use of heat and sweeping the surface with air.
- Fiberboard is both sorbent and permeable and acts like a blotter. Liquid decontaminants can force the contaminant further into the fiberboard. Any attempt to decontaminate fiberboard would be futile. The only alternatives are to remove the fiberboard, or to allow it to weather.
- Palletized unit loads of field ration meals and unit group ration outer wraps can be decontaminated through the aid of a forced clean air sweep in 4 to 5 days, compared to 3 weeks or more under natural conditions without a forced air sweep.

D-58. Contaminated food supplies are only handled by personnel trained in decontamination methods and in MOPP Level 4. Contaminated food items are divided into three groups as follows:

- Group I consists of canned and unopened packaged items which have been exposed only to agent vapors. Most items in this group will be safe to issue after a brief period of outdoor airing to remove clinging vapors.
- Table D-6 lists the decontamination procedures for packaging materials contaminated with nerve agents, mustards, and arsenicals.

Table D-6. Chemical decontamination of packaged material

<i>Packaging material</i>	<i>Contamination</i>	<i>Decontamination procedures</i>
Airtight metal containers, glass bottles, foil, aluminated laminated materials	Vapor and liquid	Air for 24 hours. Wash with hot soapy water, soda, or chlorine solution. Rinse with water.
Polyester, polyvinyl fluoride, wooden boxes, crates, board, multilayer bags	Vapor	Remove contaminated package. Air contents for 24 hours.
Cardboard, polyethylene.	Liquid	Contaminated contents- treat as unpackaged food.

D-59. Group II consists of canned and unopened packaged items which have been contaminated with a liquid chemical agent. Group II factors to consider are—

- Attempts to decontaminate porous packaging materials, such as cardboard or wood, are likely to be unsuccessful and may result in spreading the contamination. The best procedure in handling such items is to strip off the outer contaminated coverings and examine the inner layer to see if penetration of the agent has occurred. If it has, continue stripping off layers until an uncontaminated layer is reached and place it in Group I. If the agent has penetrated to the food, place it in Group III.

- Food in cans or in other sealed, impermeable containers is not in danger of chemical contamination. Because contamination is confined to the outer surface of the sealed container, decontamination is accomplished by: immersion in boiling, soapy water for 30 minutes and rinse; immersion in boiling water for 30 minutes; spray with chlorine solution; or to wash in hot soapy water, rinse, and aerate. Under no conditions should contaminated containers be opened before they have been decontaminated and monitored.
- Chlorine solution can be used on the polyethylene menu bag for up to 24 hours without a significant change in appearance, tensile properties, and size of the plastic. The use of chlorine solution will cause little or no change to most other plastics.

D-60. Group III will consist of unpackaged or poorly packaged items which have been exposed to an agent in either vapor or liquid form. Foodstuffs in this group should be decontaminated only when absolutely necessary. The decision to use foods that have been contaminated is to be made by the commander. Decontamination procedure to be followed, in order, is: trim surface fat and grossly contaminated areas; wash with water or 2-percent sodium bicarbonate solution; then boil in water.

