MCI 571A

MARINE CORPS INSTITUTE

NBC INDIVIDUAL SURVIVAL MEASURES

MARINE BARRACKS
WASHINGTON, DC

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MARINE CORPS INSTITUTE
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IN REPLY REFER TO:
1550
Ser 571
1 Feb 04

From: Director
To: Marine Corps Institute Student

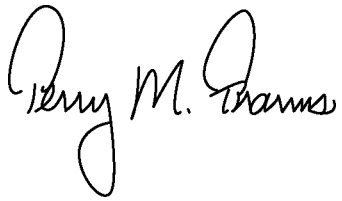
Subj: NBC INDIVIDUAL SURVIVAL MEASURES
(MCI 571A)

1. Purpose. The subject course provides instruction on nuclear, biological, and chemical (NBC) defense.

2. Scope. This course teaches the fundamentals of survival in an NBC environment. Maintaining survival equipment, donning and removing equipment, and sustaining combat potential are discussed in detail. The course emphasizes immediate action to NBC attacks and treating NBC battle casualties.

3. Applicability. This course is intended for instructional purposes only. This course is designed for Marines in the ranks of private through master sergeant in any MOS.

4. Recommendations. Comments and recommendations on the contents of the course are invited and will aid in subsequent course revisions. Please complete the course evaluation questionnaire at the end of the final examination. Return the questionnaire and the examination booklet to your proctor.



T.M. FRANUS
By direction

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Student Information

Number and Title	MCI 571A NBC INDIVIDUAL SURVIVAL MEASURES
Study Hours	9
Course Materials	Text
Review Agency	
Reserve Retirement Credits (RRC)	3
ACE	Not applicable to civilian training/education
Assistance	For administrative assistance, have your training officer or NCO log on to the MCI home page at www.mci.usmc.mil. Marines CONUS may call toll free 1-800-MCI-USMC. Marines worldwide may call commercial (202) 685-7596 or DSN 325-7596.

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Study Guide

Congratulations

Congratulations on your enrollment in a distance education course from the Distance Learning and Technologies Department (DLTD) of the Marine Corps Institute (MCI). Since 1920, the Marine Corps Institute has been helping tens of thousands of hard-charging Marines, like you, improve their technical job performance skills through distance learning. By enrolling in this course, you have shown a desire to improve the skills you have and master new skills to enhance your job performance. The distance learning course you have chosen, MCI 571A, *NBC Individual Survival Measures,* has been published to provide instruction to all Marines in any MOS. This course provides instruction in various areas of nuclear, biological, and chemical warfare. Course topics include the history of and United States policies on nuclear, biological, and chemical warfare, the use and maintenance of protective equipment and clothing, protective posture, actions to be taken before, during and after an NBC attack, and decontamination procedures and materials for the various types of chemical agents.

Your Personal Characteristics

- **YOU ARE PROPERLY MOTIVATED.** You have made a positive decision to get training on your own. Self-motivation is perhaps the most important force in learning or achieving anything. Doing whatever is necessary to learn is motivation. You have it!

- **YOU SEEK TO IMPROVE YOURSELF.** You are enrolled to improve those skills you already possess, and to learn new skills. When you improve yourself, you improve the Corps!

- **YOU HAVE THE INITIATIVE TO ACT.** By acting on your own, you have shown you are a self-starter, willing to reach out for opportunities to learn and grow.

- **YOU ACCEPT CHALLENGES.** You have self-confidence and believe in your ability to acquire knowledge and skills. You have the self-confidence to set goals and the ability to achieve them, enabling you to meet every challenge.

- **YOU ARE ABLE TO SET AND ACCOMPLISH PRACTICAL GOALS.** You are willing to commit time, effort, and the resources necessary to set and accomplish your goals. These professional traits will help you successfully complete this distance learning course.

Continued on next page

Study Guide, Continued

Beginning Your Course

Before you actually begin this course of study, read the student information page. If you find any course materials missing, notify your training officer or training NCO. If you have all the required materials, you are ready to begin.

To begin your course of study, familiarize yourself with the structure of the course text. One way to do this is to read the table of contents. Notice the table of contents covers specific areas of study and the order in which they are presented. You will find the text divided into several study units. Each study unit is comprised of two or more lessons, lesson exercises, and finally, a study unit exercise.

Leafing Through the Text

Leaf through the text and look at the course. Read a few lesson exercise questions to get an idea of the type of material in the course. If the course has additional study aids, such as a handbook or plotting board, familiarize yourself with them.

The First Study Unit

Turn to the first page of study unit 1. On this page, you will find an introduction to the study unit and generally the first study unit lesson. Study unit lessons contain learning objectives, lesson text, and exercises.

Reading the Learning Objectives

Learning objectives describe in concise terms what the successful learner, you, will be able to do as a result of mastering the content of the lesson text. Read the objectives for each lesson and then read the lesson text. As you read the lesson text, make notes on the points you feel are important.

Completing the Exercises

To determine your mastery of the learning objectives and text, complete the exercises developed for you. Exercises are located at the end of each lesson, and at the end of each study unit. Without referring to the text, complete the exercise questions and then check your responses against those provided.

Continued on next page

Continuing to March

Continue on to the next lesson, repeating the above process until you have completed all lessons in the study unit. Follow the same procedures for each study unit in the course.

Preparing for the Final Exam

To prepare for your final exam, you must review what you learned in the course. The following suggestions will help make the review interesting and challenging.

- **CHALLENGE YOURSELF.** Try to recall the entire learning sequence without referring to the text. Can you do it? Now look back at the text to see if you have left anything out. This review should be interesting. Undoubtedly, you'll find you were not able to recall everything. But with a little effort, you'll be able to recall a great deal of the information.

- **USE UNUSED MINUTES.** Use your spare moments to review. Read your notes or a part of a study unit, rework exercise items, review again; you can do many of these things during the unused minutes of every day.

- **APPLY WHAT YOU HAVE LEARNED.** It is always best to use the skill or knowledge you've learned as soon as possible. If it isn't possible to actually use the skill or knowledge, at least try to imagine a situation in which you would apply this learning. For example make up and solve your own problems. Or, better still, make up and solve problems that use most of the elements of a study unit.

- **USE THE "SHAKEDOWN CRUISE" TECHNIQUE.** Ask another Marine to lend a hand by asking you questions about the course. Choose a particular study unit and let your buddy "fire away." This technique can be interesting and challenging for both of you!

- **MAKE REVIEWS FUN AND BENEFICIAL.** Reviews are good habits that enhance learning. They don't have to be long and tedious. In fact, some learners find short reviews conducted more often prove more beneficial.

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Tackling the Final Exam

When you have completed your study of the course material and are confident with the results attained on your study unit exercises, take the sealed envelope marked **"FINAL EXAM"** to your unit training NCO or training officer. Your training NCO or officer will administer the final examination and return the examination and the answer sheet to MCI for grading. Before taking your final examination, read the directions on the DP-37 answer sheet carefully.

Completing Your Course

The sooner you complete your course, the sooner you can better yourself by applying what you've learned! HOWEVER--you do have two years from the date of enrollment to complete this course.

Graduating!

As a graduate of this distance education course and as a dedicated Marine, your job performance skills will improve, benefiting you, your unit, and the Marine Corps.

Semper Fidelis!

STUDY UNIT 1

NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) WARFARE

Overview

Focus

Nuclear, biological, and chemical (NBC) warfare is a serious threat to national security and world peace. The possibility that these weapons may be used is real. These powerful weapons possess the capability to produce mass casualties, level city blocks, shut utilities down, and destroy communications. Therefore, we must study the origins and development of these powerful weapons that have sometimes been used in warfare in the past. We also need to examine what the U.S. government and world organizations have done to attempt to regulate and restrict the use of these weapons of mass destruction (WMD).

Scope

The intent of this study unit is to explain how and why this type of warfare has been used as a tool in battle and to investigate the strict policy standards that have been enacted to deal with this type of warfare.

In This Study Unit

This study unit contains the following lessons.

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LESSON 1

HISTORY OF NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) WARFARE

Introduction

Lesson Focus

Since the beginning of human history, mankind has constantly sought advantages in armed conflict. Biological and chemical warfare and later, nuclear warfare were attempts to gain such advantages. From the 1470s, when Leonardo Da Vinci describes a barrel of burning sulfur dust being catapulted into an enemy ship to the detonation of atomic weapons in 1945, NBC warfare has produced tens of thousands of casualties. NBC has been and continues to be a critical element on the battlefield.

Content

This lesson gives you a historical overview of NBC warfare to show how it has progressed and shaped the concept of war.

Learning Objectives

At the end of this lesson, you will be able to

- Identify specific events in nuclear warfare history.
- Identify specific events in biological warfare history.
- Identify specific events in chemical warfare history.
- Identify the current NBC threat.
- Identify the purpose of an NBC threat brief.
- Identify the content of an NBC threat brief.

Continued on next page

Introduction, Continued

In This Lesson This lesson contains the following topics:

History of Nuclear Warfare

Development

Nuclear weapons are without doubt the most destructive means of warfare known to man. The detonation of a nuclear weapon is the ultimate show of force and power. A nuclear detonation can end or start a conflict in an instant. The possibility that an enemy has nuclear capabilities has caused governments to shift large amounts of manpower, finance, and other resources to nuclear defense and entire countries have been panic swept with the thought of nuclear war. Listed below is a chronology of nuclear warfare development and an account of how it has changed the world.

Date	Event
January 13, 1939	German scientist Otto Frisch coined the term fission after detecting fission fragments in an ionization chamber. Fission is the splitting of atoms or molecules. When it occurs, a massive amount of energy is created.
January 29, 1939	American scientist Robert Oppenheimer suggested creating a bomb that uses the energy released by fission as a destructive force.
February 26, 1941	Glenn Seaborg and Arthur Wahl discovered element 94, which they later named Plutonium. Plutonium is a vital ingredient in one type of fission bomb.
September 17, 1942	Colonel Leslie Groves was notified that he would take over the command of the Manhattan Project, a crash program to develop the atomic bomb. At the same time the War Production Board gave the Manhattan Project the highest emergency procurement priority in existence (AAA). These steps are taken to leapfrog the project ahead of the Germans.
November 29, 1943	B-29 modifications began at Wright Field, Ohio to adapt it for carrying atomic bombs. Up to this point, the United States had no means to deliver the bomb.
October 27, 1944	Robert Oppenheimer, the head scientist of the Manhattan Project, approved plans for bomb testing in the Jornada del Muerto Valley at the Alamogordo Bombing Range. If the tests were unsuccessful the project would have been in jeopardy of losing funding.

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History of Nuclear Warfare, Continued

Development, continued

Date	Event
April 27, 1945	The Target Committee met for the first time to select targets (cities) for atomic bombing. Yokohama, Nagoya, Osaka, Kobe, Hiroshima, Kokura, Nagasaki, Sasebo, and Tokyo Bay (for non-lethal demonstration) were all studied.
August 6, 1945	At 0000 hours in the final brief, **Hiroshima** was selected as the target of choice. At 0915:17, the Enola Gay, flying at 31060 feet, dropped the bomb. At 0916:02 Little Boy exploded at an altitude of 1850 feet, 550 feet from the aim point, the Aioi Bridge, with a yield of 15 kilotons.
August 9, 1945	At 0347, Bock's Car takes off with Charles Sweeney as the pilot. The intended target was Japan's largest arsenal in Kokura. Shortly after takeoff, Sweeney discovered fuel would not pump from the 600-gallon reserve tank. At 1044, when Bock's Car reached Kokura, the target was covered by haze and the arsenal couldn't be located. Enemy fighters and flak appeared, forcing the plane to stop its search. Sweeney then turned the plane to the only secondary target within range, Nagasaki. Even with an emergency landing at Okinawa, the fuel problem permitted only one pass over the city. Nagasaki was covered with clouds but one small gap allowed a drop several miles from the original target. At 1102 Fat Man exploded 1950 feet above the city scoring a direct hit on the Mitsubishi Steel and Arms Works with a yield of 21 kilotons.
August 14, 1945	At 1349 Washington D.C. EST, Emperor Hirohito ordered the surrender of Japanese forces after Tokyo received leaflet bombing warning of another atomic attack.
1998	India and Pakistan conduct successful nuclear weapons tests.

History of Biological Warfare

Development

Biological warfare has been used for centuries as an offensive weapon. Either by design or accident, it has proven to be a useful method to gain the advantage in war. Ranging from the simplest means of delivery by just a few men to complex, strategic operations involving the most advanced technologies known, the goal remains the same. In the following examples, notice the range of employment techniques but the consistent lethality of the results.

Date	Event
(Ancient times)	The Romans used one of the first recorded acts of biological warfare. Dead animals were used to foul the enemy's water supply. This act produced a two-fold result, weakening enemy numbers and lowering morale.
1300s	The Tartars used the same approach but with more devastating effects. They catapulted bodies infected with Bubonic plague into the city of Kaffa. Some historians believe this single event caused an epidemic that swept across medieval Europe, killing 25 million.
1763	During the French and Indian War, Native Americans greatly outnumbered the British. As an act of kindness, the British gave the Indians blankets, but the blankets were infested with smallpox. Subsequently, smallpox ravaged the Native American population and devastated their numbers.
1945	The Japanese formed Unit 731 for the sole purpose of biological warfare research. In 1931, Unit 731 used Manchurian prisoners of war to further research. In 1941, Unit 731 sprayed bubonic plague over China. At the end of World War II, the United States, offered immunity to members of Unit 731 in exchange for research data on biological warfare. This step, taken at this time, brought the United States into the biological warfare program.

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History of Biological Warfare, Continued

Development, continued

Date	Event
1942	Great Britain, in fear of Germany and Japan having the advantage in biological warfare, stepped up their testing program. Gruinard Island off the coast of Scotland was the site for anthrax bomb testing. Thought to be far enough from the coast to be considered an adequate test site, this assumption proved to be incorrect. In 1943, sheep and cattle died from an outbreak of anthrax on the Scottish coast facing the island. The British government deemed the island unsafe and it is uninhabitable to this day
Mid 1943	The United States biological weapons program was at its peak. With the information collected from both Japan and Great Britain along with our own research, the United States was definitely the forerunner in biological technology.
1956	The Soviet Union accused the United States of using biological weapons in Korea. This led them into threatening future use of chemical and biological weapons. At this point, the U.S. program shifted to one of a defensive posture.
1979	An explosion at a Soviet biological weapons plant and the outbreak of anthrax that followed confirmed U.S. suspicion that the Soviets had an extensive biological program.

Note: The Geneva convention of 1925 set standards for biological warfare policies.

History of Chemical Warfare

Development

Chemical warfare, like biological warfare, has been an instrument of destruction that has changed the art of war since man began armed conflict. The use of chemical weapons has caused opposing forces to alter their concepts and theories from conventional doctrine. The list below shows how these agents have been used to pivot the advantage to the user in battle.

Date	Event
1811	Lord Dundonald used smoke from burning coal against the enemies of England.
April 22, 1915	The Germans used 180,000 kg of chlorine gas to open an eight-mile gap in the French line at Ypres. Many consider this event the beginning of chemical warfare. This event forced officials to alter current doctrine to incorporate the field protective mask which will be discussed in study unit 2.
September 1915	A 4-inch mortar containing chemical agents was used in Laos. This represents the first time a projectile was used in chemical warfare.
October 1915	The Germans released 550 tons of chlorine from 25,000 cylinders at Rhiems. This was the largest chemical attack to date.
March 17, 1988	The Iraqis used mustard, nerve, and cyanide agents in Halabja, Turkey to produce over 15,000 casualties.

NBC Threat

Risk

In today's rapidly changing and unstable world, the possibility of an NBC attack is a reality. Not restricted to the standard parameters of war, these attacks can occur anytime and anyplace by a multitude of aggressors. Why does the possibility of an NBC attack pose such a great risk? There are several reasons why these attacks could take place. We can understand the theory and concepts behind this type of warfare if we break the threat concerns into three simple categories:

- Possibility
- Feasibility
- Accessibility

NBC attacks are not limited to the battlefield because terrorists can employ such weapons at any time.

Possibility

NBC attacks are not limited to just our known enemies. Any person or group that has the desire to lash out on behalf of its beliefs could attempt an attack at any given moment. Cults, organized crime groups, drug cartels, racial supremacist groups, religious groups, and **terrorists** are but a small list of the potential aggressors that may seek to carry out such an attack.

Feasibility

Is it possible for one person or a small group of individuals to carry out an NBC attack? The answer is yes! Consider some past events related to NBC warfare. In 1995, the Aum Shin Rikyo (Supreme Truth) launched an attack with Sarin in a Tokyo subway killing 14. That is just one example that gives validity to the fact that NBC warfare against non-combatants is highly possible and feasible.

Accessibility

Increasing NBC proliferation, evolving technology, and the Internet are making it easier to gain access to the material necessary to conduct NBC operations. In today's world of advanced communications it is relatively simple to collect, process, and distribute required information. All this allows aggressors to manipulate the system to their advantage with a degree of secrecy that is very difficult to detect. The fact that an individual can receive a potentially deadly agent via the mail must force us to act on the defensive side of NBC at all times.

Threat Briefs

Purpose

The intent of an NBC threat brief is to inform units and commanders of the potential NBC threat they could encounter. Primarily published by the Office of Naval Intelligence, a threat brief includes weapons, capabilities, and personnel. A threat brief is used to inform deployed units, conduct contingency planning, and to aid in crisis management situations.

Security Classification Designations

A threat brief is updated continually and has one of the security classification designations shown below.

Designation	Seriousness of the threat
Top Secret	Can cause **grave damage** to the country
Secret	Can cause **serious damage** to the country
Confidential	(Lowest level) **no damage** expected from the threat

Categories

A threat brief contains two categories:

- **Threat Policy--**What is the enemy intent? Will they use a weapon of mass destruction (WMD)? Have they used a WMD in the past?

- **Delivery System--**If a WMD is used, how do we expect the enemy to deliver it? Can they deliver it from the air or sea? Do they have long range capabilities?

Lesson 1 Exercise

Directions Complete exercise items 1 through 10 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 Where was a nuclear weapon first used in an act of war?

a. Guadalajara
b. Hiroshima
c. Gruinard
d. Nagasaki

Item 2 What was the first recorded use of biological warfare?

a. Infected bodies being catapulted into sieged cities.
b. Infested blankets being given to the enemy.
c. Infected animals being used to contaminate enemy water.
d. Agents being catapulted onto enemy ships.

Item 3 What treaty set standards for biological warfare policies?

a. Biological Warfare Convention
b. Geneva Convention
c. Fair and Humane Treatment Convention
d. Laws of War Convention

Item 4 What event brought the United States into a full biological warfare program?

a. United States contact with members of Unit 731 at the end of World War II
b. The end of the Korean War
c. Outbreak of anthrax at a Soviet biological plant
d. Soviet Union accuses the United States of testing biological warfare in Korea

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Item 5

Where was the largest chemical warfare strike in history?

a. Halabja
b. Gruinard
c. Ypres
d. Rhiems

Item 6

What single event forced warfighting doctrine to incorporate chemical warfare defense?

a. Formation of Unit 731
b. Attack at Ypres
c. The Stokes Mortar
d. Geneva Convention

Item 7

Why is an NBC attack towards the United States always possible?

a. Many countries are NBC capable.
b. Terrorists can use NBC any time.
c. Most countries are not afraid to use NBC.
d. NATO policy allows the use of NBC weapons.

Item 8

Identify the categories of an NBC threat brief.

a. Threat and policy
b. Threat, policy, and capabilities
c. Threat policy and delivery system
d. Threat policy, capabilities, and delivery systems

Continued on next page

Item 9

The purpose of an NBC threat brief is to

a. track terrorist movement.
b. allow the Office of Naval Intelligence to predict attacks.
c. inform units and commanders of potential NBC threats.
d. inform NATO who has NBC capabilities.

Item 10

Which level of security classification designation for an NBC brief is considered to be the lowest?

a. Secret
b. Top Secret
c. Classified
d. Confidential

Continued on next page

Solutions

The table below lists the solutions to the exercise items. If you have any questions about these items, refer to the reference page.

Item Number	Answer	Reference Page
1	b	1-6
2	c	1-7
3	b	1-8
4	a	1-7
5	d	1-9
6	b	1-9
7	b	1-10
8	c	1-11
9	c	1-11
10	d	1-11

Summary

In this lesson, you learned about the history of NBC warfare, the potential NBC threat, and NBC briefs.

In the next lesson, you will learn about the various NBC policies involving the use of NBC weapons.

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LESSON 2

UNITED STATES POLICIES ON NUCLEAR, BIOLOGICAL, AND CHEMICAL WARFARE

Introduction

Lesson Focus

As a world super power and military leader, the United States is expected by allied nations to set the standard in the morality of warfare. This expectation does not stop with traditional battlefield concepts but continues with standards on nuclear, biological, and chemical (NBC) policies.

Content

This lesson provides you with important information on the position the United States takes on each aspect of NBC warfare. The lesson also includes the specific U.S. policies to regulate the use of NBC weapons.

Learning Objectives

At the end of this lesson, you will be able to

- Identify United States policy on the use of nuclear weapons.
- Identify United States policy on the use of biological weapons.
- Identify United States policy on the use of chemical weapons.
- Identify United States policy on the use of non-lethal weapons.

In This Lesson

This lesson contains the following topics.

United States Policy on Nuclear Weapons

Use of Nuclear Weapons

Current U.S. policy on nuclear weapons use is that we may use them at the lowest degree necessary to terminate a war or other hostilities against us. This policy allows pre-emptive strikes, which means we can use nuclear weapons first. Any nation attacking the United States assumes the risk of facing countermeasures incorporating nuclear weapons. When engaged with numerically superior enemy forces we have the option to strike with nuclear weapons. Presidential authority must be granted before U.S. military commanders can employ any type of nuclear weapon.

United States Policies on Biological and Chemical Weapons

Biological and Chemical Weapons Use

The U.S. policy on biological and chemical weapons is that we will never use them under any circumstances. On April 10, 1972, the United States attended the Convention on the Prohibition of the Development, Production, and Stockpiling of Bacteriological and Toxin Weapons and their Destruction. The articles generated from this convention augmented the then-existing policy created by the Geneva Convention of 1925. In short, these two policies prohibit the use of asphyxiating, poisonous, or other gases as well as the use of bacterial methods of warfare.

Applicable Protocol

Before the ratification of the 1972 protocol, U.S. policy on chemical warfare was one of "retaliation in kind." This means, for example, we had the option to use nerve agent if it were used on us first. Enemy use of biological or toxic agents against the United States would be considered a breach of the 1972 Biological Weapons Convention and the 1925 Geneva Protocol. Current U.S. policy retains the option to retaliate to such an attack with the use of nuclear weapons.

United States Policy on Non-Lethal Weapons

Riot Control and Herbicide Agents

The United States and our NATO allies do not consider herbicides and riot control agents to be "chemical agents." United States policy dictates we will not use these agents as a primary weapon in war except under the following circumstances:

- Riot control situations under direct United States control such as the handling of rioting prisoners of war.
- Situations in which non-combatants are used by enemy forces to shield attacks and the use of riot control agents would reduce civilian casualties.
- Operations involving the need to make large areas of the battlefield uninhabitable.
- Rescue missions in remote or isolated areas.
- Security operations involving the protection or recovery of sensitive material or nuclear weapons.
- Rear echelon security to protect convoys, medical facilities, and other secondary assets from terrorists, civil insurrection, and other paramilitary groups.
- In domestic situations such as prison riots and hostage rescues.
- Herbicides may be used to control vegetation within military installations and their immediate perimeter in times of war.
- The President must issue the authority to use riot control agents or herbicides in times of war.
- For training purposes.

Lesson 2 Exercise

Directions

Complete exercise items 1 through 4 by performing the action required. Check your answers against those listed at the end of this lesson.

Items 1 Through 4

Matching: For items 1 through 4, match the policy in column 1 with its description in column 2. The descriptions in column 2 may be used more than once.

Column 1		**Column 2**	
Policy		**Description**	
___ 1.	U.S. policy on herbicides and riot control agents	a.	We have the right to use this type of agent or warfare to end acts of aggression towards the United States
___ 2.	U.S. policy on chemical warfare	b.	This type of agent or warfare will never be used.
___ 3.	U.S. policy on nuclear warfare	c.	This type of agent or warfare may be used to ensure rear area security.
___ 4.	U.S. policy on biological warfare		

Continued on next page

Solutions

The table below lists the solutions to the exercise items. If you have any questions about these items, refer to the reference page.

Item Number	Answer	Reference
1	c	1-20
2	b	1-19
3	a	1-18
4	b	1-19

Study Unit 1 Summary

In this study unit, you learned significant and important events in the history of NBC warfare, the NBC threat, and threat briefs. You also learned the U.S. policies on the use of nuclear, biological, and chemical weapons. This study unit has given you an overview of why NBC defense training is important.

Wrap Up

In the next study unit, you will learn about individual protection equipment and how it will help protect you on the NBC battlefield.

STUDY UNIT 2

INDIVIDUAL PROTECTIVE EQUIPMENT

Overview

Focus

Your primary means of protection from an NBC attack is your ability to use your individual protective equipment effectively. NBC warfare can not only produce immediate casualties, but can also hinder personal and unit capabilities. Individual protective equipment can protect you from the initial attack and help sustain unit performance by reducing the spread of contamination.

Scope

This study unit covers various types of personal protective equipment, methods for employment, serviceability standards, and maintenance procedures.

In This Study Unit

This study unit contains the following lessons.

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LESSON 1

M40 FIELD PROTECTIVE MASK

Introduction

Lesson Focus

The M40 Field Protective Mask is without a doubt the most important piece of gear that you can have on the NBC battlefield for self-preservation. It is essential that you understand what the mask can and cannot do. You must also be able to identify the various components of the mask.

Content

This lesson provides instruction on using the individual components of the mask. It also explains how the parts work together as a whole.

Learning Objectives

At the end of this lesson, you should be able to

- Describe the capabilities and characteristics of the M40.
- Identify the features, components, and accessories of the M40.
- Identify the external, internal, and additional nomenclature of the M40.

In This Lesson

This lesson contains the following topics.

M40 Description

Capabilities

The M40 field protective mask is designed to protect your face, mouth, nose, eyes, and respiratory tract from chemical and biological agents. It will also help protect you from certain types of radioactive fallout. On the other hand, the mask does not create oxygen; therefore, it will not protect you in an oxygen restricted or confined area. Similarly, you must not depend on it to protect you from all of the toxic chemicals a fire produces. This means that if you use the mask during a fire aboard ship it may not help you. The mask will not protect you from ammonia, carbon monoxide, and other volatile toxic substances. However, the mask is still a versatile piece of equipment. It can operate in any type of climate and will accommodate a right or left-handed shooter.

Characteristics

The M40 is a lightweight piece of gear made from a silicone rubber base with an inturned sealing surface that allows it to form an airtight seal on your face. It contains both clear and neutral gray eyelens outserts. The canister-type filter can be quickly and easily installed. The entire system is designed to be carried and stored in the mask carrier.

Categories

Many separate items make up the M40 Field Protective Mask. To help you understand how these parts function together, they are grouped into three main categories.

Category	Definition
Component	A component is an item that is vital to the functioning of the mask. If all of the components are not serviceable and assembled properly, the mask will not protect you.
Accessory	Accessories are items that enhance the operation and the degree of comfort you experience while wearing the mask. In most cases, these items are not required for the mask to function.
Feature	Features are benefits of the mask. They have been incorporated into the design to make the mask more effective and versatile.

Continued on next page

M40 Description, Continued

Breakdown

The table below lists the various items of the mask as accessories, components, and features.

Accessory	Component	Feature
Mask carrier	Facepiece	Quick release canister
Faceform	Head harness	Optical inserts
Waterproof bag	Outlet valve disk	Voicemitter
Eyelens outserts	External drink tube	Drinking ability
Hood	Canister	Left or right-handed shooter accommodation
Inlet valve disk	Eyelenses	
Nosecup valve disk		
Nosecup assembly		
Outlet valve cover		
Internal drink tube		
Airflow deflector		

M40 External Nomenclature

Nomenclature

It is important that you understand the location and function of each item or part of the M40. This knowledge will enable you to troubleshoot your mask if it malfunctions and will also help when you perform your serviceability checks.

Facepiece

The facepiece is made of a silicone and butyl rubber material. It is designed to form an airtight seal around the user's face. It also provides a solid base for attaching items such as the canister, lenses, and drink tube.

Canister

The canister filters out chemical and biological agents from contaminated air. Once filtered, the clean air enters the mask and is ready to be used by the body. The canister is removed by turning it counterclockwise.

Continued on next page

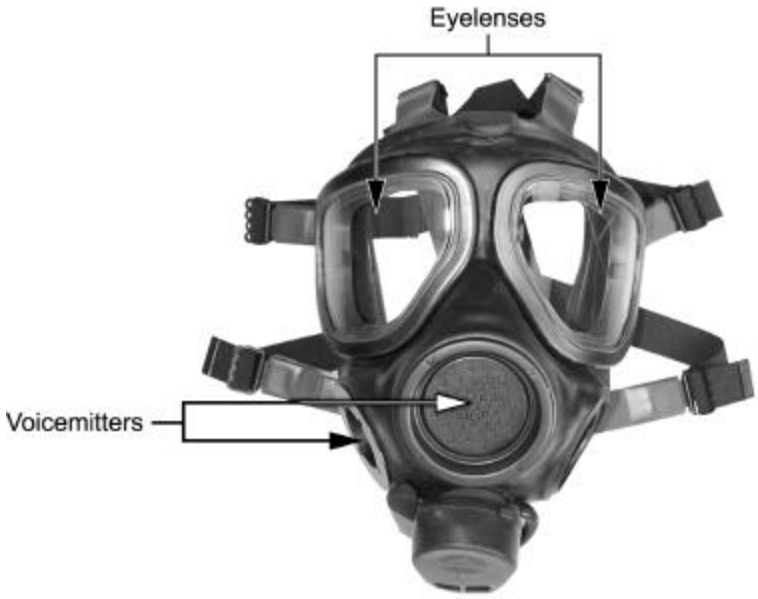
M40 External Nomenclature, Continued

Voicemitters

Both the side and front voicemitters intensify and project sound from the inside of the mask to the outside. The side voicemitter enables the wearer to operate field phones while masked.

Eyelenses

The eyelenses enable the user to have a clear field of vision while still providing protection from contamination.



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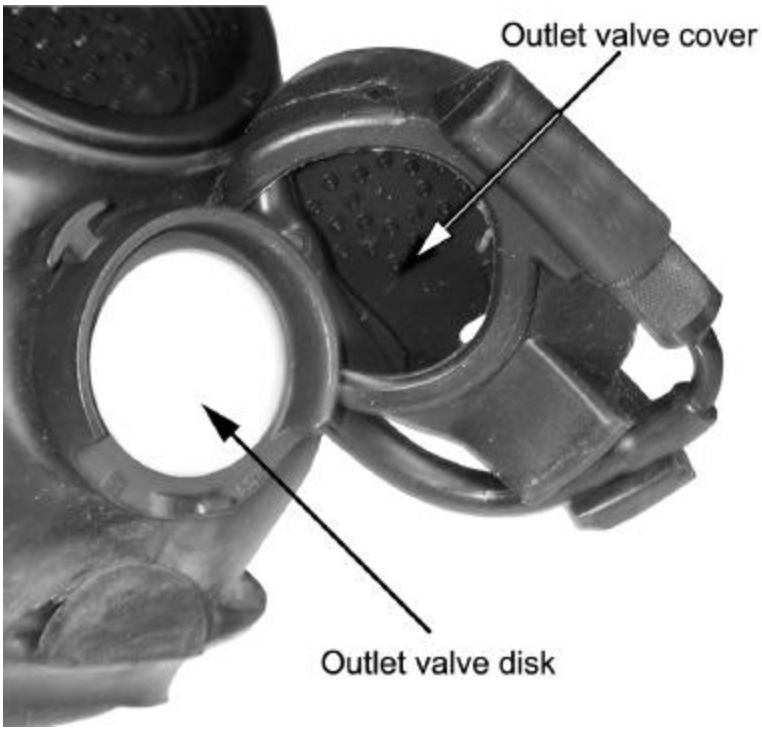
M40 External Nomenclature, Continued

Outlet Valve Cover

The outlet valve cover provides a storage area for the external drink tube and coupling when it is not in use. The primary purpose of the cover is to provide protection to the outlet valve disk located directly underneath.

Outlet Valve Disk

The outlet valve disk is designed to allow one-way airflow. When you exhale, the disk opens to release air from the inside of the mask. When you inhale, the disk automatically forms an airtight seal forcing air to enter the mask through the canister where it is filtered.



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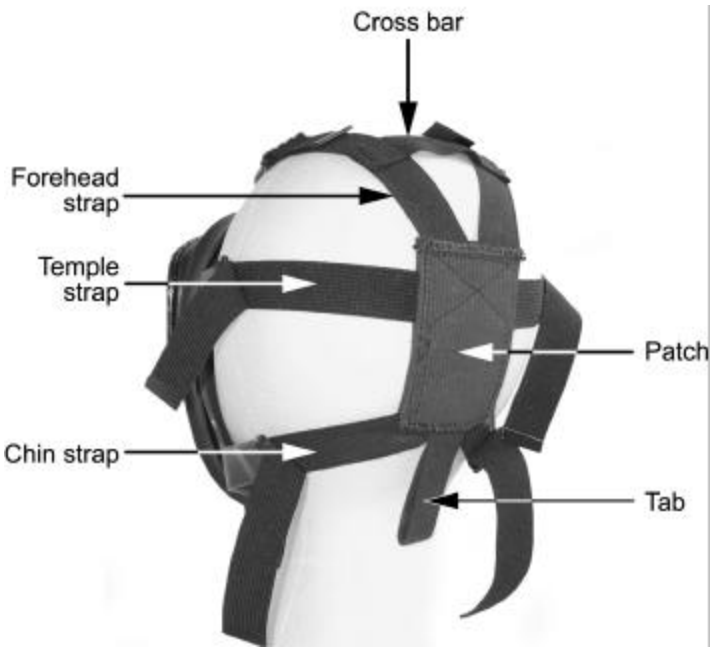
M40 External Nomenclature, Continued

Head Harness

The head harness keeps the mask on the head and in place so that the mask does not lose the airtight seal once it is formed. Clip and buckle assemblies attach the harness to the mask. When attached, the crossbar should be towards the top of the mask and the tab at the bottom. The harness has six elastic straps that start from the patch and go outboard and attach to the mask. The top two straps are called the forehead straps, the middle two are the temple straps, and the bottom two are called the chin straps.



M40 Internal Nomenclature

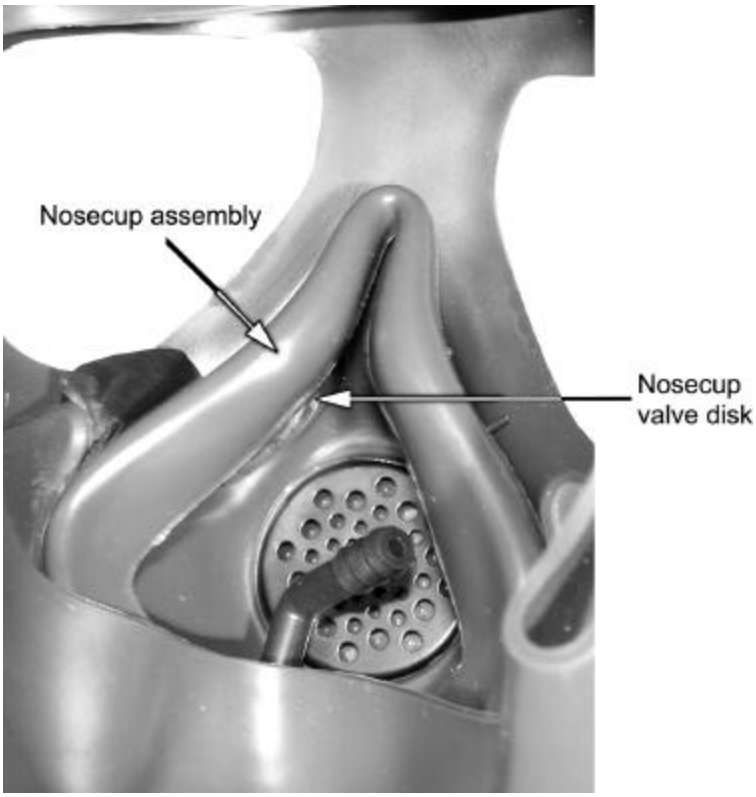
Nosecup Assembly

The nosecup assembly is used to house the nosecup disks. It also provides a containment area to hold air exhaled from the nose.

Nosecup Valve Disk

These disks are designed to prevent the air exhaled from the nose from fogging the inside of the lenses. They are located in the nosecup valve seat.

Diagram



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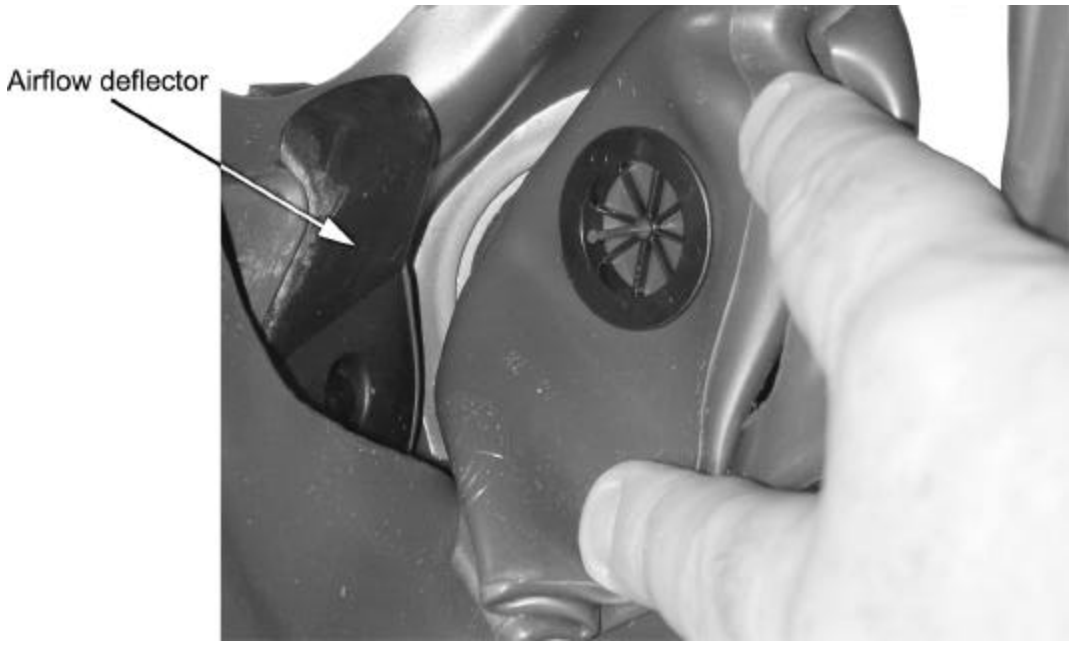
M40 Internal Nomenclature, Continued

Airflow Deflector

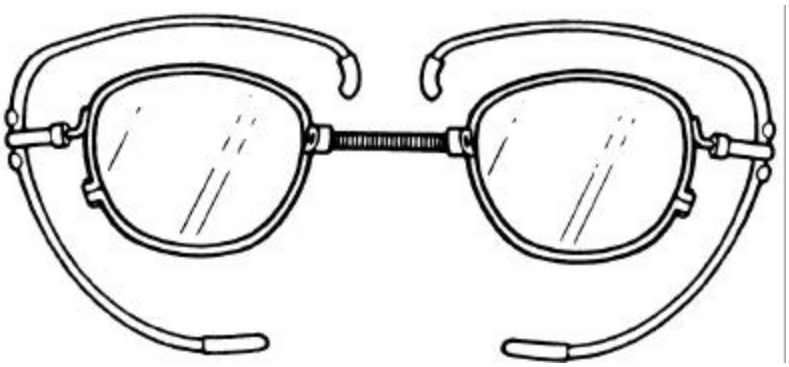
The airflow deflector is used to direct inhaled air over the eyelenses to prevent fogging. The airflow deflector attaches to the airflow deflector flange.