D-61. Group III factors to consider are—

- Boiling in water may be eliminated when the contamination has been only with the vapors of irritant agents. When such an exposure has been light, aeration for a short time may be used for decontamination.
- Frying, roasting, or broiling will not remove traces of blister agents from meats. In general, salvage of foods heavily contaminated with droplets of the blister agents, especially the arsenical blister agents, is not practical. Foods of high water or fat content are unfit for consumption and reclamation is not practical when contaminated with liquid mustard or a liquid nitrogen mustard.
- When foods have been exposed to blister agent vapor, they can be reclaimed by washing with sodium bicarbonate solutions and rinsing with clear water, by intensive cooking, or in the case of dry provisions, by 24 to 48 hours of aeration. Lean meat contaminated with mustard vapor can be reclaimed by boiling in water for 30 minutes or more. With nitrogen mustard vapor contamination, the meat should be boiled in a 2-percent sodium bicarbonate solution. Discard the water used to boil the meat.
- Nerve agent contamination is treated the same as blister agent contamination.
- Foods, such as potatoes and hard-skinned fruits and vegetables, can be decontaminated by washing or scrubbing, followed by peeling or scraping, then washing again.
- Prepared food in open containers will be contaminated; it must be temporarily isolated, or disposed of (bury or as directed by commander).
- A food item that is contaminated with irritants can be decontaminated by airing. Consumability is determined by taste rather than toxicity.
- Phosgene is rapidly hydrolyzed, therefore, washing the food with water or airing it will usually suffice.
- Food contaminated with white phosphorous should be destroyed.
- Normally, hydrocyanic acid will have little effect on food supplies. The exposures will most likely be as a vapor. However, foods with a high water content may become unfit for consumption after exposure to high concentrations.
- The effect of cyanogen chloride on foods is not known. Foods exposed to cyanogen chloride vapors are considered toxic.

D-62. Table D-7 on page D-16 lists the decontamination procedures for unpackaged food contaminated with a chemical agent.

D-63. Decontaminating cattle, poultry, and other livestock is only attempted when other sources of food are not available. Heavily contaminated animals should be destroyed. Livestock contaminated lightly by phosgene, nerve agents, mustards, and arsenicals (such as vapor or liquid) may be slaughtered in the early stages of poisoning before the full effects of exposure are shown. If these animals are slaughtered in the preliminary stages of poisoning and all tissues exposed to the agent (the head, blood, lungs, organs, and local areas) are

discarded, there is no danger in consumption of the meat, provided the animal passes a pre-slaughter and slaughter inspection. This is true even of animals poisoned by arsenical agents since the edible tissue will contain amounts of arsenic too small to be toxic. Organs (liver, brain, heart, kidney, and lungs) will contain more arsenic than the musculature and are discarded. The meat must be well cooked. Personnel involved in slaughtering procedures must be careful to prevent spreading contamination to the meat and to themselves.

D-64. Decontaminating forage and grain exposed to only chemical agent vapors is by aeration. Aerated supplies, especially if mixed with larger amounts of uncontaminated supplies, produces no ill effects when fed to animals. Forage or grain heavily contaminated by liquid vesicants, especially arsenicals, should not be used.

Table D-7. Chemical decontamination of unpackaged food

<i>Chemical agent</i>	<i>Fatty foods (butter, bacon, milk, cheese, ham)</i>	<i>Non-fatty foods, high water content crystalline (fruits, vegetables, salt, sugar)</i>	<i>Non-fatty foods, low water content, amorphous (flour, cereals, bread, peas)</i>
Nerve agents			
Vapor, heavy	Destroy	Destroy, unless possible to boil after airing 48 hours.	Air for 48 hours, then boil
Vapor, light	Destroy	Air for 48 hours, then boil	Air for 48 hours, then boil
Liquid	Destroy	Destroy	Destroy
Mustards			
Vapor	Remove 1-3 centimeters of outer layer and wash with 2% sodium bicarbonate solution. Boil for at least 30 minutes. Destroy milk.	Wash with water, air for 48 hours.	Wash with water, air for 48 hours.
Liquid	Destroy	Destroy	Destroy
Arsenicals			
	Destroy	Destroy	Destroy

Glossary

This glossary lists acronyms and terms with Army or joint definitions. Where Army and joint definitions differ, (Army) preceded the definition. Terms for which this publication is the proponent are marked with an asterisk (*). The proponent publication for other terms is listed in parentheses after the definition.