M40 Additional Item Nomenclature

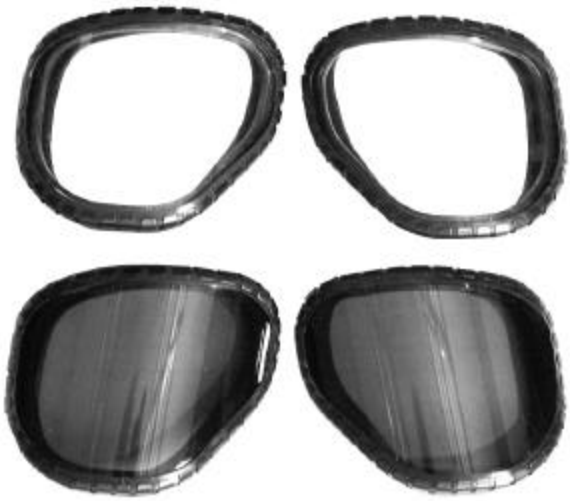
Optical Inserts

Optical inserts are corrective lenses used inside the mask. They take the place of contact lenses and traditional glasses. Contact lenses could cause permanent damage if worn during CS gas training. Traditional glasses prevent the mask from sealing correctly.



Eyelens Outserts

The eyelens outserts provide an additional layer of protection for the mask. The tinted or shaded lenses are used for bright light conditions.



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M40 Additional Item Nomenclature, Continued

Hood

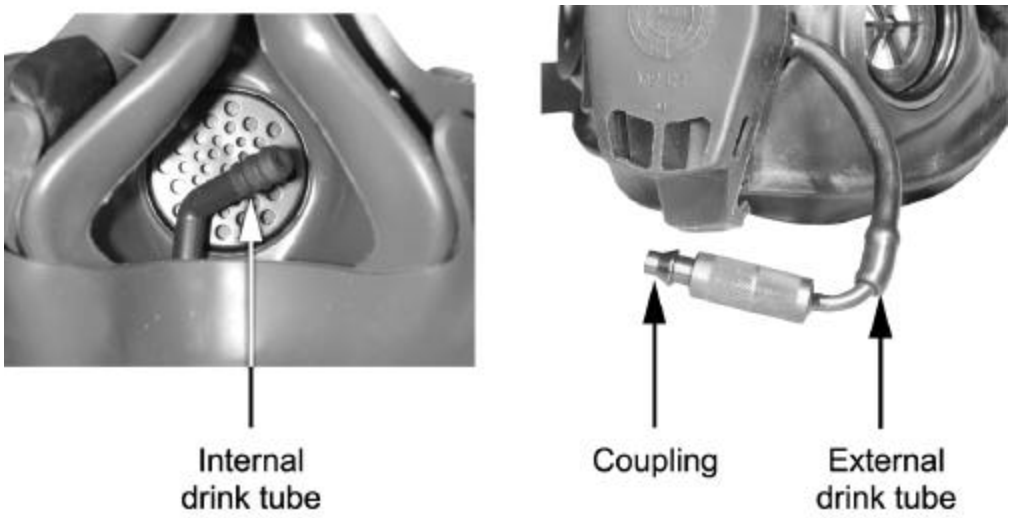
The hood protects the head, scalp, and neck from liquid contamination. The hood also provides positive pressure around the outlet valve disk. When the temperature is above 32 degrees Fahrenheit, the hood should cover the lower portion of the outlet valve cover to maintain positive pressure. When the temperature is below 32 degrees Fahrenheit, the hood should fall lower than the outlet valve cover to prevent moisture from wetting inner clothing.

Continued on next page

M40 Additional Item Nomenclature, Continued

Drink Tubes

The drink tubes allow the user to drink water while in a contaminated environment without risking exposure to agents. The drinking system is composed of the internal drink tube and the external drink tube with an attached quick disconnect coupling that safely connects to, and quickly disconnects from, the M1 canteen cap.



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M40 Additional Item Nomenclature, Continued

Mask Carrier

The mask carrier is designed to transport and protect the mask. It is also used to store additional gear used with the mask. Knowing the names of the parts of the mask carrier will help you understand the directions for properly transporting the carrier.

Diagram

Waterproof Bag

The waterproof bag prevents the mask and filter from becoming wet.

Lesson 1 Exercise

Directions

Complete items 1 through 13 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1

Select the statement that best describes the characteristics of the M40.

a. Lightweight, silicone rubber based, quick replace canister, and individually transported
b. Lightweight, natural rubber based, quick replace canister, and individually transported, oxygen producing
c. Lightweight, silicone rubber based, quick replace lenses, and individually transported
d. Lightweight, natural rubber based, quick replace lenses, and individually transported

Item 2

Select the statement that best describes the capabilities of the M40. The M40 protects the

a. eyes, face, and lungs from chemical agents.
b. eyes, face, ears, and lungs from chemical agents, and can accommodate a left or right shooter.
c. eyes, face, and lungs from chemical agents only, and can accommodate a left or right shooter.
d. eyes, face, and lungs from chemical and biological agents, and can accommodate a left or right shooter.

Items 3 through Item 9

Matching: For items 3 through 9, match the item in column 1 with its description in column 2. The descriptions in column 2 may be used more than once.

Column 1	**Column 2**
Item	**Description**
___3. Eyelens	a. Component
___4. Canister	b. Accessory
___5. Mask carrier	c. Feature
___6. Hood	
___7. Drinking ability	
___8. Head harness	
___9. Waterproof bag	

Continued on next page

Item 10 What part of the mask maintains the airtight seal around the face?

a. Lenses
b. Hood
c. Outlet valve disk
d. Facepiece

Item 11 What part of the mask ensures a one-way airflow?

a. Outlet valve disk
b. Facepiece
c. Canister
d. Hood

Item 12 What part of the mask holds it to your face?

a. Facepiece
b. Head harness
c. Temple straps
d. Hood

Item 13 What part of the drinking system connects to the M1 cap?

a. Internal drink tube
b. Quick disconnect coupling
c. External drink tube
d. Quick insert coupling

Continued on next page

Solutions

The table below lists the solutions to the exercise items. If you have any questions about these items, refer to the reference page.

Item Number	Answer	Reference
1	a	2-4
2	d	2-4
3	a	2-5
4	a	2-5
5	b	2-5
6	b	2-5
7	c	2-5
8	a	2-5
9	b	2-5
10	d	2-6
11	a	2-8
12	b	2-9
13	b	2-14

Summary

In this lesson, you learned the capabilities, characteristics, and nomenclature of the M40 Field Protective Mask.

In the next lesson, you will learn the serviceability and maintenance standards of the M40.

LESSON 2

M40 FIELD PROTECTIVE MASK SERVICEABILITY AND MAINTENANCE STANDARDS

Introduction

Lesson Focus

The M40 Field Protective Mask must be completely serviceable to provide the maximum protection to the user. It is important to understand how to inspect the mask properly because even a pinhole could cause the mask to malfunction in a contaminated environment. Knowing how to care for, clean, and store the mask will help ensure it is mission-ready at all times.

Content

This lesson contains information about the mask and procedures that can be used to check the M40 for serviceability, and how to properly clean, sanitize, and carry the mask.

Learning Objectives

At the end of this lesson, you will be able to

- Check the M40 for serviceability.
- Identify the procedures for cleaning the M40.
- List the three methods by which the mask carrier can be worn.
- Identify the procedures for storing the mask.

In This Lesson

This lesson contains the following topics.

M40 Serviceability

Mission-Ready

Your M40 must be serviceable at all times. Every time you receive a mask, you must perform a serviceability check. This check should take place at the point of issue so that your unit NBC specialist can replace the mask or parts or repair any discrepancies. At the time of inspection, NBC personnel can switch canister sides if necessary and ensure you have the correct size mask. The primary purpose of the serviceability check is to ensure that the mask can maintain an airtight seal.

Facepiece

Inspect the facepiece for rips, cuts, tears, holes, punctures, or any other damage that can allow a foreign substance inside. Inspect the mask from top to bottom, inside and out. Holding the mask to a bright light will aid in the check. Look for dirt, mud, sand, sticky spots, or any other obstruction that could prohibit the facepiece from obtaining an airtight seal around your face.

Eyelenses, Outserts, and Inserts

Ensure the outserts have been removed from the eyelenses. Check the eyelenses for cracks, chips, and breaks. Check the metal ring around the lenses for dents, breaks, and corrosion. Inspect both sets of outserts in the same manner to include the rubber rings for rips, cuts, dryrot, and sticky spots. All lens material should be free of cuts, scratches, discoloration, or anything that can hinder vision while wearing the mask. If you are required to wear optical inserts with the mask, they should fit properly, be free of breaks, and provide a clear field of vision.

Voicemitters

Check both the side and front voicemitters for corrosion, dents, cracks, and chips. The retaining rings should be hand tight and the four beads in the center of the voicemitter should face outboard. This is done to ensure it is assembled correctly.

Continued on next page

M40 Serviceability, Continued

Drink Tubes	The internal and external drink tubes should be free of rips, cuts, tears, and holes. The internal tube should be in proper alignment so that it may be grasped by the teeth while wearing the mask. The metal coupling attached to the external tube should have no dents or cracks and should fit into the M1 canteen cap with slight pressure. The entire system should be free of clogs and obstructions. To check the drinking system, put the mask on, insert the coupling into the M1 cap, and blow air through the system. When not in use, the external drink tube is stored in the protective pouch on the outlet valve cover.
Outlet Valve Cover	Grasp the outlet valve cover by the tab and gently pull up to remove. The cover should not be ripped, cut, or torn. Inspect inside the cover for moisture and dirt.
Outlet Valve Disk	Remove the outlet valve cover to inspect the outlet valve disk. Inspect the disk for rips, cuts, tears, holes, and dryrot. Give careful attention to inspection under or behind the disk. This area should be free of dirt, grime, sand, or any other obstruction that would keep the disk from sealing tight. The disk should lie flat and rotate without sticking.
Canister	The canister should not be dented, smashed, corroded, or crushed. Pay particular attention to the threads, ensuring they are not stripped or cross-threaded. Shake the canister and listen for loose material on the inside. You should not see dust or particles falling out of the canister. The canister should not be clogged or waterlogged.
Head Harness	Inspect the head harness for cuts, tears, mildew, and fraying. The harness should have full elasticity. Inspect the buckles attached to the mask. The metal tips of the harness should pass freely through the clip and buckle assembly on the mask.

Continued on next page

M40 Serviceability, Continued

Hood	The hood must be removed from the mask for proper inspection. The hood should be inspected for rips, cuts, tears, and holes. The zipper should be in full working condition. All straps, cords, and fasteners should be operable. The protective coating on the outside of the hood should not be worn or peeling. The entire surface area should be clean from dirt and sticky material.
Nosecup Assembly	The nosecup assembly should be free of dirt and have no rips, cuts, or tears. Ensure the assembly is seated firmly against the backside of the voicemitter. Do this by grasping the nosecup assembly and gently pulling. The nosecup assembly should not move from the housing.
Nosecup Valve Disk	The nosecup valve disks should be seated on the inside of the nosecup. They should not be ripped, torn, or cut. Both disks should lie flat and rotate freely. A crumpled or sticky disk is unserviceable.
Airflow Deflector	The airflow deflector must be mounted securely on the inside facepiece. The flanges must be intact and there must be no rips or tears in the mounting holes.
Mask Carrier	Empty the carrier and check the inside for dirt, sharp edges, or any abrasive material that might damage the inside of the mask. Inspect all seams, straps, and fasteners. The entire carrier should be checked for mildew, solvents, and dryrot.
Waterproof Bag	Inspect the waterproof bag for rips, cuts, tears, holes, and brittleness. The enclosed rubber bands should not be sticky, broken, or brittle.

M40 Maintenance

Care

The M40 field protective mask is a very durable piece of gear, but don't overlook the fact that it can be broken or damaged. Store and transport the mask with care to ensure it functions correctly when needed. The list below will point out things you should and should not do.

- Store only the mask and authorized accessories in the carrier. Chow, tobacco products, pens, markers, and maps are not authorized materials.
- Use only authorized cleaning material on the mask, mask carrier, and accessories. DS2, CLP, Simple Green, brake cleaner, pine oil, and similar fluids are not acceptable.
- You should never use a mask that has not been cleaned first.
- Do not use any type of artificial heat to dry the mask. Clothes dryers, hair dryers, ovens, and microwaves will damage the mask.
- During embarkation do not store the mask at the bottom of sea bags, footlockers, or storage containers.
- Do not use the mask and carrier as a pillow or a seat cushion.
- Do not allow food to come in contact with the waterproof bag. The food may pick up toxic chemicals.
- Check the mask for serviceability after embarkation.
- Check the mask for serviceability after every training exercise.
- Clean the mask after every use and CS training exercise.
- Have qualified NBC personnel switch canister sides and make repairs.
- You should have qualified NBC personnel determine correct mask size.
- Remove the mask from the waterproof bag as soon as possible.

Continued on next page

Authorized Cleaning Gear

Non-medicated soap, potable water, and isopropyl rubbing alcohol are the only authorized cleaning materials that may be used on the mask. A lens cleaning brush, scrub brush, cheesecloth, and plastic polish are the only additional items needed to clean the mask properly. Following the steps outlined in this section will ensure you have a properly maintained mask.

Cleaning

Thorough cleaning of the mask is imperative for proper functioning. For sanitary reasons, the mask should be cleaned at the time of issue. Following the steps outlined in this section will ensure you have a properly maintained mask.

Step	Action
1	Turn the canister counterclockwise to remove it from the facepiece. Clean around the two mating surfaces and the canister itself. Do not use water around the canister.
2	Lift the rubber ring around the outsert up from the eyelens. Clean the outserts and lenses with plastic polish. Repeat this step for the other side.
3	Remove the hood from the mask. Clean the hood with a brush and soapy water and dry with cheesecloth.
4	Pull the quick disconnect coupling out of its protective pocket and remove the outlet valve cover.
5	Clean the inside and outside of the facepiece with warm soapy water and cheesecloth. A brush may be used to remove dirt and sand. Alcohol can be used to remove greasy and oily spots. Ensure all parts are dry before stowing.
6	Remove all dirt and foreign matter from around and under the outlet valve disk. A lens brush can be used to accomplish this task.
7	Empty carrier of contents and shake to remove dirt and dust. A wet brush may be used to clean carrier.
8	Ensure all parts are dry before you reassemble the mask.

M40 Mask Carrier

Storage

The mask carrier safeguards and transports the M40. Proper storage of the mask will aid in maintenance procedures by minimizing damage and keeping the mask clean. The carrier also holds additional items used during NBC operations. These items will be discussed in greater detail in Study Unit 3. This section will show you where the items are placed in the carrier.

- **M8 Chemical Detector Paper**--Stored in one of the inside pockets of the carrier with the waterproof bag.
- **M291 Decontamination Kit**--Stored in the large pocket on the outside of the carrier.
- **M1 Waterproof Bag**--Stored in one of the inside pockets of the carrier with the detector paper.
- **Eyelens Outserts**--Stored in one of the inside pockets of the carrier.

Methods to Wear the Carrier

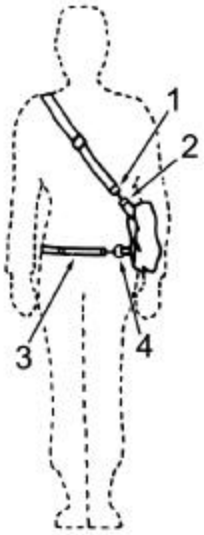
You are authorized to wear the mask carrier in one of three ways: the shoulder carry, leg carry, and pistol belt carry. To understand how the carrier is placed on the body, it is necessary to know the various items that make up the carrier.

Continued on next page

M40 Mask Carrier, Continued

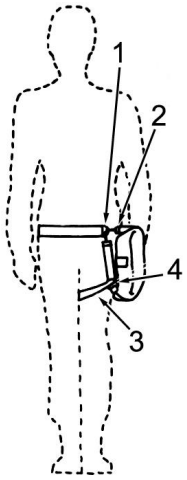
Shoulder Carry

Attach shoulder strap D-ring (1) to the short strap hook (2) on the carrier and adjust. Hook the waist strap (3) to the round ring (4) and adjust.



Leg Carry

Put shoulder strap D-ring (1) around waist and attach it to the short strap hook (2) on the carrier. Bring the waist strap (3) from the backside between the legs. Pass this strap through the round ring (4) and attach it to the shoulder strap D-ring (1). Adjust all straps to a tight fit.



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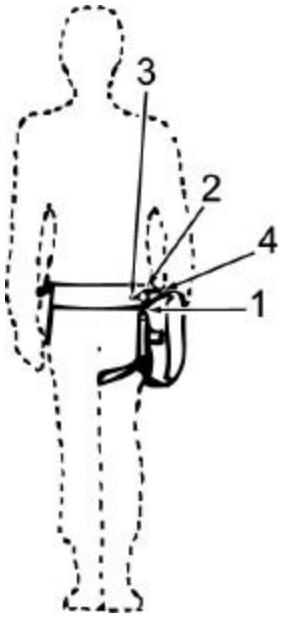
M40 Mask Carrier, Continued

Pistol Belt Carry

Fold the shoulder strap D-ring (1) and tuck it into the waist strap pocket that is located beneath the identification plate of the carrier. Bring the waist strap (3) from the backside between the legs. Pass this strap through the round ring (4) and attach it to the short strap (2). Attach the short strap hook and short adjustable strap hook into the holes on the left side of the pistol belt.



Stowage of the Mask

Place the mask in the carrier to allow for quick and easy use. Roll up the hood away from the head harness. The bottom two straps should be loose enough to pass over the head. The mask should sit in the carrier straight up with the lenses facing outboard.

Lesson 2 Exercise

Directions Complete items 1 through 4 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 The primary purpose of the serviceability check is to ensure the mask

a. has all required parts.
b. maintains an airtight seal.
c. is the correct size.
d. has the canister on the correct side.

Item 2 The authorized cleaning materials for the M40 are

a. non-medicated soap, potable water, and isopropyl alcohol
b. CLP, alcohol, and plastic polish.
c. plastic polish, soapy water, and oil.
d. plastic polish, oil, and CLP.

Item 3 The authorized methods used to wear the mask carrier are

a. shoulder carry, leg carry, and pistol belt carry.
b. shoulder carry, hip carry, and pistol belt carry.
c. belt carry, hip carry, and back carry.
d. hip carry, leg carry, and back carry.

Item 4 The additional items to be stored in the mask carrier are outserts, M8 chemical detector paper, and

a. rifle cleaning gear.
b. M8 waterproof bag.
c. M258A1 detection kit.
d. M291 decontamination kit.

Continued on next page

Solutions

The table below lists the solutions to the exercise items. If you have any questions about these items, refer to the reference page.

Item Number	Answer	Reference
1	b	2-20
2	a	2-24
3	a	2-25
4	d	2-25

Summary

In this lesson, you learned how to check the mask for serviceability, the proper maintenance procedures for the mask, the authorized methods to wear the mask carrier, and how to correctly store the mask.

In the next lesson, you will learn how to properly use the M40 Field Protective Mask.

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LESSON 3

M40 FIELD PROTECTIVE MASK OPERATIONS

Introduction

Lesson Focus

Having a clean and serviceable mask is important, but it's just as important to have a mask that fits properly. You also must be able to use the mask proficiently within a certain time frame.

Content

This lesson contains the knowledge and techniques that you need to fit your mask, use the mask, and drink while in a contaminated environment.

Learning Objectives

At the end of this lesson, you will be able to

- Identify the proper way to fit the mask to your head.
- Identify the commands and terms associated with the M40 mask.
- Identify the proper masking sequence for the M40 mask.
- Identify the proper way to use the drinking system of the M40 mask.

In This Lesson

This lesson contains the following topics.

The Mask

Proper Fit

It is essential that your mask fit securely on your head without being overly tight. If the mask is too tight on the head it will not function properly. A tight mask will cause the facepiece to buckle at various points and leak. After a short period of time a tight mask will give the user a headache which will get worse the longer the mask is worn.

- The mask should be centered left to right and up and down on the face.
- The eyes should be centered in the lenses.
- The patch in the middle of the harness should be centered in the back of your head.

Procedures

Following the procedures below will help ensure the mask fits properly.

Step	Action
1	Ensure you have a clean and serviceable mask.
2	Loosen all six straps of the head harness.
3	Insert your chin into the mask and pull the harness over your head.
4	With your left hand, grasp the facepiece and center the mask on your head.
5	With your right hand, tighten the two forehead straps. Tighten the straps one at a time by giving them two or three quick and short tugs. You may switch hands as long as one hand holds the mask.
6	Repeat step 5 for the temple and chin straps. Note**:** The patch in the back of the head harness must be centered on the back of the head. Do not pull each strap as tight as it will go. Tighten the straps evenly and equally all the way around the mask. You may repeat the entire procedure if necessary. The temple straps should be above the ears and the chin straps below the ears.

Check

If you have a properly fitted and serviceable mask it will have an airtight seal. You can check this by covering the inlet port located in the center of the canister with the palm of your hand and by breathing in. At this point the mask will collapse around your face. When you take the mask off you only need to loosen the bottom or chin straps.

Using the Mask

NBC Commands

The universal individual alarm to put on the mask is **"GAS-GAS-GAS",** repeated three times. To give this alarm, extend your arms straight out to the side; hands made into a fist. As you say the word gas, bend your arms at the elbows, place your fists to the ears, and repeat the word gas three times. The command to take the mask off is **"ALL CLEAR-UNMASK."** The individual training standard for donning, clearing, and sealing the mask is 9 seconds. An additional 6 seconds is given to secure the hood in place.

Continued on next page

Donning

The act or procedure of getting the mask from the carrier onto your head or face is called donning. Two primary steps are contained in this procedure: clearing and sealing. When you initially put the mask on you may have contaminated air trapped inside the mask. You must clear this air from the mask. You must then create an airtight seal. Following the steps outlined below will help ensure you don, clear, and seal the mask properly.

Step	Action
1	Upon receiving the command or detecting the presence of contamination, stop breathing, close your mouth and eyes. **Do not breathe until the mask is on your face.**
2	**Donning**- With your left hand open the carrier and with the right hand remove the mask. If you have a weapon and helmet, place the weapon between your legs, helmet on the weapon, and continue.
3	**Clearing the mask**- Put your chin in the mask and hold it to your face firmly. Place your hand over the outlet valve assembly and exhale sharply. You should feel the air inside the mask being pushed out around the edges of the mask.
4	**Sealing the mask**-With the palm of the free hand, cover the inlet port of the canister and breath in. The facepiece of the mask should collapse around your face. If the mask fails to collapse check for obstructions such as hair or clothing between the skin and facepiece.
5	Pull the head harness over the head into the correct position.
6	With the mask held firmly in place, tighten the two chin straps. The temple and forehead straps do not need to be adjusted. The patch should be centered, and all straps flat against the skin.
7	Clear the facepiece again and check for leaks. If necessary, you may adjust, clear, and seal until the mask functions properly.
8	Give the alarm and secure the hood into position.

Drinking System

Importance of Hydration

You must stay hydrated on the battlefield and doing so is even more important while using NBC protective equipment. Factors such as climate, workload, mission, and duration of wearing NBC equipment all contribute to the possibility of heat related casualties. The drinking system of the M40 allows you to drink water while in a contaminated environment without risking exposure to contaminants.

Checks

Before attaching the drinking system to the M1 canteen cap you must ensure the two mating surfaces are free of contamination. The two mating surfaces in this case will be the coupling attached to the external drink tube and the top of the M1 canteen cap. The M8 chemical agent detector paper can tell you if contamination is present. If contamination is detected, you can clean the two mating surfaces with the M291 decontamination kit. Check the two surfaces with the M8 paper again to ensure the surfaces are clean. Both the M8 paper and M258A1 kit will be discussed in further detail in Study Unit 3.

Continued on next page

Drinking System, Continued

Procedures for Drinking

Follow the drinking procedures below to ensure you drink safely while wearing the field protective mask.

Step	Action
1	Remove the quick disconnect coupling and external drink tube from the protective pouch of the outlet valve cover. Holding the mask to your face with one hand and removing the coupling with the other ensures the mask does not break its seal.
2	Check the coupling for contamination with M8 paper.
3	Remove your canteen and flip the cover of the M1 cap up. Check the surface of the cap with a separate piece of M8 paper.
4	If both surfaces are clean, insert the coupling into the M1 cap. Push the coupling into the M1 cap so that the pin enters the coupling (be careful not to break the seal of the mask).
5	Push the outlet valve cover in towards your face. This will position the internal drinking tube close to your mouth. Pull the internal drinking tube into your mouth with your teeth.
6	Blow into the canteen to create positive pressure. Raise and invert the canteen to drink water.
7	After several swallows, stop drinking and lower canteen. Blow into the canteen to prevent it from collapsing. Repeat as needed.

Continued on next page

Drinking System, Continued

Disconnecting the System

It is important to disconnect the drinking system properly to avoid the risk of contamination. The steps outlined below will help you do this.

Step	Action
1	Turn the canteen upright
2	Blow into the drinking system. It is important to clear all the water out of the tubes. **Water that is left in the tubes can become stale or stagnate and lead to illness the next time you use the drinking system.**
3	Hold the coupling firmly with one hand and the canteen with the other. The coupling should be held as close to the mask as possible. Pull the canteen down and away from the mask until it releases. **Do not pull on the canteen by itself because this will result in the mask being lifted away from the face**.
4	Check the mask for an airtight seal.
5	Release the internal drink tube from your mouth.
6	Place the coupling back into the protective pouch of the outlet valve cover.
7	Flip the cover down on the M1 cap and stow.

Lesson 3 Exercise

Directions Complete items 1 through 6 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 You know you have a properly fitted and serviceable mask when

a. you can breath freely while wearing the mask.
b. the eyelenses will not fog while wearing the mask.
c. your eyes will be centered in the lenses while wearing the mask.
d. the mask will collapse around your face when the canister is covered.

Item 2 What is the authorized command to put the mask on?

a. Mask, mask, mask
b. All mask, all mask, all mask
c. Gas, gas, gas
d. Unclear, unclear, unclear

Item 3 Select the statement that best describes the masking sequence.

a. Receive alarm, hold breath, close eyes, check mask, don mask, clear, seal, and give alarm.
b. Receive alarm, hold breath, close eyes, check mask, don mask, clear, seal.
c. Receive alarm, stop breathing, close eyes, don mask, clear, seal, and give alarm.
d. Receive alarm, stop breathing, don mask, clear, seal, and give alarm.

Item 4 Select the amount of time in seconds allotted to put the mask on without the hood.

a. 6
b. 9
c. 12
d. 14

Continued on next page

Item 5

What is used to check for contamination on the mating surfaces of the drinking system?

a. M258A1 kit
b. M8 detector paper
c. M256 kit
d. M1 canteen cap

Item 6

Select the sequence that best describes the procedures to drink water while masked.

a. Check mating surfaces, insert quick disconnect coupling into M1 cap, grasp internal drink tube, create positive pressure.
b. Check mating surfaces, remove internal drink tube from protective cover, insert quick disconnect coupling into M1 cap, create positive pressure
c. Grasp internal drink tube, insert quick disconnect coupling into M1 cap, create positive pressure
d. Remove M1 cap and check with M8 or M9, grasp internal drink tube, insert quick disconnect coupling into M1 cap, create positive pressure

Lesson 3 Exercise Solutions

Solutions

The table below lists the solutions to the exercise items. If you have any questions about these items, refer to the reference page.

Item Number	Answer	Reference
1	d	2-32
2	c	2-33
3	c	2-34
4	b	2-33
5	b	2-35
6	a	2-35

Summary

In this lesson, you learned how to properly fit, clear, and seal the mask. You also learned the procedures for drinking water while wearing the field protective mask.

In the next lesson, you will learn about the various items used to protect the rest of your body from contamination.

LESSON 4

PROTECTIVE CLOTHING

Introduction

Lesson Focus

Protecting the rest of your body from chemical and biological agents is just as important as protecting your eyes and respiratory tract. There are many different types of protective clothing or ensembles available for individuals working in contaminated environments. These types vary depending on the type of contamination and the particular situation and mission. Some are designed for basic combat operations while others are used strictly for decontamination operations.

Content

This lesson provides you with the information and techniques to identify the various categories of protective clothing, the components used for protection in contaminated environments, and the characteristics and capabilities of NBC protection.

Learning Objectives

At the end of this lesson, you will be able to

- Identify the different categories of protective clothing.
- Identify the characteristics of protective clothing.
- Identify the capabilities of protective clothing.
- Identify the components that make up a protective ensemble.

In This Lesson

This lesson contains the following topics.

Protective Suits

Categories

Protective clothing falls into one of the categories listed below.

- Permeable--This type of protective clothing allows air and moisture to pass through the fabric. This is the most common type of protective clothing found on the NBC battlefield.

- Impermeable--This type of protective clothing will not allow air and moisture to pass through the fabric. This type of protective clothing would be used in decontamination operations where large amounts of water would be encountered.

Continued on next page

BDO

Battle Dress Overgarment (BDO) is a two piece garment set used for individual protection. It consists of one coat and one pair of trousers that are in a camouflage, woodland, or desert pattern. The BDO is **permeable** and **expendable.**

The jacket has a zipped front and the trousers have a fly front and zipped legs.

The overgarment is designed with two layers. The outer layer is made of a nylon and cotton mix and the inner layer of protection is a charcoal impregnated polyurethane foam.

The charcoal liner may leave charcoal deposits on the skin or undergarments. This does not mean the suit is unserviceable or degraded in protection ability, the deposits will not harm the user when worn.

The BDO is water resistant but not waterproof and is normally worn as an outer garment. The BDO comes in a vapor barrier bag that helps protect it from moisture, sunlight, and other damage.

BDO jacket

BDO trousers

Continued on next page

CPOG

The Chemical Protective Overgarment (CPOG) is very similar to the BDO. It too is a two piece garment set used for individual protection and is **permeable** and **expendable**.

The CPOG consists of one coat and one pair of trousers that are plain green in color. The jacket has a full-length zipper opening covered by a protective flap, the trousers have a fly front and a zipper closure on the outside of each leg and the overgarment is designed with two layers.

The outer layer is made of a nylon and cotton mix and the inner layer of protection is a charcoal impregnated polyurethane foam. The charcoal liner may leave charcoal deposits on the skin or undergarments but this does not mean the suit is unserviceable or degraded in protection ability; the deposits will not harm the user when worn.

The CPOG type suit is not water-resistant and should be worn under wet weather gear. The CPOG comes in a vapor barrier bag that helps protect it from moisture, sunlight, and other damage. The primary characteristics of the CPOG are listed on the next page.

CPOG jacket

CPOG trousers

Continued on next page

Protective Suits, Continued

Protection Capabilities

Both the CPOG and BDO will protect you from chemical agent liquid droplets and vapors, toxins, and biological agents. They will also provide protection from radioactive alpha and beta particles. Recommended weartimes for the suits may be extended by commanders if the situation dictates. Weartime is calculated as soon as the suit is removed from the vapor barrier bag. Donning of the suit regardless of time of day is counted as one full day. The suits are not designed to be reimpregnated or decontaminated. The chart below shows weartimes.

	Type of protective suit	
	CPOG	**BDO**
Duration of Protective Qualities	14 days after the suit is removed from vapor barrier bag	30 days after the suit is removed from vapor barrier bag
Liquid and Vapor Contamination Protection	Will protect for up to 6 hours of exposure	Will protect for up to 24 hours of exposure

Serviceability Standards

Chemical protective suits become unserviceable when they are ripped, cut, or torn. Broken or missing zippers and fasteners also make the suit unserviceable. Oils, solvents, lubricants, or any type of petroleum products that soak into the suit will make it unserviceable.

Components

Additional Protection

To receive total protection from NBC type agents, you need additional components to protect your hands, feet and other areas of the body. This is especially important when encountering liquid agents that can poison your body through skin absorption.

Gloves

Chemical protective gloves are a two piece set consisting of an outer and inner layer. The outer protective layer is impermeable and made of black butyl rubber. The inner layer or glove is made of white cotton and designed to absorb perspiration. When in cold weather or during heavy work, individuals should use work gloves or black shells over the chemical gloves to protect them. The gloves become unserviceable when they are ripped, torn, punctured, exposed to petroleum products, or become sticky. The gloves can be decontaminated and reused as long as they remain serviceable.

The gloves are available in three different thicknesses for various types of work. Seven millimeter gloves are used to perform sensitive tasks or in situations where they are not exposed to harsh treatment, and should be replaced or decontaminated within 6 hours of contamination. Fourteen-millimeter gloves are used for medium stress jobs such as ammo handling and mechanical work. Twenty-five-millimeter gloves are used for harsh and heavy type work. Both fourteen and twenty-five millimeter gloves should be replaced or decontaminated within 24 hours of contamination.

Continued on next page

Components, Continued

GVO/BVO

The Green Vinyl Overboot (GVO) and Black Vinyl Overboot (BVO) will protect the wearer from NBC agents and weather such as rain or snow. The boots are designed to go over the traditional combat boot, giving 24 hours of protection once contaminated. Rips, tears, punctures, stickiness, cracking and exposure to petroleum make the boots unserviceable. The boots are secured to the feet by elastic fasteners and can be decontaminated and reused as long as they remain serviceable.

Continued on next page

Components, Continued

CPFC

The Chemical Protective Footwear Cover (CPFC) is designed to slip easily over the combat boot. It has an unsupported butyl sole and a flexible butyl upper. Eyelets on the front, sides, and back allow the covers to be pulled securely in place over the combat boot using a bootlace. These covers will provide protection from NBC agents as long as they remain serviceable. The boots become unserviceable when they are ripped, torn, punctured, exposed to petroleum products, become sticky, or when laces break. The CPFC is being replaced by the GVO/BVO.

Chemical Protective Helmet Cover

This cover is a one-size-fits-all butyl-coated nylon cloth. It uses elastic webbing in the hem to secure over the helmet to provide protection to the Kevlar and Kevlar cover. It becomes unserviceable when it is ripped, torn, or it deteriorates.

Lesson 4 Exercise

Directions Complete items 1 through 5 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 Select the statement that best describes the two categories of protective clothing.

a. Impregnated and non-impregnated
b. Permeable and impermeable
c. Butyl and silicone rubber
d. Cotton and nylon

Item 2 Select the statement that best describes the characteristics of chemical protective overgarment.

a. Permeable, 2-piece outergarment, charcoal impregnated, and expendable
b. Impermeable, 2-piece outergarment, charcoal impregnated, and expendable
c. Permeable, 2-piece undergarment, charcoal impregnated, and expendable
d. Permeable, 2-piece undergarment, butyl impregnated, and expendable

Item 3 What is the duration of the protective qualities of the chemical protective overgarment?

a. 6 hours
b. 24 hours
c. 14 days
d. 30 days

Continued on next page

Item 4

How long will the battle dress overgarment protect you from liquid contamination?

a. 6 hours
b. 24 hours
c. 14 days
d. 30 days

Item 5

If an individual were tasked with an ammunition supply detail in a contaminated environment, what thickness of chemical protective gloves should be used?

a. 7 millimeter
b. 14 millimeter
c. 24 millimeter
d. 25 millimeter

Continued on next page

Solutions

The table below lists the solutions to the exercise items. If you have any questions about these items, refer to the reference page.

Item Number	Answer	Reference
1	b	2-42
2	a	2-44
3	c	2-45
4	b	2-45
5	b	2-46

Summary

In this lesson, you learned how to protect the rest of your body from contamination.

In the next lesson, you will learn about the various levels of Mission Orientated Protective Posture and how it is used in NBC type operations.

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LESSON 5

MISSION ORIENTED PROTECTIVE POSTURE

Introduction

Lesson Focus

Sustaining combat effectiveness on the NBC battlefield involves more than protection from chemical and biological agents. The ability to maintain a high level of proficiency balanced with NBC protection is obtained by having the appropriate mission oriented protective posture referred to as MOPP, **Mission Oriented Protective Posture**.

Content

This lesson will give you the ability to recognize the various levels of MOPP and understand how and why they are used.

Learning Objectives

At the end of this lesson, you will be able to

- Identify the definition and purpose of MOPP.
- Identify the problems involved with using MOPP.
- Identify the factors of MOPP analysis.
- Identify the components of each level of MOPP.
- Identify the separate levels of radioactive MOPP.
- Identify the purpose of MOPP gear exchange.
- Identify the considerations in selecting a MOPP gear exchange site.
- Identify the three types of MOPP gear exchange.
- Identify the equipment needed to conduct a MOPP gear exchange.
- Identify the MOPP gear exchange close out procedures.
- Identify the procedures for sleeping in MOPP.

Continued on next page

Introduction, Continued

In This Lesson This lesson contains the following topics.

MOPP Characteristics

Purposes

The purpose of MOPP is to allow commanders a flexible level of protection in an NBC environment reflecting the current situation. MOPP was designed to balance protection with the threat, temperature, mission, and type of workload.

Advantages

MOPP will protect you from all known chemical and live biological agents. It will also protect you from certain types of radioactive fallout by reducing the contact of beta particles with the skin. Alpha particle ingestion is also lowered. Another advantage of MOPP is that it reduces the spread of contamination and simplifies decontamination procedures.

Disadvantages

Although MOPP provides an excellent means of protection in a contaminated environment, it is not always conducive to mission accomplishment. Wearing of the gear degrades personal and unit performance. Listed below are concerns that must be taken into consideration while in MOPP.

- Heat stress and exhaustion
- Mental distress
- Decreased morale
- Decreased motivation
- Reduced motor skills
- Impaired hearing from the hood
- Impaired vision from the mask
- Reduced levels of communication, command, and control
- Reduced stamina

Continued on next page

MOPP Characteristics, Continued

Psychological Effects

History has shown that psychological effects produce 10 percent of battlefield casualties. In an NBC type environment the number of psychological casualties increases to 25 percent. Many result from prolonged periods in MOPP; therefore, leaders must take these effects into consideration. Some symptoms of psychological effects are claustrophobia, paranoia, apprehension, fear, hallucinations, panic, confusion, disorientation, and distorted body sensations.

Dehydration

The human body must have water to cool itself and to function properly. Hydration is even more crucial while in MOPP levels. For example, MOPP level 4 will cause the average individual to lose 1 quart of water per hour under normal temperatures and conditions. When you are working at a moderate to heavy work rate with temperatures less than 80 degrees Fahrenheit, you should consume 1 quart of water every hour. At the same work rate with the temperature over 80 degrees Fahrenheit, you should consume 2 quarts every hour. **Leaders must insure that all personnel are well hydrated at all times. Insufficient hydration will result in rapid increase in body heat and heart rate which will lead to heat stress and exhaustion.**

Training

NBC training and education enables units to operate despite the effects associated with MOPP. The more training conducted in MOPP, the more efficient individuals become. With training, weapons, instruments, and controls can be handled effectively while wearing protective gloves. Similarly, communication problems can be overcome by talking slower, repeating orders, and practicing with the mask on. Conducting training while at different MOPP levels will increase individual stamina, enhance troop confidence in the gear and its ability, while minimizing the psychological effects of MOPP. An updated unit SOP with specific guidelines encompassing MOPP allows leaders to be flexible. Delegating responsibility to small unit leaders will allow them to adjust MOPP levels to their current situation.

Analysis

Factors of MOPP Analysis

It is the responsibility of every commander to conduct a thorough MOPP analysis that reflects the current situation. The analysis is a tool used to help locate the balance between mission accomplishment and minimizing the casualties associated with MOPP. The nine major factors involved in MOPP analysis will assist unit leaders and commanders in the complex assessment of MOPP.

- Mission
- Work Rate
- Required Time
- Target
- Warning Time
- Weather
- Additional Protection
- Troop Preparedness
- Time of Day

Mission

The nature of the mission, importance of the mission, and what risks it will require greatly affect the amount of protection needed.

Work Rate

The type and amount of work required to complete the mission is categorized as light, moderate, and heavy. MOPP gear will reduce unit effectiveness at all levels but the effects are more severe as work rate and MOPP levels increase. Listed below are examples of work rate categories.

- **Light**--Administrative tasks, riding in vehicles, and weapons cleaning.
- **Moderate**--Handling of equipment, ammo, and refueling operations.
- **Heavy**--Combat, forced marching, and building fighting positions.

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Analysis, Continued

Required Time Leaders must evaluate how much time is needed to complete the mission at various MOPP levels. FM 3-4 charts include many different scenarios like the example below. Charts and tables are only guidelines to assist in the analysis; experience and training are the best means to establish accurate timelines.

MISSION	WORK RATE CATEGORY	TIME WITHOUT MOPP	TIME IN MOPP LEVEL 4 AT 50 DEGREES F	TIME IN MOPP LEVEL 4 AT 85 DEGREES F
Ammunition re-supply to an artillery battery	Heavy	30-45 minutes	90-135 minutes	180-270 minutes

Target Is the unit in question a likely target? Several other questions must be reviewed to produce this answer. Where is the unit located? Is the unit within range of enemy artillery and mortars? Is the unit considered a primary target in the rear area? Is the unit on a likely avenue of approach? Experience, training, knowledge of NBC weapons, accurate intelligence reports, and sound judgment will help in answering these questions.