SECTION I – ACRONYMS AND ABBREVIATIONS

AE	aeromedical evacuation
AFDD	Air Force doctrine document
AFI	Air Force instruction
AFMAN	Air Force manual
AFMS	Air Force Medical Service
AFPAM	Air Force pamphlet
AFRAT	Air Force radiation assessment team
AFRRI	Armed Forces Radiobiology Research Institute
AFTTP	Air Force tactics, techniques, and procedures
AJP	allied joint publication
AMEDD	Army Medical Department
AMedP	allied medical publication
AML	area medical laboratory
AO	area of operations
APHC	Army Public Health Center (Provisional)
AR	Army regulation
ATP	Army techniques publication
BAS	battalion aid station
BAT	biological augmentation team
BH	behavioral health
BUMEDINST	Bureau of Medicine and Surgery instruction
BW	biological warfare
CB	chemical-biological
CBIRF	Chemical-Biological Incident Response Force
CBPS	chemical biological protective shelter
CBRN	chemical, biological, radiological, and nuclear
CBRNE	chemical, biological, radiological, nuclear, and high-yield explosives
CCDR	combatant commander
CDC	Centers for Disease Control and Prevention
CERFP	chemical, biological, radiological, nuclear, and high-yield explosives enhanced response force package
CJCSI	Chairman of the Joint Chiefs of Staff instruction
CM	consequence management
COMDTINST	Commandant, United States Coast Guard instruction

CONOPS	concept of operations
CONUS	continental United States
COSC	combat and operational stress control
COSR	combat and operational stress reactions
CPDEPMEDS	chemically protected deployable medical systems
CPE	collective protection equipment
CPEMEDS	Collectively Protected Expeditionary Medical Support
CPS	collective protective shelter
CW	chemical warfare
DA	Department of the Army
DCRF	defense CBRN response force
DD	Department of Defense
DEPMEDS	deployable medical systems
DMSS	Defense Medical Surveillance System
DNBI	disease and nonbattle injury
DOD	Department of Defense
DODD	Department of Defense directive
DODI	Department of Defense instruction
DTD	detailed troop decontamination
ECP	entry control point
EMDT	expeditionary medical decontamination team
EMEDS	expeditionary medical support
EMT	emergency medical treatment
EOD	explosive ordnance disposal
FDPMU	forward-deployable preventive medicine unit
FHP	force health protection
FM	field manual
FST	forward surgical team
GOA	government-owned animal
GP	general purpose
HAZMAT	hazardous materials
HR	human remains
HRF	homeland response force
HSS	health service support
IFAS	initial field account survey
IPE	individual protective equipment
IRF	incident response force
IRS	incident report survey
ISO	International Organization for Standardization
IV	intravenous
J-3	joint staff operations

JECP	Joint Expeditionary Collective Protection
JEM	joint effects model
JFC	joint force commander
JMPT	Joint Medical Planning Tool
JP	joint publication
JTF	joint task force
JWARN	Joint Warning And Reporting Network
LRN	Laboratory Response Network
LRN-B	Laboratory Response Network-Biological
MACRMS	mortuary affairs contaminated remains mitigation site
MCO	Marine Corps order
MCRP	Marine Corps reference publication
MCWP	Marine Corps warfighting publication
MES	medical equipment set
MILVAN	military van
MOPP	mission-oriented protective posture
MPTk	medical planners' toolkit
MTF	medical treatment facility
MTTP	multi-Service tactics, techniques, and procedures
MWD	military working dog
NATO	North Atlantic Treaty Organization
NAVMED P	Bureau of Medicine and Surgery publication
NAVSUP P	Naval Supply Systems Command publication
NAVSUPINST	Naval Supply Systems Command instruction
NBC	nuclear, biological, and chemical
NCMI	National Center for Medical Intelligence
NCO	noncommissioned officer
NCOIC	noncommissioned officer in charge
NMRC	Naval Medical Research Center
NTRP	Navy tactical reference publication
NTTP	Navy tactics, techniques, and procedures
NWP	Navy warfare publication
OCONUS	outside the continental United States
OEH	occupational and environmental health
OIC	officer in charge
OPLAN	operation plan
OPNAV	Office of the Chief of Naval Operations
OPORD	operation order
OSCAR	Operational Stress Control and Readiness
OSHA	Occupational Safety and Health Administration
PAM	prevention and aerospace medicine