Warning Time How much time does the unit have to react to a NBC strike? Again, other areas need to be explored to get a solid answer. What NBC capabilities do the enemy possess? Have they deployed NBC weapons systems and munitions? Have they previously used NBC weapons? Have adjacent units experienced NBC contact? Will wind speed, direction, and terrain place the unit in an NBC hazard area? How many and what type of alarm systems does the unit have in operation and are they positioned to give early warning? All these factors must be taken in consideration for an accurate analysis.

Weather How will the current and projected weather affect unit performance? High temperature and humidity along with the work rate will slow mission accomplishment. High winds will narrow the window of opportunity of the enemy employing NBC weapons.

Continued on next page

Analysis, Continued

Additional Protection	If the unit is operating under canopy or dense treetop cover, bunkers, buildings, or vehicles, the MOPP level could be reduced.
Troop Preparedness	How much and what type of NBC training has the unit experienced? What is the physical state of the unit? How much food, water, and rest has the unit received? Well-trained and conditioned units will perform at higher levels while in MOPP.
Time of Day	Time of day will greatly affect the end results of NBC use. The best time to use NBC weapons is early morning and late evening when temperatures are ideal and optimum conditions prevail. At these times agents tend to linger close to the ground and move horizontally.

Levels

MOPP Ready MOPP ready is the condition when individuals carry their field protective mask. The remainder of their MOPP gear has been identified and can be issued to individuals and units within two hours. Protective boots, gloves, and suits are components that make up the various MOPP levels.

MOPP Level 0 MOPP level 0 consists of having all gear required readily available. The mask is carried. Readily available means within arms reach. (At this point it takes approximately 8 minutes to assume MOPP level 4.)

ITEM	REQUIREMENT
Mask	Carried
Overgarment	Readily available
Overboots	Readily available
Gloves	Readily available
Helmet Cover	Readily available

MOPP Level 1 When in MOPP level 1, the reaction time needed to assume MOPP level 4 is cut in half to 4 minutes. M8 or M9 detection paper is attached to the suit. The method of attachment will be discussed in study unit 4.

ITEM	REQUIREMENT
Mask	Carried
Overgarment	Worn. In hot weather the top may be left open for ventilation
Overboots	Readily available
Gloves	Readily available
Helmet Cover	Readily available

Continued on next page

MOPP Level 2 At MOPP level 2, the chemical protective overboots and protective helmet cover are added. The boots take 3-4 minutes to put on. From this point MOPP levels 3 and 4 can be reached easily and quickly.

ITEM	REQUIREMENT
Mask	Carried
Overgarment	Worn. In hot weather the top may be left open for ventilation.
Overboots	Worn
Gloves	Readily available
Helmet Cover	Worn

MOPP Level 3 At MOPP level 3, the mask and hood are added. This level causes body temperature to rise increasing the risk of heat related casualties. The 9-second standard for masking is still utilized.

ITEM	REQUIREMENT
Mask	Worn. In hot weather the hood may be rolled up for ventilation.
Overgarment	Worn. In hot weather the top may be left open for ventilation.
Overboots	Worn
Gloves	Readily available
Helmet Cover	Worn

Continued on next page

MOPP Level 4

At MOPP level 4, the rubber gloves are added. Cotton inserts are worn inside the gloves to help absorb moisture. This step is accomplished in seconds to bring the individual to full MOPP protection.

ITEM	REQUIREMENT
Mask	Worn. Hood secured in place.
Overgarment	Worn. With top in place and secure.
Overboots	Worn
Gloves	Worn
Helmet Cover	Worn

Mask Only Command

The "Mask Only" command is used for situations such as downwind vapor hazards existing from a nonpersistant agent. The mask only command should not be given when a liquid blister or nerve agent is present.

Continued on next page

Radioactive MOPP

MOPP levels may be used for more than standardizing protective clothing levels. The various levels can also dictate actions and requirements to be taken regarding equipment and procedures. MOPP levels can reflect the current enemy threat level; the radiological MOPP levels used aboard ship shows an example of this.

MOPP Level	Enemy Threat Level
1	Suspected--Possession of radiological capabilities
2	Possible--Expressed affirmation or assessed political will of an enemy to use radiological weapons
3	Probable--Statements of intent to employ radiological weapons
4	Imminent--Confirmation of increased activity involving delivery systems or justification that contamination or casualties will occur

Continued on next page

Levels, Continued

Radiological Levels

The chart below gives examples of the steps taken in the various radiological MOPP levels.

Level	Equipment	Actions	Conditions
1	• Conduct inspection of all detection and monitoring systems. • Equip personnel with masks.	• Review standards set forth on ships CBR-D (chemical, biological, radiological- defense) bill.	• Set material condition "Yoke." • Set readiness condition "III."
2	• Mask worn on person. • Pre-position CBR-D equipment as set forth in ships bill. • Operationally test the counter measure wash down system (CMWDS). • Test alarms/Issue dosimeters.	• Train decontamination and medical team in treatment of casualties.	• Designate primary and secondary Contamination Control Area (CCA). • Set material condition "Modified Zebra." • Conduct threat brief.
3	Test all portable radiac equipment, activate CMWDS intermittently, and activate collective protective system.	• Have personnel take ready shelter. • Activate CCA stations.	• Set "General Quarters." • Set material condition "Zebra."
4	• Monitor radiation detection equipment continuously. • Activate CMWDS continuously.	• Don protective mask. • Implement mandatory water drinking regimen. • Set Maximum Permissible Exposure (MPE) and casualty dose rate. • Designated personnel take ready and deep shelter.	• Set circle "William."

Gear Exchange

Purpose

MOPP gear exchange provides temporary relief from MOPP and reduces the spread of contamination. In unavoidable situations, a MOPP gear exchange replaces contaminated ensembles that are near expiration with new garments. The primary purpose of a MOPP gear exchange is to restore the normal operating tempo of a unit working in MOPP.

Site Selection

Site selection is an important factor in conducting a MOPP gear exchange or decontamination operation. The site must provide limited protection from further contamination, reduce the spread of contaminates to other areas, and be within reasonable proximity to the unit needing it. It is a common practice to conduct vehicle and equipment decontamination in conjunction with MOPP gear exchange, therefore a water source may be required. Listed below are considerations for selecting a MOPP exchange site. Higher headquarters normally selects the site.

- Off of main routes but has easy access
- Large enough for the identified unit
- Good overhead concealment
- Good water source
- Good drainage

Methods of Exchange

There are three different types of MOPP gear exchange that can be conducted. The current situation and type of equipment being used will dictate which method to use.

- Buddy–Team Method
- Triple Buddy-Team Method
- Individual or Emergency Method

Continued on next page

Gear Exchange, Continued

Equipment

The following equipment is necessary to perform a MOPP exchange.

- Four long-handled brushes
- Plastic or poncho
- Supertropical Bleach (STB)
- Four Individual Equipment Decon Kits (IEDK)
- Soapy water
- Cutting tool
- Three 3-gallon containers
- Sponges
- Drying towels
- Two waste containers

Buddy-Team Method

This method of MOPP gear exchange is the most common type used to exchange suits. The biggest concern when doing a MOPP exchange is the spread of contamination. To reduce the spread of contamination it is important to follow the steps exactly how they are outlined on the following pages.

Continued on next page

Gear Exchange, Continued

Step	Contamination Type	Required Equipment	Action
1. Decontaminate individual gear (weapon, helmet, canteens, etc.)	All contamination	• Four long-handled brushes • Large piece of plastic or clean poncho	1. Mix three parts earth to two parts STB (STB will be discussed in study unit five).
	Chemical or Biological	• One 30-gallon container STB mix • One IEDK	1. Discard helmet cover. 2. Brush STB onto gear. Gently shake off excess STB and place gear on an uncontaminated surface.
	Radiological	• Hot, soapy water	1. Brush gear clean and wash with hot, soapy water. 2. Place gear on clean surface.
2. Prepare to decontaminate	All contamination	Cutting tool	1. Buddy #1 unfastens the straps on buddy #2's hood and pulls them over the shoulder and attaches them back to the Velcro fastener. 2. #1 loosens drawcord on #2's hood and then removes M9 tape. 3. #1 unzips #2's trouser legs and rolls one cuff in each. #1 unfastens or cuts the fasteners on #2's boots.
3. Decontaminate mask and hood	Chemical or Biological	Two IDEK per person	1. #1 uses IDEK to wipe #2's eyelens outserts from the top down 2. #1 then wipes the hood from the top down. #1 then wipes his own gloves in preparation for rolling the hood. 3. #1 rolls #2's hood starting from the back using two-inch tucks until it reaches the center of the head. The front is rolled tightly up to the outlet valve cover.
	Radiological	Three 3-gallon containers Two sponges Hot, soapy water Rinse water Drying towels	#1 wipes #2's hood with hot, soapy water, then again with clean water and dries.

Continued on next page

Gear Exchange, Continued

Step	Contamination Type	Required Equipment	Action
4. Remove protective overgarments and boots	All contamination	Two waste or discard containers (plastic bags, cans, etc).	1. #1 unsnaps #2's protective jacket and unties the drawcord at the bottom. 2. #1 unfastens the Velcro flap over the zipper and unzips the jacket. The Velcro at the wrist is unfastened. 3. #1 stands behind #2 and grasps the outer portion of the jacket at the shoulders. #2 will make a fist while #1 pulls the jacket down and away ensuring the inner or black portion of the jacket is not touched. 4. #1 places the jacket on the ground beside #2 with the black lining facing up. 5. #1 unsnaps and unzips #2's protective trousers but does not loosen the waist tabs. 6. #2 loosens his own protective boots by alternately stepping on the heels and pulling the foot up, but not out of the protective boot. 7. #1 pulls the protective trousers down to #2's knees without touching the undergarments. 8. #2 simultaneously steps out of the trouser leg and overboot that is closest to the jacket and places the combat boot on the black side. #2 then steps out of the other side and stand on the jacket.
5. Remove protective gloves	All contamination	Two waste or discard containers (plastic bags, cans, from step 4).	#2 works his fingertips out of the gloves, holds his arm away from his body and lets the gloves fall free.
6. Put on new overgarment	All contamination	One set of chemical protective overgarments per person	1. #1 opens the new overgarment without touching the inside of the package. 2. #2 pulls the overgarment out of the package without touching the outside. #2 puts the overgarment on leaving the trouser legs open.

Continued on next page

Gear Exchange, Continued

Step	Contamination Type	Required Equipment	Action
7. Put on new overboots and gloves	All contamination	One set of chemical protective overboots and gloves per person	1. #1 opens the package with the new overboots without touching the inside. 2. #2 pulls the overboots out of the package without touching the outside. # 2 puts the overboots on and fasten the trouser legs. 3. #1 opens the package with the new gloves without touching the inside. 4. #2 pulls the gloves out of the package without touching the outside. # 2 will put the gloves on and attach M9 detector paper.
8. Secure hood	All contamination	One IDEK	1. #1 uses the IEDK to wipe his own gloves. 2. #1 then unrolls #2's hood and secure it. 3, #1 and #2 reverse roles and repeat steps 2-8.
9. Secure gear	All contamination	One protective helmet cover per person	Individuals will put on the cover and check their gear using the buddy system.

Triple Buddy-Team

This method is used when working with the M42 or M43 (crew or aircraft mask) when a third person is needed to hold the canister and hose to prevent the spread of contamination. The procedures are very similar to the buddy-team method and the required equipment is the same. More details on these procedures are in FM 3-5/MCWP 3-37.3.

Individual Method

The individual method is used when an individual has no help and the risk of MOPP failure demands that the exchange occur. More details on this procedure is in FM 3-5/MCWP 3-37.3.

Close Out Procedures

Upon completion of a MOPP gear exchange, the site must be closed or cleared properly. Site clearance includes cleanup, marking, and reporting.

- Bury or double bag and remove contaminated MOPP gear and other expendables.
- Post standard NBC markers with required information (NBC marking and reporting will be discussed in study unit 4).
- Submit an NBC 5 report.

Daily Functions

Head Calls

Individuals may have to relieve themselves while wearing protective clothing even if the mission or situation does not allow for a MOPP gear exchange or other types of decon. The following procedures must be performed to avoid getting contamination on undergarments or exposed skin. (As a last resort you may relieve yourself in the overgarment and change it as soon as possible.)

Step	Action
1	Select an area for a cathole, avoiding heavy brush and low areas.
2	Provide security by using the buddy system if possible.
3	Scrape about two inches of earth from the top of the surface area. This area should be large enough to hold your gear and weapon.
4	Dig the cathole approximately one foot deep and within arms reach of the weapon.
5	Place weapon and gear in the cleared area.
6	Decontaminate your gloves using appropriate equipment.
7	Pull the overgarment top up by folding it back on itself.
8	Decontaminate your gloves again.
9	Unsnap and unzip the overgarment trousers and lower them enough to perform the specific function.
10	Remove protective gloves and lower undergarments.
11	Perform specific function.
12	Secure undergarments.
13	Put protective gloves back on ensuring you do not touch the outside with your hands.
14	Secure your overgarment.
15	Secure your weapon and gear.
16	Ensure waste paper and decon wipes are in the cathole.
17	Fill in cathole.
18	Continue the mission.

Continued on next page

Daily Functions, Continued

Sleeping

While sleeping in MOPP gear or a contaminated environment, the following procedures must be taken to avoid exposure to contaminates.

- Protect yourself with overhead cover.
- Ensure all body parts are covered with protective clothing.
- Ensure the hood is fitted properly and worn correctly with the mask.
- Use the buddy system to check each other while sleeping.

Hygiene

Hygiene plays an important role in the defense of NBC attacks. This subject will be discussed in greater detail in study unit 3.

Lesson 5 Exercise

Directions Complete items 1 through 13 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 Select the meaning of the term MOPP.

a. Mission Oriented Preventive Posture
b. Mission Oriented Protective Posture
c. Military Oriented Protective Posture
d. Mission Organized Preventive Posture

Item 2 Select the purpose of MOPP.

a. It enables individuals to protect themselves under NBC conditions
b. It allows units to carry out missions in contaminated environments
c. It aids commanders in considering risk-to-mission factors
d. It gives the commander a flexible means of protection in an NBC environment reflecting the current situation

Item 3 Mission, _____ are factors involving MOPP analysis.

a. work rate, required work time, warning time, weather, time of day
b. work rate, work time, warning time, weather, enemy location
c. work rate, work time, warning time, weather, type of terrain
d. work time, type of terrain, weather, day/night, unit targeted

Item 4 Handling of equipment, ammo, and refueling operations are examples of a _____ work rate.

a. moderate
b. light
c. sustained
d. heavy

Continued on next page

Item 5

Training, physical state, rest, and food the unit has received are examples of

a. additional protection.
b. troop preparedness.
c. sustainment training.
d. pre-deployment training.

Item 6

Select the statement that best describes MOPP level 3. Overgarment worn,

a. boots worn, mask on, hood optional, and gloves carried.
b. boots worn, mask carried, hood carried, and gloves carried.
c. boots worn, mask carried, hood carried, and gloves worn.
d. boots worn, mask on, hood optional, and gloves worn.

Item 7

What is radioactive MOPP level 3?

a. Possible—expressed affirmation or assessed political will of an enemy to use Radiological weapons.
b. Imminent—confirmation of increased activity involving delivery systems or justification that contamination or casualties will occur.
c. Suspected—possession of Radiological capabilities.
d. Probable—statements of intent to employ radiological weapons.

Item 8

Select the primary purpose of MOPP gear exchange. MOPP gear exchange

a. provides temporary relief from MOPP.
b. is used to replace contaminated ensembles that are near expiration with new garments.
c. is used to restore the normal operating tempo of a unit working in MOPP.
d. is used when individuals need to relieve themselves.

Continued on next page

Item 9

Select the statement that best describes the factors in selecting a MOPP gear exchange site. Higher headquarters normally selects the site off main routes

a. but one that has easy access, large enough for the identified unit, has good overhead and concealment, and has good drainage.
b. but one that has easy access, has good overhead concealment, and has good drainage.
c. but one that has easy access, large enough for the identified unit, has good overhead, and has good drainage.
d. but has easy access, large enough for the identified unit, has good overhead concealment, type of terrain, and has good drainage.

Item 10

The methods of MOPP gear exchange are individual,

a. hasty, buddy-team, triple-buddy team, and deliberate.
b. hasty, buddy-team, and deliberate.
c. buddy-team, triple-buddy team, and deliberate.
d. buddy-team, and triple-buddy team.

Item 11

_____ are examples of the items required to conduct a MOPP gear exchange.

a. Four long–handled brushes, plastic or poncho, supertropical bleach (STB), and permeable suits.
b. Four individual equipment decon kits, soapy water, and a cutting tool.
c. Three 3-gallon containers, sponges, and site selection.
d. Drying towels, two waste containers, and vapor detection kits.

Continued on next page

Item 12

Select the statement that best describes the sequence for the MOPP gear exchange closeout procedures.

a. Bury or double bag and remove contaminated MOPP gear and other expendables, mark area, and submit a NBC 5 report.
b. Submit a NBC 5 report, bury or double bag and remove contaminated MOPP gear and other expendables, and mark area.
c. Bury or double bag and remove contaminated MOPP gear and other expendables, mark area, and submit a NBC 4 report.
d. Submit a NBC 4 report, bury or double bag and remove contaminated MOPP gear and other expendables, and mark area.

Item 13

Select the statement that best describes the procedures for sleeping in MOPP gear. Protect yourself with overhead cover, ensure all body parts are covered with protective clothing,

a. and use the buddy system to check each other while sleeping.
b. ensure the hood is fitted properly, and use the buddy system to check each other while sleeping.
c. ensure the hood is fitted properly, use the buddy system to check each other while sleeping, and sleep in two hour intervals.
d. ensure the hood is loosened to aid breathing, and use the buddy system to check each other while sleeping.

Continued on next page

Solutions

The table below lists the solutions to the exercise items. If you have any questions about these items, refer to the reference page.

Item Number	Answer	Reference
1	b	2-53
2	d	2-55
3	a	2-57
4	a	2-57
5	b	2-59
6	a	2-61
7	d	2-63
8	c	2-65
9	a	2-65
10	d	2-65
11	b	2-66
12	a	2-69
13	b	2-71

Summary

In this lesson, you learned about MOPP gear and about MOPP levels.

In the next study unit, you will learn about the various types of NBC attacks and how to defend against them.

LESSON 6

MCU-2/P PROTECTIVE MASK

Introduction

Background

As events both at home and abroad have demonstrated, the possibility of NBC weapons being used is great. The NBC threat is not limited to land, but extends to the oceans, seas, and waterways. Your MCU-2/P mask is the most important piece of equipment for self-protection.

Content

This lesson provides information on the capabilities, components, and serviceability standards of the MCU-2/P mask. Operational procedures, cleaning and care for the mask, and proper storage will also be discussed.

Learning Objectives

At the end of this lesson, you will be able to

- Describe the capabilities and characteristics of the MCU-2/P.
- Identify the features, components, and accessories of the MCU-2/P.
- Identify the internal, external, and additional nomenclature of the MCU-2/P.
- Identify the differences between the MCU-2/P and M40 mask.

In This Lesson

This lesson contains the following topics.

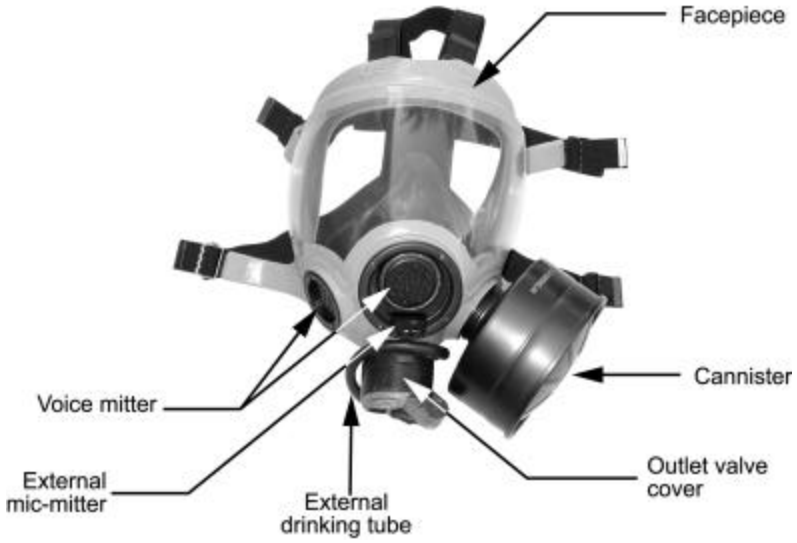
MCU-2/P Description

Capabilities

The MCU-2/P mask is designed to protect your face, mouth, nose, eyes, and respiratory tract from chemical and biological agents. It will also help protect you from certain types of radiological fallout.