PDS	patient decontamination site
PIU	patient isolation unit
PPE	personal protective equipment
PPW	patient protective wrap
PTE	potentially traumatizing event
RSDL	reactive skin decontamination lotion
RTD	return to duty
SB	supply bulletin
SIGACT	significant activity
SMRC	Specialized Medical Response Capability
SOP	standard operating procedure
STANAG	standardization agreement
TAP	toxicological agent protective
TB MED	technical bulletin (medical)
TC	training circular
TCCC	tactical combat casualty care
TEMPER	tent, extendable, modular, personnel
TET	theater epidemiology teams
TG	technical guide
TIC	toxic industrial chemical
TIM	toxic industrial material
TM	technical manual
U.S.	United States
USAF	United States Air Force
USAMRICD	United States Army Medical Research Institute of Chemical Defense
USAMRIID	United States Army Medical Research Institute of Infectious Diseases
USCG	United States Coast Guard
USMC	United States Marine Corps
USN	United States Navy
USNORTHCOM	United States Northern Command
USTRANSCOM	United States Transportation Command
UTC	unit type code
VCL	vapor control line
WMD	weapons of mass destruction
WMD-CST	weapons of mass destruction-civil support team

SECTION II – TERMS

biosurveillance

The process of gathering, integrating, interpreting, and communicating essential information related to all-hazards threats or disease activity affecting human, animal, or plant health to achieve early detection and warning, contribute to overall situational awareness of the health aspects of an incident, and to enable better decisionmaking at all levels. (National Strategy for Biosurveillance).

combat and operational stress reactions

The expected and predictable emotional, intellectual, physical, and/or behavioral reactions of an individual who has been exposed to stressful events in war or stability operations.

Also known as COSR. (JP 4-02).

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 3-11).

health surveillance

The regular or repeated collection, analysis, and interpretation of health-related data and the dissemination of information to monitor the health of a population and to identify potential risks to health, thereby enabling timely interventions to prevent, treat, or control disease and injury. It includes occupational and environmental health surveillance and medical surveillance. (JP 4-02).

immediate decontamination

Decontamination carried out by individuals immediately upon becoming contaminated to save lives, minimize casualties, and limit the spread of contamination. (JP 3-11).

mass casualty

Any large number of casualties produced in a relatively short period of time, usually as the result of a single incident such as a military aircraft accident, hurricane, flood, earthquake, or armed attack that exceeds local logistic support capabilities. (JP 4-02).

medical surveillance

The ongoing, systematic collection, analysis, and interpretation of data derived from instances of medical care or medical evaluation, and the reporting of population-based information for characterizing and countering threats to a population's health, well-being, and performance. (JP 4-02).

mission-oriented protective posture

A flexible system of protection against chemical, biological, radiological, and nuclear contamination in which personnel are required to wear only that protective clothing and equipment appropriate to the threat level, work rate imposed by the mission, temperature, and humidity. (JP 3-11).

occupational and environmental health surveillance

The regular or repeated collection, analysis, archiving, interpretation, and dissemination of OEH-related data for monitoring the health of, or potential health hazard impact on, a population and individual personnel, and for intervening in a timely manner to prevent, treat, or control the occurrence of disease or injury when determined necessary. (JP 4-02).

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. (JP 3-11).

operational stress control and readiness

A Marine Corps program that assigns mental health personnel directly as organic assets in ground combat units at the level of regiments, rather than attaching them to external medical treatment facilities or combat stress teams. Also called OSCAR. (NTRP 1-02 and MCRP 5-12C).

***patient decontamination**

The removal and/or the neutralization of hazardous levels of chemical, biological, radiological, and nuclear contamination from patients before admission into a medical treatment facility under the supervision of medical personnel to prevent further injury to the patient during the decontamination process.

thorough decontamination

Decontamination carried out by a unit 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. (JP 3-11).

toxic industrial material

A generic term for toxic, chemical, biological, 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. (JP 3-11).

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15 March 2016

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