External View

The illustration below identifies the external components of the MCU-2/P mask.



Internal View

The illustration below identifies the internal components of the MCU-2/P mask.

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MCU-2/P Description, Continued

Comparison

The MCU-2/P mask is very similar to the M40 in description and operation. The chart below lists the similarities in the nomenclature of the two masks. An **X** identifies the items that are identical on each mask. If they are not identical, a brief description of the differences is given.

NOMENCLATURE	M40	MCU-2/P
Facepiece	X	X
Head harness	X	X
Outlet valve disk	X	X
Canister	X	X
Eyelens		A large, flexible single lens made of urethane material that allows for a distortion-free view.
Outserts		Polycarbonate outsert attaches to flex lens by use of clips and a rubber strap.
Hood		Hood is similar in nature but is designed to fit the MCU-2/P.
Waterproof bag	X	X
Inlet valve disk	X	X
Nosecup valve disk	X	X
Nosecup assembly	X	X
Outlet valve cover	X	X
Drinking system	X	X
Airflow deflector	X	X
Voicemitter		Has a mic-mitter assembly that allows connection to an internal microphone for various communication needs.

MCU-2/P Maintenance

Serviceability

Your MCU-2/P must be serviceable at all times. Every time you receive a mask, you must perform a serviceability check. This check should take place at the point of issue so that your unit NBC specialist can replace the mask or repair any discrepancies. At the time of inspection, NBC personnel can switch canister sides if necessary and ensure you have the correct size mask. The primary purpose of the serviceability check is to ensure that the mask can maintain an airtight seal. As with the M40 Field Protective Mask, the MCU-2/P mask will not protect you if it is not serviceable or you do not know how to use it properly. See lessons two and three of this study unit for more details in the areas of serviceability and operation.

Cleaning

Thorough cleaning of the mask is imperative for proper functioning. For sanitary reasons, the mask should be cleaned at the time of issue. Following the steps outlined in this section will ensure you have a properly maintained mask.

Step	Action
1	Turn the canister counterclockwise to remove it from the facepiece. Clean around the two mating surfaces and the canister itself. Do not use water around the canister.
2	Lift the rubber ring around the outsert up from the eyelens. Clean the outserts and lenses with plastic polish. Repeat this step for the other side.
3	Remove the hood from the mask. Clean the hood with a brush and soapy water and dry with cheesecloth.
4	Pull the quick disconnect coupling out of its protective pocket and remove the outlet valve cover.
5	Clean the inside and outside of the facepiece with warm soapy water and cheesecloth. A brush may be used to remove dirt and sand. Alcohol can be used to remove greasy and oily spots. Ensure all parts are dry before stowing.
6	Remove all dirt and foreign matter from around and under the outlet valve disk. A lens brush can be used to do this.
7	Empty carrier of contents and shake to remove dirt and dust. A wet brush may be used to clean carrier.
8	After all parts are dry, you may reassemble the mask.

Continued on next page

MCU-2/P Maintenance, Continued

Care

The MCU-2/P mask is a very durable piece of gear considering the delicate nature of its purpose, but don't overlook the fact that this piece of gear can be broken or damaged. Store and transport the mask with care to ensure it functions correctly when needed. The list below will point out things you should and should not do.

- Store only the mask and authorized accessories in the carrier. Food, drink items, tobacco products, pens, markers, and maps are not authorized materials.
- Use only authorized cleaning material on the mask, mask carrier, and accessories. DS2, CLP, Simple Green, brake cleaner, pine oil, and similar fluids are not acceptable.
- Never use a mask that has not been cleaned first.
- Do not use any type of artificial heat to dry the mask. Clothes dryers, hair dryers, ovens, and microwaves will damage the mask.
- During embarkation do not store the mask at the bottom of sea bags, footlockers, or storage containers.
- Do not use the mask and carrier as a pillow or a seat cushion.
- Do not allow food to come in contact with the waterproof bag. The food may pick up toxic chemicals.
- Check the mask for serviceability after embarkation.
- Check the mask for serviceability after every training exercise.
- Clean the mask after every use
- Clean the mask after every CS training exercise.
- Have qualified NBC personnel switch canister sides and make repairs.
- Have qualified NBC personnel determine correct mask size.
- Remove the mask from the waterproof bag as soon as possible.

Storage

The mask carrier safeguards and transports the MCU-2/P. Proper storage of the mask will aid in maintenance procedures by minimizing damage and keeping the mask clean. The carrier also holds additional items used during NBC operations--these items will be discussed in greater detail in study unit three. This section will show you where the items are placed in the carrier.

- **M8 Chemical Detector Paper**--Stored in one of the inside pockets of the carrier with the waterproof bag.
- **M291 Skin Decontamination Kit**--Stored in the large pocket on the outside of the carrier.
- **M1 Waterproof Bag**--Stored in one of the inside pockets of the carrier with the detector paper.

Carrier

The mask carrier for the MCU-2/P mask is worn on the body in the same manner as the M40.

MCU-2/P Fitting Procedures

Proper Fit

It is essential that your mask fit securely on your head without being overly tight. If the mask is too tight on the head, it will not function properly. A tight mask will cause the facepiece to buckle at various points and leak. After a short period of time, an overly tight mask will give the user a headache which will get worse the longer the mask is worn.

- The mask should be centered left to right and up and down on the face.
- The eyes should be centered in the lens.
- The patch in the middle of the harness should be centered in the back of your head.

Procedures

Following the procedures below will help ensure the mask fits properly.

Step	Action
1	Ensure you have a clean and serviceable mask.
2	Loosen all six straps of the head harness.
3	Insert your chin into the mask and pull the harness over your head.
4	With your left hand, grasp the facepiece and center the mask on your head.
5	With your right hand, tighten the two forehead straps. Tighten the straps one at a time by giving them two or three quick and short tugs. You may switch hands as long as one hand holds the mask.
6	Repeat step five for the temple and chin straps. Note: The patch in the back of the head harness must be centered on the back of the head. Do not pull each strap as tight as it will go. Tighten the straps evenly and equally all the way around the mask. You may repeat the entire procedure if necessary. The temple straps should be above the ears and the chin straps below the ears.

Check

If you have a properly fitted and serviceable mask, it will have an airtight seal. You can check this by covering the inlet port located in the center of the canister with the palm of your hand and by breathing in. At this point the mask will collapse around your face. When you take the mask off, you need only loosen the bottom or chin straps.

MCU-2/P Donning and Clearing

Procedures

The act or procedure for getting the mask from the carrier onto your head or face is called donning. Two primary steps are contained in this procedure: clearing and sealing. When you initially put the mask on, you may have contaminated air trapped inside the mask. You must clear this air from the mask. You must then create an airtight seal. Following the steps outlined below will help ensure you don, clear, and seal the mask properly.

Step	Action
1	Upon receiving the command or detecting the presence of contamination, stop breathing, close your mouth and eyes. **Do not breathe until the mask is on your face.**
2	**Donning**- With your left hand, open the carrier and with the right hand remove the mask. If you have a weapon and helmet, place the weapon between your legs, helmet on the weapon, and continue.
3	**Clearing the mask**- Put your chin in the mask and hold it to your face firmly. Place your hand over the outlet valve assembly and exhale sharply. You should feel the air inside the mask being pushed out around the edges of the mask.
4	**Sealing the mask**-With the palm of the free hand, cover the inlet port of the canister and breath in. The facepiece of the mask should collapse around your face. If the mask fails to collapse, check for obstructions such as hair or clothing between the skin and facepiece.
5	Pull the head harness over the head into the correct position.
6	With the mask held firmly in place, tighten the two cheek straps. The temple and forehead straps do not need to be adjusted. The patch should be centered, and all straps flat against the skin.
7	Clear the facepiece again and check for leaks. If necessary, you may adjust, clear, and seal until the mask functions properly.
8	Give the alarm and secure the hood into position.

NBC Commands

The universal individual alarm to put on the mask is "**GAS-GAS-GAS,"** repeated three times. To give this alarm, extend your arms straight out to the side; hands made into a fist. As you say the word gas, bend your arms at the elbows, placing your fists to the ears. This action is repeated three times. The command to take the mask off is "**ALL CLEAR-UNMASK."** The individual training standard for donning, clearing, and sealing the mask is nine seconds. An additional six seconds is given to secure the hood in place.

Lesson 6 Exercise

Directions Complete items 1 through 4 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 Select the statement that best describes the capabilities of the MCU-2/P. The MCU-2/P protects

a. eyes, face, and lungs from chemical agents.
b. eyes, face, ears, and lungs from chemical agents and can accommodate a left or right shooter.
c. eyes, face, and lungs from chemical agents only and can accommodate a left or right shooter.
d. eyes, face, and lungs from chemical and biological agents and can accommodate a left or right shooter.

Item 2 The primary purpose of the serviceability check is to ensure the mask

a. has all required parts.
b. maintains an airtight seal.
c. is the correct size.
d. has the canister on the correct side.

Item 3 Which of the following is a difference between the MCU-2/P and M40?

a. The MCU-2/P has a large single lens.
b. The M40 does not have a removable canister.
c. The MCU-2/P does not have drinking capabilities.
d. The eyelens of the MCU-2/P is adjustable.

Item 4 What is an additional feature of the MCU-2/P mask?

a. An extended drinking tube
b. A mic-mitter assembly
c. An extra size category
d. A double canister for shipboard fire fighting

Continued on next page

Solutions

The table below lists the solutions to the exercise items. If you have any questions about these items, refer to the reference page.

Item Number	Answer	Reference
1	d	6-78
2	b	6-80
3	a	6-79
4	b	6-85

Summary

You have learned about the capabilities, components, and serviceability standards for the MCU-2/P mask. We also discussed operational procedures, cleaning and care for the mask, and proper storage.

STUDY UNIT 3

NUCLEAR, BIOLOGICAL, AND CHEMICAL DEFENSE

Overview

Focus

Defense against NBC attacks or weapons of mass destruction (WMD) is a complex process. There are many aspects that must be taken into consideration, but they all fall under three simple principles: avoidance, protection, and decontamination. If units and individuals understand these three areas, they will be better equipped to survive on the NBC battlefield.

Scope

This study unit includes defensive measures for nuclear, biological, and chemical attacks. These measures will guide your actions before, during, and after nuclear, biological, and chemical attacks.

In This Study Unit

This study unit contains the following lessons.

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LESSON 1

NUCLEAR WARFARE

Introduction

Lesson Focus

Nuclear weapons cause extensive devastation on the battlefield. One strike can produce massive amounts of casualties, disrupt communications, and restrict movement in large areas of the theater of operation. Through training and education, units can overcome many of the effects of nuclear warfare to survive an attack, continue to fight, and ultimately win.

Content

This lesson includes the knowledge and techniques needed to understand nuclear warfare effects and how to defend against them.

Learning Objectives

At the end of this lesson, you will be able to

- Identify the terms associated with nuclear warfare.
- Identify the effects that a nuclear explosion produces.
- Identify the types of radiation.
- Identify what actions should be performed before a nuclear attack.
- Identify what actions should be performed during a nuclear attack.
- Identify what actions should be performed after a nuclear attack.

Continued on next page

In This Lesson This lesson contains the following topics.

Nuclear Terminology

Definitions

To understand the effects of nuclear warfare, you must be familiar with the following terms and definitions.

Term	Definition
Base Surge	A surge of radioactive water droplets caused when water is thrown into the air by a nuclear explosion.
Blackout	The distortion, absorption, or deflection of a communications or radar signal by the ion field that forms from a nuclear explosion.
Blueout	A phenomenon of liquid reverberation resulting from the reflection of shock generated from an underwater explosion that will mask the sound sonar should detect.
Centigray (cGy)	The international unit of measurement used to calculate radiation.
Electromagnetic Pulse (EMP)	An intense electromagnetic field that occurs fractions of a second after a nuclear explosion. An EMP can damage electrical and electronic equipment by inducing strong electric current into the circuits. This is similar to a lightning strike.
Fallout	The descent of contaminated radioactive particles to the earth's surface after a nuclear detonation.
Fission	The splitting of atoms. Fission causes one type of nuclear explosion.
Ground Zero	The precise location or center of a nuclear detonation.
Shockwave	An impulse of energy conducted through solid or liquid material (also called the **blast wave**).
Transient Radiation Effects on Electronics (TREE)	Causes temporary or permanent damage to electronic equipment as a result of exposure to initial radiation.
Yield	The explosive power of a nuclear weapon. It is measured in kilotons or megatons (thousands or millions of tons) of TNT. One kiloton is equivalent to an entire football field stacked eight feet high with TNT.

Detonations

Types of Bursts

Another term used to describe a detonation is burst. Different bursts produce different effects. The section below describes the various types of bursts and the effects they produce. Terms associated with the effects were previously described in this lesson.

Air Burst

An air burst is a detonation that occurs above the surface of the ground or water, but below 100,000 feet. The effects of an air burst are

- Initial Radiation
- Thermal Radiation
- EMP
- TREE
- Blackout
- Fallout

Surface Burst

A surface burst is a detonation that occurs on or near the surface of the ground or water. Surface bursts normally produce the most devastating effects. The effects of a surface burst are

- Shockwave
- Fallout
- Initial Radiation
- Thermal Radiation
- EMP
- TREE
- Blackout

Sub-surface Burst

A sub-surface burst is a detonation that occurs underground or under water. For tactical military detonations, a sub-surface burst will most likely occur under the water. The effects of a sub-surface burst are

- Base Surge
- Blueout
- Underwater Shock
- Fallout

Effects of a Nuclear Detonation

Primary Effects

When a nuclear detonation occurs, there are several instant effects. The primary effects are **blast, heat, and initial radiation**. The combination of the three can produce massive damage and casualties on the battlefield.

Blast

One of the primary casualty effects of a nuclear detonation is the blast, commonly referred to as the shockwave. The shockwave travels outward from ground zero in a circle at about seven or eight times the speed of sound. The incredible intensity of the blast raises the atmospheric pressure by about 10 pounds per square inch, exerting immense pressure on the human body, creating damage to internal organs.

The range of the shockwave depends on the size of the blast and terrain features. When the shockwave reaches its outer limits, the atmospheric pressure outside the circumference starts to push it back towards ground zero. This is known as the backlash. A shockwave creates hurricane-type damage. Buildings are demolished, trees uprooted, vehicles thrown about, and extensive projectile or missile damage results from objects hurled through the air.

Heat

A nuclear detonation generates an enormous amount of heat and light. This heat and light is referred to as the fireball. The fireball produces a brilliant flash of light known as "light dazzle," which can cause temporary or permanent blindness if looked at too long. The heat component of the fireball is often referred to as thermal radiation. Thermal radiation causes serious burns and ignites combustible material.

Initial Radiation

Initial radiation is radiation that is released from the fireball. Initial radiation will be discussed in more detail in the next section of this lesson.

Continued on next page

Additional Environmental Effects

In different climates and environments, nuclear detonations will create different effects. Deployment to these environments will create unique problems in defensive planning and in anticipating the end result of a detonation.

Type of Environment	Additional Effects
Cold/Arctic	• Break-up of cover • Quick thaws • Avalanches • Increased light dazzle effects • Cold weather effects on Radiac equipment • High winds that make radiological predictions harder • Radiation hot spots in snow banks and drifts • Frozen ground that makes fortification difficult
Desert	• Lack of vegetation and permanent fixtures make fortification difficult • Blowing sand can spread contamination
Jungle	• Increased mildew, rust, and dry rot can hinder NBC equipment • Increased missile damage and tree blowdown • Radiation collected in the canopy will be washed to water collection points and create radiation hot spots
Urban	• Increased injury from glass and debris • Structural collapse • Firestorms from gas lines and fuel stations • Bridge and overpass routes weakened or destroyed

Types of Radiation

Importance of Knowledge	You must know something about the following types of radiation to protect yourself from them.
Initial	Highly penetrating and harmful radiation, primarily neutrons and gamma rays released from the fireball during the first minute after a nuclear explosion.
Thermal	High intensity pulse of heat released during the early formation of a nuclear fireball.
Residual	Radioactive substances that remain after a nuclear explosion. This radiation is produced by fallout and lasts longer than one minute after the detonation.
Alpha	Alpha particles are charges emitted from the nucleus of an atom. Alpha particles have a range of approximately 10 centimeters in still air and are considered an internal hazard to the human body.
Beta	Radiation emitted from the nucleus of an atom that can burn the skin. Beta particles have a range of 10-15 meters in still air. The burns produced are called beta burns.
Gamma	Gamma radiation is very short wave and high energy electromagnetic emissions from the nucleus of an atom. This is the primary radiation hazard on the nuclear battlefield.
Induced	Induced radiation is produced by a material as a result of that material's exposure to radiation from another source.

Actions Prior to an Attack

Preparation

Defensive preparation is the key to surviving a nuclear attack. This preparation must take place before combat operations in the form of NBC training and education. Listed below are defensive measures that should take place if friendly forces employ a nuclear weapon and warning time permits. You should also use these measures if the current enemy NBC threat indicates a nuclear attack is imminent. Regardless of the circumstances or surroundings, always seek **low-lying shelter and continue to harden and protect as time permits**.

Shelter

A shelter is anything used to help in the protection from the effects of a nuclear detonation. As time permits, you should constantly seek to improve and further fortify your shelter. The initial focus should be shielding from gamma and neutron radiation. Different types of material produce various shielding effects. The thicker the protective layers, the better it will shield. Listed below are examples of various shielding material.

- Gamma--layers of dense materials such as lead, iron, concrete, and stone.
- Neutron--hydrogen-based materials that absorb the neutrons. Water, oil, and paraffin are excellent forms of protection.

Terrain

Certain terrain features provide natural protection from nuclear weapons. Knowing how terrain features influence the effects of nuclear weapons and how they give protection is particularly useful when too little warning time is given to fully prepare. Listed below are examples of natural features that provide protection.

- Hills and mountains provide protection as long as they are between you and the detonation. The earth will absorb heat and light from the fireball. What is not absorbed deflects above you.
- Depressions such as gullies, ravines, and ditches provide a good source of protection because they allow the shockwave to pass over the body, reducing the chance of injury produced by missile damage.
- Caves, fallen trees, and boulders will also help reduce nuclear casualties if used properly. Predicting ground zero of an enemy attack is impossible; therefore, the best protection is to be underground with some type of overhead cover.

Continued on next page

Actions Prior to an Attack, Continued

Man Made Protection

The value of this type of protection ranges from fair to excellent if it is used appropriately. Walls, culverts, underground shelters, sewers, and tunnels all provide protection. Whatever you can place between you and ground zero will provide some type of protection as long as it will not blow over, collapse, or blow up. Use good judgement and common sense when selecting protection.

Buildings

Buildings make excellent shelters against nuclear effects if selected properly because they take a small amount of time and effort to prepare. Buildings made of block, stone, and steel provide better protection than structures built with light frames, long beams, and sheet metal. Avoid buildings with more than four or five floors in the event of collapse.

Regardless of the building type, always seek the lowest level. Lie on the floor and position yourself near structural supports, under stairs, or inside a fireplace. Avoid windows and doors that could be blown in and cause damage. A basement is always the best means of protection. Radiation is cut by a factor of 10 in basements compared to floors at ground level.

Fighting Positions

Fighting positions provide excellent protection from nuclear effects because the earth is a natural shielding material, and these shelters can be constructed almost anywhere quickly and with little assets. As with other forms of protective shelters, actions can be taken to harden fighting positions to increase their protective capabilities.

- Use small openings to restrict the amount of gamma radiation that enters. A one-person fighting position allows the entry of ½ to ¼ the radiation that a two person fighting position allows to enter.

- The deeper the position the better. Radiation is reduced by a factor of two for every 16 inches of depth a position is built.

- Use materials such as wool blankets, wood, and canvas to line fighting positions to enhance your protection. Thermal exposure may still burn these materials so you should avoid contact with them. Always cover the position. Covering a fighting position with metal screening like that on doors and windows can reduce thermal effects by 50 percent.

Continued on next page

Actions Prior to an Attack, Continued

Vehicles

Some vehicles provide good protection while others should not be used as a means of protection. Wheeled vehicles should not be used as a form of nuclear protection. These vehicles provide little to no protection from the effects of a nuclear detonation. They are also very susceptible to being blown over creating even more injuries. Heavily armored vehicles, such as tanks, provide the best protection. Light armored vehicles will provide adequate protection. Listed below are steps that should be taken for any vehicle to increase its protective capabilities.

- Dismount from turrets and higher positions and get on the floor of the vehicle.
- Close all hatches, gun breaches, and ventilation systems to prevent the entry of fallout and radiation particles.
- The shockwave can throw personnel, weapons, and tools about the vehicle. All loose gear should be secured and protective equipment such as helmets and flak jackets should be worn to prevent injury.
- Sandbags are a great source of protection from nuclear effects. Each layer placed on the floor, overhead, and around vehicles will reduce the gamma radiation factor by two. Wetting of the sandbags will protect them from thermal damage and enhance their neutron radiation shielding ability.
- Dig vehicles in or position them in trenches or cuts in the road to limit blast and radiation effects. If possible, place the engine compartment between the detonation and the crew. Avoid having the vehicle broadside to the detonation.

Equipment

Electromagnetic pulse (EMP) will damage electronic equipment such as computers and radios. If time permits, all vehicles and other equipment should be turned off to avoid damage.

Actions During an Attack

Indicators

In most cases, a nuclear attack from the enemy will occur with little or no warning, but the indicators that a nuclear weapon has been detonated are unmistakable. They are a brilliant flash of light, high winds, an enormous explosion, and a mushroom cloud.

Immediate Action

If caught in the open during a nuclear attack,

- Immediately drop to the deck seeking cover if possible.
- Close your eyes and cover all exposed skin by putting arms and hands under the body.
- Maintain positive control of your weapon.
- Stay down until the blast wave passes and all debris stop blowing.
- Check for injury and damaged gear.
- Continue the mission.

Actions After an Attack

Continue Protective Measures

After the attack, you must continue individual protection. Listed below are actions that should be taken to reduce contamination effects:

- Check for radioactive contamination.
- Brush, scrape, or flush contamination from clothing and contact areas.
- Cover fighting positions and shelters.
- Begin radiac monitoring.
- Report the strike.
- Cover the mouth with a handkerchief to reduce contamination intake to the lungs. This is preferred over masking to prevent contamination from being trapped in the canister.
- Continue the mission.

Lesson 1 Exercise

Directions Answer exercise items 1 through 20 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 Through Item 7 Matching: For items 1 through 4, match the terms in column 1 to the definitions in column 2. Place your answers in the spaces provided.

Column 1	**Column 2**
Term	**Definition**
___ 1. Blackout	a. A phenomenon of liquid reverberation resulting from the reflection of shock generated from an underwater explosion.
___ 2. Blueout	b. An intense electromagnetic field that occurs fractions of a second after a nuclear explosion. Can damage electrical and electronic equipment by inducing strong electric current into the circuits.
___ 3. Electromagnetic Pulse	c. A cause of temporary or permanent damage to electronic equipment that is a result of exposure to initial radiation.
___ 4. Transient Radiation Effects on Electronics	d. The distortion, absorption, or deflection of a communications or radar signal by an ion field formed as a result of a nuclear explosion.

Continued on next page

Items 5 Through Item 7

Matching: For items 5 through 7, match the terms in column 1 to the definitions in column 2. Place your answers in the spaces provided.

Column 1	**Column 2**
Term	**Definition**
___ 5. Fallout	a. The international unit of measurement used for radiation
___ 6. Centigray	b. The term used to describe the explosive power of a nuclear weapon
___ 7. Yield	c. The descent of contaminated radioactive particles to the surface after a nuclear detonation

Item 8

Select the type of nuclear burst that produces the most destructive power.

a. Surface
b. Air
c. Sub-surface
d. Supersonic

Item 9

Select the statement that best describes the primary effects of a nuclear detonation.

a. Blast, heat, and gamma radiation
b. Blast, heat, and initial radiation
c. Blast, shockwave, heat, and initial radiation.
d. Blast, light dazzle, and initial radiation.

Continued on next page

Item 10

Increased glass injury, structural collapse, firestorms, and weakened bridges are examples of additional effects resulting from a detonation in a (an) _____ environment.

a. cold
b. desert
c. jungle
d. urban

Items 11 Through Item 15

Matching: For items 11 through 15, match the types of radiation in column 1 with their definitions in column 2. Place your answers in the spaces provided.

Column 1	**Column 2**
Type of Radiation	**Definition**
___ 11. Initial	a. Highly penetrating and harmful radiation released during the first minute after a nuclear explosion.
___ 12. Residual	b. High intensity pulse of heat released during the early formation a nuclear fireball.
___ 13. Gamma	c. Electromagnetic emissions of short wave length from the nucleus of an atom. This is the primary radiation hazard on the nuclear battlefield.
___ 14. Beta	d. Radioactive substance that remains after a nuclear explosion.
___ 15. Thermal	e. Radiation emitted from the nucleus of an atom that can burn the skin.

Continued on next page

Item 16

Select the statement that best describes the actions you should take before a nuclear attack.

a. Immediately don and clear the mask and seek cover.
b. Seek low-lying shelter, continue to harden and protect.
c. Drop to the deck, cover exposed skin, close eyes, and inventory self and gear.
d. Administer all antidotes and assume MOPP level 4.

Item 17

Electronic and electrical equipment should be turned off before a nuclear attack to prevent damage from

a. gamma radiation.
b. electromagnetic pulse.
c. thermal radiation.
d. blast effect.

Item 18

Which type of vehicle provides the best means of protection from nuclear effects?

a. Wheeled
b. Enclosed
c. Armored
d. Safety

Item 19

Select the statement that best describes the actions during a nuclear attack.

a. Seek low-lying shelter, and continue to harden and protect.
b. Immediately don and clear the mask and seek cover.
c. Drop to the deck, cover exposed skin, close eyes, and inventory self and gear.
d. Seek cover, inventory self and gear, decontaminate, and report strike.

Item 20 Select the statement that best describes the actions after a nuclear attack.

a. Administer all antidotes and assume MOPP 4.
b. Immediately don and clear the mask and seek cover.
c. Inventory self and gear, decontaminate, report strike, continue mission.
d. Inventory self and gear, report strike, go to nearest fallout site

Continued on next page

Solutions

The table below lists the solutions to the exercise items. If you have any questions about these items, refer to the reference page.

Item Number	Answer	Reference Page
1	d	3-5
2	a	3-5
3	b	3-5
4	c	3-5
5	c	3-5
6	a	3-5
7	b	3-5
8	a	3-6
9	b	3-7
10	d	3-8
11	a	3-9
12	d	3-9
13	c	3-9
14	e	3-9
15	b	3-9
16	b	3-10
17	b	3-12
18	c	3-12
19	c	3-13
20	c	3-14

Summary

In this lesson, you learned about the different types of nuclear detonations, their effects, and defensive measures to take before, during, and after a nuclear detonation.

In the next lesson, you will learn about biological defense.

LESSON 2

BIOLOGICAL WARFARE

Introduction

Lesson Focus

Biological weapons are often referred to as the "poor man's atomic bomb." This is because they are inexpensive to produce, easy to manufacture, and extremely deadly. It is estimated that a 12.5-kiloton atomic bomb, which costs millions of dollars to produce, could cause 80,000 casualties. One hundred kilograms of anthrax spores produced for under a thousand dollars could kill between one and three million people.

Content

In this lesson, you will learn about the different types of biological agents and how they enter and poison the human body. You will also learn what defensive measures to take before, during, and after a biological attack.

Learning Objectives

At the end of this lesson, you will be able to

- Identify the terms associated with biological warfare.
- Identify how biological agents are classified.
- Identify the factors that affect the duration of a biological agent.
- Identify the actions that should be performed before a biological attack.
- Identify the actions that should be performed during a biological attack.
- Identify the actions that should be performed after a biological attack.

Continued on next page

Introduction, Continued

In This Lesson This lesson contains the following topics.

Terminology

Definitions

By knowing and understanding how biological agents poison and enter the human body, you can better defend yourself from them. The common terms associated with biological warfare are

- **Vector**--A vector is a carrier, or intermediate host, especially an animal or insect that carries a pathogen from one host to another. In most cases, vectors are ticks, lice, or mosquitoes.
- **Pathogens**--Microscopic organisms that can cause disease in humans, plants, or animals.
- **Toxins**--Substances harmful to humans or animals that are produced by microorganisms.
- **Bacteria**--Single-celled microscopic organisms.
- **Rickettsiae**--Microorganisms that can produce diseases. Rickettsiae are carried by vectors such as ticks, lice, fleas, and mosquitoes.
- **Viruses**--Submicroscopic disease causing organisms, viruses are responsible for over 60% of all infectious diseases. Viruses can reproduce only inside living cells.
- **Fungi**--Fungi are plants that lack chlorophyll. Many species of fungi produce mycotoxins that are poisonous to humans.
- **Neurotoxins**--Poisons that affect the central nervous system.
- **Cytotoxins**--Poisons that kill all types of cells in the body.
- **Dermatoxins**--Poisons that produce a skin hazard similar to blister agents.
- **Enterotoxins**--Poisons that attack the intestinal system.

Categories

Classification

Many of the symptoms and effects of biological agent poisoning resemble those of chemical agents (which will be discussed in the next lesson). For military purposes, biological agents produce casualties in two ways and are classified by the way they act. The two main classes are

- Live agents
- Toxins

Live Agents

Live agents include all forms of living organisms such as bacteria, viruses, fungi, and rickettsiae. These agents produce casualties by causing incapacitating disease or death.

Toxins

Toxins are derived from live agents and can produce a wide variety of symptoms in the human body. Toxins are broken down into two separate sub-categories.

- **Neurotoxins** or "nerve toxins" have highly damaging effects on the nervous system because they interfere with the transmission of nerve impulses. Neurotoxins do not produce identical symptoms. Some can block receptors or inhibit the activity of ion channels while others may stimulate or restrict the release of acetylcholine. Generally speaking these agents are rapid acting and produce immediate symptoms.

- **Cytotoxins** or "cell poisons" produce various symptoms due to their unique mechanisms. Some simply destroy cells while others interrupt cell activity such as protein synthesis, cell regulation, or other biochemical processes. Most cytotoxins produce casualties with a delayed reaction upon contact. Symptoms develop a few hours to a few days after exposure.

Continued on next page

Categories, Continued

Delivery

The delivery or dissemination of biological agents depends on the desired end-result of the threat initiators. Tactical agents will be delivered primarily in aerosol form but may also be in a powder or liquid state depending on the characteristics of the particular agent. Some agents can contaminate hundreds of square miles and most can contaminate at least several square miles. Methods of delivery are

- Low impact bombs that pop rather than explode
- Airbursting munitions
- Aerosol generators
- Aircraft spray
- Spray generators
- Vectors

Exposure

Contamination from biological agents takes place through inhalation, ingestion, and skin absorption.

- Inhalation occurs when the agent is inhaled into the respiratory tract.
- Ingestion occurs when the agent is absorbed through the intestinal tract from contaminated food or water.
- Skin absorption occurs when the agent enters through the epidermal layer of the skin or mucous membranes.

Factors of Duration

Many factors affect the duration of biological agents. It is important for you to be familiar with them because the longer the agent is in the area, the longer you must stay in protective clothing and the greater the risk of exposure. Listed below are factors that determine the duration of a biological agent:

- State of the agent (solid, powder, liquid, etc.)
- Concentration of the agent
- Means of delivery
- Type of agent
- Weather and wind conditions

Agents

Identification

The identification of biological agents on the battlefield is extremely difficult. Many of the symptoms of biological agent poisoning resemble those of chemical agent poisoning. Correct identification of agent poisoning is vital for medical or first aid treatment. There are no specific treatments for most biological agents other than standard life-saving procedures. These include treating the victim for shock, supportive care, artificial respiration, and cardiac resuscitation. Keep in mind that poisoning by any agent, even one that is non-lethal, can result in death depending on the concentration of the agent, amount of exposure, and route of entry. For decontamination, hot, soapy water is preferred when available. The table below gives a brief description of some potential military biological agents.

AGENT	SOURCE	ENTRY	TIME FACTOR	SYMPTOMS	FIRST AID	DECON	CLASS
Anatoxin A	Blue-green Algae	Ingestion	Less than five minutes	Twitching Tremors Paralysis Respiratory arrest Death	None	Water	Neurotoxin
Batracho-toxin	Colombian Arrow frog	Inhalation	Rapid	Loss of balance Profound weakness Convulsions Respiratory failure	None	Water	Neurotoxin
Botulinum	Bacteria *Clostridium*	Ingestion	Delayed Reaction 2 hours to 8 days	Weakness Dizziness Profuse vomiting Double vision	Antitoxin	Water Bleach	Neurotoxin
Microcystin	Blue-green Algae	Inhalation Ingestion	Less than five minutes	Severe liver damage Convulsions Shock Death within hours	None	Water Bleach	Cytotoxin
Palytoxin	Coral	Inhalation Ingestion Absorption	Rapid	Drowsiness Weakness Vomiting Convulsions Death within minutes	None	Water	Neurotoxin
Ricin	Castor bean plant	Inhalation Ingestion Absorption	Delayed reaction 6 hours to 3 days	Nausea Vomiting Abdominal cramps Circulatory failure Death	Fluids Antitoxins	Water	Cytotoxin
Saxitoxin	Alaskan butter clam	Inhalation Ingestion Absorption	10 minutes	Body numbness Dizziness Nausea Rapid pulse Weakness Death	Induce vomiting	Water Bleach	Neurotoxin

Continued on next page

Identification, continued

AGENT	SOURCE	ENTRY	TIME FACTOR	SYMPTOMS	FIRST AID	DECON	CLASS
Scorpion venom & toxin	Various scorpions	Inhalation Absorption	Delayed reaction	Rigid paralysis Increased pulse rate Congestive heart failure	Procaine Antivenin	Water	Neurotoxin
Snake venom & toxin	Various snakes	Inhalation Absorption	Rapid	Hemorrhage Blurred vision Vomiting Shock Cardiac failure Respiratory failure Death	Antiserum	Water	Neurotoxin
Staphylococcus Enterotoxin (type b)	Bacteria	Inhalation Ingestion	30 minutes to six hours	Sudden vomiting Abdominal craps Nausea Explosive diarrhea Severe weakness	Rest Fluids	Water Formalde-hyde	Neurotoxin
Tetrodotoxin (Fugu poison)	Puffer fish Some newts & frogs	Inhalation Ingestion Absorption	Rapid Respiratory failure within minutes	Vomiting Nausea Body numbness Weakness Severe shock Respiratory failure	None	Water STB DS2	Neurotoxin
Trichothecene (T-2 also called Yellow Rain)	Fungal toxins (Infected grain)	Inhalation Ingestion Absorption	10 minutes to one day Death may be delayed for up to one week	Nausea Dizziness Skin irritation Eye irritation Chest pain Blisters Bloody vomit Massive hemorrhaging Anemia Liver failure Bone marrow suppression	Antitoxin	Water STB DS-2	Cytotoxin

Actions Prior to an Attack

Preparation

Defense from biological agents must begin before entering a combat environment or theater of operation where biological weapons may be deployed. Constant training and education in biological warfare tactics is essential for survival.

Personal Health

Good health and a high state of physical fitness play a vital role in the defense of biological agent poisoning. A strong, healthy, and well-maintained body has a better chance to ward off germs, viruses, and other diseases associated with biological warfare. Listed below are areas of concern when preparing for a biological strike:

- **Food and water**- You should eat as often as the situation permits. A fully nourished body fights off biological agents better than a malnourished one, which is why being well nourished will sustain you longer if a biological agent contaminates food and water.

- **Rest**- You should rest as much as possible, especially if you are in MOPP gear which makes rest and sleep more difficult.

- **Physical condition**- Physical conditioning begins with food, water, and rest. Having a well-rested and well-fed body increases your chance of survival on the biological battlefield. A high level of physical fitness promotes better mental health, reduces heat casualties in MOPP, and allows your body to fight biological agents better.

Immunization

Up-to-date immunization helps minimize biological casualties. Immunizations also prevent illness from diseases found primarily in other countries. Many diseases that are uncommon in the United States are prevalent in other areas of the world. NBC threat briefs, along with medical and health intelligence can assist leaders in determining if additional immunizations are needed in a particular theater of operation or against certain enemy forces.

Continued on next page

Actions Prior to an Attack, Continued

Hygiene

Proper hygiene and health care are essential in reducing the spread of natural germs or purposely-employed biological agents. As often as possible, clean your entire body with an uncontaminated water source. Brush your teeth daily and wash your hands thoroughly before eating. Although cuts, nicks, and scratches are unavoidable in the military, these injuries should be cleaned and bandaged as soon as time permits. Biological agents can poison the body through open wounds in the skin more readily than they can through intact skin.

Sanitation

Keeping your area in a good state of police is a good way to reduce the spread of disease and germs. A clean area will prevent the infestation of insects, rodents, and other vectors that could possibly carry a biological agent. Marking of your area when departing will prevent friendly forces from inhabiting a possible hazardous site. Listed below are areas of concern in the sanitation of your area:

- Bury all food and rations not used. Wastewater from cleaning, cooking, and washing should be buried.
- Food and water should be kept in sealed containers to prevent contamination. Containers and equipment that hold water should be emptied on a daily basis to prevent stagnation.
- Personal waste stations should be constructed according to local standard operating procedures. These facilities should be cleaned daily and contain soap and water for washing hands.

Actions During an Attack

Indicators

The most critical step in the defense against a biological attack is identifying it as soon as possible. A biological agent may be delivered in a variety of ways with symptoms appearing from minutes to days after exposure. Indicators of a biological attack are

- Mysterious illness in personnel
- Large number of insects suddenly appearing in the area
- Large number of dead animals with no apparent cause of death
- Mass casualties with flu type symptoms
- Artillery shells that have low explosive power
- Bombs that pop rather than explode
- Mist or fog that is sprayed from an aircraft

Immediate Action

Protecting yourself with protective ensembles is essential if you expect to survive a biological attack. Upon recognizing a biological attack you should immediately assume MOPP 4 and continue the mission. While putting on protective gear, use overhead cover to reduce contact with the agent.

Actions After an Attack

Identification of the Agent	After the attack, proper agent identification is critical. First aid procedures cannot be initiated until the agent is identified. The proper sampling procedures will be discussed in greater detail in Study Unit 4.
Decontaminate	You should decontaminate yourself and equipment as soon as possible to restore combat power and reduce the spread of contamination. Do this by washing with soap and water or using decontaminating kits. Decontamination techniques and kits will be discussed in greater detail in Study Unit 4.
Casualties	Casualties from a biological strike must be isolated to reduce the spread of the agent. Using the minimum number of personnel to treat casualties will also prevent the spread of contamination. Medical personnel will dictate the type and degree of first aid procedures to be used.
Reporting	It is important to report the attack to all friendly and adjacent units. Doing this will also help in pinpointing the location and origin of the attack. Reporting procedures will be discussed in greater detail in Study Unit 4.
Marking	Marking of the contaminated area should be done as soon as possible to limit entry into the area. Doing this will reduce the spread of contamination and warn friendly forces of the threat area. Marking procedures will be discussed in greater detail in Study Unit 4.
Food and Water	Food and water should be consumed only from appropriate sources to prevent ingestion of biological agents.

Lesson 2 Exercise

Directions

Answer exercise items 1 through 15 by performing the action required. Check your answers against those listed at the end of this lesson.

Items 1 through Item 5

Matching: For items 1 through 5, match the terms in column 1 to the definitions in column 2. Place your answers in the spaces provided.

Column 1	**Column 2**
Term	**Definition**
___ 1. Vector	a. Microscopic organisms that can cause disease in humans, plants, or animals
___ 2. Pathogen	b. A carrier, especially an insect that carries a pathogen from one host to another
___ 3. Toxin	c. Poisonous substances produced by microorganisms that are harmful to humans or animals
___ 4. Bacteria	d. Single-celled microscopic organisms
___ 5. Rickettsiae	e. Microorganisms carried by vectors such as ticks, lice, fleas, and mosquitoes

Items 6 Through Item 10

Matching: For items 6 through 10, match the terms in column 1 to the definitions in column 2. Place your answers in the spaces provided.

Column 1	**Column 2**
Term	**Definition**
___ 6. Enterotoxins	a. Submicroscopic disease causing organisms
___ 7. Dermatoxins	b. Kill all types of cells in the body.
___ 8. Cytotoxins	c. Attack the intestinal system
___ 9. Neurotoxin	d. Produce a skin hazard similar to blister agent
___ 10. Viruses	e. Affects the central nervous system

Continued on next page

Item 11 Biological agents are classified by

a. the way they act.
b. how they poison the body.
c. the physical state they are in.
d. how they are delivered.

Item 12 Concentration of the agent, means of delivery, type of agent, and the state of the agent describe

a. threat indicators.
b. factors of duration.
c. agent identification.
d. first aid selection.

Item 13 Keeping up-to-date immunizations, good sanitation, proper hygiene, and being well rested are examples of actions to take _____a biological attack.

a. before
b. during
c. after
d. near

Item 14 What is the most critical step during a biological attack?

a. Immediate action
b. Recognizing indicators
c. Up to date immunizations
d. Marking of the area

Item 15 What is the most critical step after a biological attack?

a. Marking of the area
b. Reporting the threat
c. Identifying the threat
d. Immediate action

Continued on next page

Solutions

The table below lists the solutions to the exercise items. If you have any questions about these items, refer to the reference page.

Item Number	Answer	Reference Page
1	b	3-23
2	a	3-23
3	c	3-23
4	d	3-23
5	e	3-23
6	c	3-23
7	d	3-23
8	b	3-23
9	e	3-23
10	a	3-23
11	a	3-24
12	b	3-25
13	a	3-28
14	b	3-30
15	c	3-31

Summary

In this lesson, you learned about the different types of biological agents and how they affect the human body. You also learned what actions to take before, during, and after a biological strike.

In the next lesson, you will learn about chemical warfare defense.

LESSON 3

CHEMICAL WARFARE

Introduction

Lesson Focus

A chemical agent is a substance that military units use to kill, injure, or incapacitate opposing forces. Nations have used chemical weapons in the past; the possibility that they will use them in the future cannot be ignored. The effects of chemical agents are very diverse; some kill in seconds while others can leave you in agonizing pain for months.

Content

In this lesson, you will learn about the different types of chemical agents and how they poison the human body. You will also learn what defensive measures to take before, during, and after a chemical attack.

Learning Objectives

At the end of this lesson, you will be able to

- Identify the terms associated with chemical warfare.
- Identify the three ways chemical agents are classified.
- Identify the three physical states of chemical agents.
- Identify the three uses of chemical agents.
- Identify the different types of chemical agents.
- Identify the actions that should be performed before a chemical attack.
- Identify the actions that should be performed during a chemical attack.
- Identify the actions that should be performed after a chemical attack.

Continued on next page

In This Lesson This lesson contains the following topics.

Terminology

Definitions

By knowing the following definitions you will understand how chemical agents affect and enter the human body.

- **Persistent**- A persistent agent is an agent that stays in the area for an extended period of time. In most cases, the agent will be in a liquid or solid form.

- **Non-persistent** - A non-persistent agent is an agent that evaporates or dissipates very quickly. In most cases, it will be in an aerosol or vapor form.

- **Ingestion** - Ingestion is one manner in which a chemical agent can poison or enter the body. This occurs when the agent is in food or water that is consumed by the body.

- **Skin Absorption** - Skin absorption is another method of chemical poisoning. When a chemical agent makes contact with the skin, it is absorbed by the epidermal layer and eventually enters the blood stream. It is then carried to vital organs and the rest of the body.

- **Inhalation** - Inhalation is the most prominent means of chemical poisoning. When you inhale a chemical agent, it goes directly into the body producing rapid chemical poisoning effects.

Classification

Groups

Chemical agents can be divided into three main groups based on the way they affect the human body and the severity of those effects. The three groups are

- Lethal
- Blister
- Incapacitating

Definitions of Groups

Lethal

Lethal agents are designed and used on the NBC battlefield to accomplish one thing--kill anyone they come in contact with. The most common lethal agents military personnel may encounter are

- Blood
- Nerve
- Choking

Blister

Blister agents are persistent agents that primarily attack the skin, but they will also damage the eyes, lungs, and respiratory tract if inhaled. Blister agents can poison food and water supplies and produce severe diarrhea and vomiting when absorbed into the body. The most common forms of blister agents military personnel may encounter are

- Levinstein Mustard
- Distilled Mustard
- Lewisite
- Phosgene Oxime

Incapacitating

Incapacitating agents can cause physiological or physical effects designed to reduce the combat power of opposing forces. Incapacitating agents have a wide range of effects. The desired result will dictate which agent will be used; effects range from instant effects that only last for minutes or delayed effects that can last for days. The most commonly used forms of incapacitating agents are

- BZ
- Fentanyls

Military Chemical Compounds

Purposes of Compounds

Another group of agents are military chemical compounds. They are used in training simulation, riot control situations, vegetation control, obscuring, screening, and signaling.

Non Purpose of Compounds

These agents are not intended to cause death or permanent injury.

Types of Compounds

Listed below are the most common types of military compounds that could be used.

- Irritants
- Riot Control
- Herbicides
- Flame
- Smoke

Physical States

The Three States

Chemical agents come in many different states. Some are odorless, colorless, and tasteless while others have distinct smells, taste, and appearance. They have different boiling points, freezing points, vapor pressures, and stability levels. **The most important thing to remember is that all agents are in a liquid, solid, or gaseous state**. This is important because knowing the state of the agent will tell you how the agent can poison or enter your body, how long the agent will stay in the area, and to a certain degree, it will help identify the type of agent.

Uses of Agents

Tactical Purposes

Because chemical agents can be employed on the battlefield in various physical states they can be used for a wide variety of tactical purposes in combat**. For military purposes, chemical agents kill, seriously injure, or incapacitate**. When agents are used in the following manner, their use will result in slower movement and reduced work rates due to the MOPP factor.

- They can be used to produce instant casualties against a numerically superior force.
- Incapacitating agents can be used to deplete supporting logistics and manpower in the form of treatment, care, and evacuation.
- Certain agents can contaminate large areas of the battlefield for prolonged periods of time making them difficult or impossible to occupy.
- Agents can disrupt supply lines and hinder the use of equipment until it is decontaminated.
- Chemical agents will instill fear, anxiety, and lower morale in opposing forces.

Types of Agents

Protection

Regardless of the type of agent you encounter, you must always protect yourself in the same manner. The steps are outlined below. **If the concentration is high enough or the exposure long enough, any agent, including training agents, can kill.**

Step	Action
1	Always protect yourself with your field protective mask. With adequate warning, proper use of the mask can result in very limited or no exposure to the agent.
2	Chemical agent casualties should be masked as soon as possible to avoid further exposure to the agent.
3	Protect yourself using your protective overgarments.
4	Decontaminate as necessary.

Decontamination

There are many forms of decontaminates available to render chemical agents harmless or reduce their effects. It is important to know what decontaminate works best with the different types of agents. Large amounts of hot, soapy water can be used to clean yourself and equipment when no decontaminate is available. This information will be discussed further in Study Unit 5.

Blood

Blood agents are one of the most deadly agents because they produce effects within seconds of contact. Blood agents can cause death within minutes. These agents enter the body primarily by inhalation and affect the body's ability to transfer oxygen from the blood cells to the rest of the body.

AGENT	STATE	ODOR	USE	SYMPTOMS	DECON
Hydrogen Cyanide (AC)	Colorless liquid that evaporates quickly	Bitter almonds or peach kernels	Very quick acting suitable for surprise attack	Pink or purple lips and fingertips, instant unconsciousness and death	None required in field conditions
Cyanogen Chloride (HC)	Colorless liquid that evaporates quickly	Pungent	Very quick acting suitable for degrading filter elements	Pink or purple lips and fingertips, severe tearing and irritation effects, instant unconsciousness and death	None required in field conditions
Arsine (SA)	Gas	Mild garlic	Delayed from 2 hours to 11 days	Headache, liver and kidney damage, vomiting, nausea, and anemia	None required in field conditions

Continued on next page

Types of Agents, Continued

Nerve

Nerve agents can poison the body by inhalation, skin absorption, and ingestion. This means they can be in a liquid form and remain in the area for extended periods of time. Nerve agents interfere with nerve impulses sent from the brain to the rest of the body. The first aid for nerve agent is atropine. Atropine will be discussed in more detail in Study Unit 5.

AGENT	STATE	ODOR	USE	SYMPTOMS	DECON
Tabum (GA)	Colorless to brown liquid	Faintly fruity	Quick acting casualty	Difficulty in breathing, drooling, excessive sweating, vomiting, cramps, loss of bladder and bowel control, twitching, jerking, confusion, coma, and convulsions.	Calcium-hypochloride, STB, DS2, hot soapy water
Sarin (GB)	Colorless liquid	None	Quick acting casualty	Same as above	Calcium-hypochloride, STB, DS2, hot soapy water
Soman (GD)	Colorless liquid	Fruity	Quick acting casualty	Same as above	Calcium-hypochloride, STB, DS2, hot soapy water
VX	Amber colored liquid	None	Delayed action casualty (Death can occur within 15 minutes of a fatal dose)	Same as above	Calcium-hypochloride, STB, DS2, hot soapy water

Choking

Choking agents will most likely enter the body through inhalation. These agents attack the lining of the lungs causing the lungs to fill with liquid, thus choking the victim. The agents are more than three times as dense as air which causes them to linger in trenches and other low-lying areas. These agents were responsible for more than 80% of all chemical agent casualties in World War I.

AGENT	STATE	ODOR	USE	SYMPTOMS	DECON
Phosgene (CG)	Colorless gas	New-mown grass or hay	Delayed action casualty	Coughing, wheezing, dryland drowning	Aeration, not required in field environment
Diphosgene (DP)	Colorless to oily liquid	New-mown grass or hay	Delayed action casualty	Coughing, wheezing, dryland-drowning, tearing of the eyes	Aeration Steam Ammonia

Continued on next page

Types of Agents, Continued

Blister

Blister agents can poison your body by inhalation, skin absorption, and ingestion. These agents blister and burn the skin or any other body part they contact. When inhaled, they affect the respiratory tract and mucous membranes. If ingested, these agents cause severe vomiting and diarrhea leading to dehydration and heat related casualties. Self or first aid for blister agent poisoning is the M291 series skin decontamination kit. The various kits will be discussed in more detail in Study Unit 5.

AGENT	STATE	ODOR	USE	SYMPTOMS	DECON
Levinstein Mustard (H)	Colorless to amber liquid	Slight garlic or horseradish	Delayed acting casualty	Irritation of the eyes, nose, throat, and lungs. Vomiting and high fever. Reddening of the skin with blisters to follow. If ingested it will cause intestinal tract damage.	STB, fire or heat, DS2
Distilled Mustard (HD)	Colorless to amber liquid	Slight garlic or horseradish	Initial symptoms might not appear until 24 hours after contact	Irritation of the eyes, nose, throat, and lungs. Vomiting and high fever. Reddening of the skin with blisters to follow. If ingested it will cause intestinal tract damage.	STB, fire or heat, DS2
Lewisite (L)	Colorless to brownish liquid	Geraniums	Moderately delayed acting casualty	Rapid irritation of the eyes and skin. Can cause permanent blindness. Severe blistering about 13 hours after contact. When inhaled, high concentrations can be fatal within 10 minutes.	STB, bleach, DS2
Phosgene Oxime (CX)	Liquid above 35 degrees Celsius Solid below 35 degrees Celsius	Intense, penetrating, and violently irritating	Rapid acting casualty	Immediate and intense pain on contact. Violent irritation to eyes and nose. Skin becomes pale within 30 seconds. Area turns brown in about 24 hours. Blisters may take up to two months to heal.	Large amounts of water, DS2

Continued on next page

Types of Agents, Continued

Incapacitating

Incapacitating agents cause physiological effects. These agents cause various types of disabilities lasting from a few minutes after exposure to several days. Incapacitating agents generally will not cause death unless the dose received exceeds that of the incapacitating dose by many times.

AGENT	STATE	ODOR	USE	SYMPTOMS	DECON
BZ	White crystalline solid	None	Delayed acting incapacitating	Affects the ability to remember, solve problems, pay attention, and follow instructions. Causes sleepiness, blurred vision, and decreased alertness. Casualties take three to four days to recover	Large amounts of water. Symptoms may appear 36 hours after exposure. Delay is typical, prepare for an outbreak 6 to 24 hours after attack.
Fentanyls	Aerosol	None	Rapid acting incapacitating (within 10-90 seconds of contact)	Depressed heart rate and respiration, lethargy' sedation, and immobilization. This agent acts like morphine and is 10,000 times as potent.	Large amounts of water.

Irritants (tear producing)

Irritants cause a constant flow of tears and irritation to the eyes. This makes vision nearly impossible until the effects wear off. They also irritate the skin and cause breathing to become difficult. These agents are used when prolonged incapacitation is not the desired result. Widely used for training, riot control, and operations dealing with non-combatants.

AGENT	STATE	ODOR	USE	SYMPTOMS	DECON
Chloroacet-ophenone (CN)	Solid powder	Apple blossoms	Training and riot control	Irritates eyes and respiratory tract. Burning of the nose throat and skin. High concentrations can burn the skin.	Aeration
Chloroben-zylidene Malonon-itrile (CS)	Solid, powder, or liquid	Pepperlike	Training and riot control	Produces immediate effects even in extremely low concentrations. Burning of the skin and eyes, copious tearing, coughing, tightness in chest, sinus and nasal drip, and dizziness.	Aeration

Types of Agents, Continued

Vomit Inducing

Vomiting agents primarily affect the respiratory tract. These agents are similar to tear producing agents but with much stronger effects that last longer. These agents are not designed to kill or seriously injure, but to incapacitate their victims.

AGENT	STATE	ODOR	USE	SYMPTOMS	DECON
Diphenyl-chloroarsine (DA)	Colorless crystal	None	Fast acting incapacitating	Violent uncontrollable sneezing, coughing, tightness in chest, nausea, vomiting, severe, headache and pain.	Aeration
Diphenyl-cyanoarsine (DC)	Solid	Garlic or bitter almonds	Fast acting incapacitating	Violent uncontrollable sneezing, coughing, tightness in chest, nausea, vomiting, severe, headache and pain.	Aeration

Actions Before an Attack

Training

The best protection from a chemical attack is training and education. As with nuclear and biological warfare, this training must be conducted on the individual and unit level before the unit enters an environment that has been contaminated or a situation where the threat of chemical weapons exists. Units that are well trained in chemical warfare methods improve their combat readiness and their ability to fight and win on the chemical battlefield.

Targeting

Units that are well trained, equipped, and prepared to fight in a chemical environment pose a hard target and are less likely to be attacked. The use of camouflage, cover, and concealment will prevent the enemy from detecting you. If they can't see you, they can't attack you.

- Continue to harden and protect fighting positions.
- Give special consideration to overhead protection to reduce the effects of liquid agents.
- Dispersion also plays a role in targeting. Most agents from a single strike do not cover a very large area. Troops, ships, and equipment that are spread out have an advantage because the chance of 100% contamination is unlikely. Congested troop areas, convoys, and rear area facilities are prime targets.

Equipment

NBC equipment and gear should be in a serviceable state at all times. This is especially important for your individual protective mask and clothing.

- Your gear should be well maintained and close by at all times to enable you to react to an attack without warning.
- Decontamination equipment, monitors, and detectors should be protected as much as possible.
- All equipment of the same type should be transported and staged separately from other equipment to prevent total losses.
- Chemical alarms and monitors should be placed in the most advantageous positions to allow sufficient warning.

Actions During an Attack

Recognition

One of the key elements in surviving a chemical attack is to know an attack is occurring or one has recently occurred. Identification of an attack in progress is the most efficient means available to individuals or small units with little or no NBC defense equipment. Chemical alarms and monitors generally provide enough warning to allow for protection. The various alarms and monitors will be discussed in further detail in Study Unit 5. Local unit standard operating procedures should be in place to warn of an attack. Any type of alarm or signal can be used as long as it is known by each member of the unit. These can include sirens, horns, illumination, or other signaling devices. Indicators of a chemical attack are

- Chemical alarms sounded
- Positive reading on chemical detector paper
- Munitions that "pop" rather than explode
- Chemical agent poisoning symptoms in yourself or others
- Dead animals and insects with no apparent cause of death
- Aircraft spray
- Strange mist or fog
- Unusual liquid or oily substances on the ground

Immediate Action

Immediately upon recognizing a chemical attack, follow the steps below.

Step	Action
1	Stop breathing, don, clear, and seal your field protective mask.
2	Mask victims of chemical poisoning thus reducing further poisoning from the agent.
3	When time permits you should immediately assume a protective posture level and seek cover in preparation for multiple attacks.

Actions After an Attack

Identification

After the attack, you must identify what type of agent was employed. This allows you to decide what actions to take for first aid, medical treatment, and decontamination. In most cases, this information will tell you what hazards and after effects will be present.

First Aid

Specific first aid for chemical poisoning depends on the particular agent. Always follow standard first aid procedures for any agent. These include

- Treating the casualty for shock.
- Cleaning and covering open wounds to prevent further poisoning.
- Transporting to a medical facility as soon as possible.

Decontaminate

Before leaving the contaminated area, you must decontaminate yourself, gear, and equipment. The agent used will dictate what decontaminant is to be used. There are many different levels and types of decontamination methods along with a wide variety of equipment and gear. The current mission, support available, time available, location, and several other factors must be taken into consideration when selecting decontamination procedures. Decontamination theory and procedures will be discussed in further detail in Study Unit 5.

Report and Mark

After an attack, you must warn adjacent and other friendly forces about the chemical strike. This will enable them to prepare for contamination hazards and additional strikes. Marking of the area warns friendly forces of the contaminated area. Warning, reporting, and marking will be discussed in further detail in Study Unit 4.

Mission

Above all, you must continue the mission. Regardless of the situation, the unit must continue. The purpose of learning all the aspects of NBC defense culminates in one goal--to bring the unit back to combat readiness as quickly and safely as possible.

Lesson 3 Exercise

Directions

Answer exercise items 1 through 17 by performing the action required. Check your answers against those listed at the end of this lesson.

Items 1 Through 5

Matching: For items 1 through 5, match the terms in column 1 to the definitions in column 2. Place your answers in the spaces provided.

Column 1	**Column 2**
Term	**Definition**
___ 1. Persistent	a. Means by which a chemical agent can poison or enter the body when the agent is in food or water.
___ 2. Skin absorption	b. Agent that stays in the area for an extended period of time. In most cases the agent will be in a liquid or solid form.
___ 3. Ingestion	c. The most prominent means of chemical poisoning. The agent goes directly into the body producing rapid chemical poisoning effects.
___ 4. Non-persistent	d. The chemical agent is absorbed by the epidermal layer and is carried by the bloodstream to the rest of the body.
___ 5. Inhalation	e. Agent that evaporates or dissipates very quickly. In most cases it will be in an aerosol or vapor form.

Item 6

Select the answer that best describes how chemical agents are classified.

a. Physical state, physiological action, and use
b. Kill, seriously injure, and incapacitate
c. Lethal, blister, and incapacitating
d. Military compounds, agents, and riot control

Continued on next page

Item 7

Select the answer that best describes how chemical agents are used.

a. Physical state, physiological action, and use
b. Kill, seriously injure, and incapacitate
c. Lethal, blister, and incapacitating
d. Military compounds, agents, and riot control

Item 8

Select the answer that best describes the three physical states of chemical agents.

a. Solid, gas, and powder
b. Inhalation, skin absorption, and ingestion
c. Persistent, non-persistent, and vapor
d. Solid, liquid, and gas

Items 9 Through 13

Matching: For items 9 through 13, match the agent in column 1 to the description in column 2. Place your answers in the spaces provided.

Column 1		**Column 2**
Agent		**Description**
___ 9.	Nerve	a. Affects the body's ability to transfer oxygen.
___ 10.	Blood	b. Similar to tear producing agents but with much stronger effects that last longer. These agents are not designed to kill or seriously injure, but to incapacitate their victims.
___ 11.	Blister	c. Attacks the lining of the lungs causing the lungs to fill with liquid.
___ 12.	Choking	d. Self or first aid for this agent is atropine.
___ 13.	Vomiting	e. Self or first aid for this agent is the M291 series skin decontamination kit.

Continued on next page

Item 14

Selecting good overhead cover, proper dispersion, and gear placement are examples of actions _____ the attack.

a. after
b. during
c. before
d. near

Item 15

The best protection from a chemical attack is

a. proper use of alarms and monitors.
b. training and education.
c. recognizing the indicators.
d. camouflage, cover, and concealment.

Item 16

What is the most critical step during a chemical attack?

a. Recognizing the indicators
b. Using your protective mask
c. Identification of the agent
d. Sounding the alarm

Item 17

The first step to take after a chemical attack is to

a. identify the agent.
b. decontaminate.
c. mark the area.
d. administer first aid.

Continued on next page

Solutions

The table below lists the solutions to the exercise items. If you have any questions about these items, refer to the reference page.

Item Number	Answer	Reference Page
1	b	3-37
2	d	3-37
3	a	3-37
4	e	3-37
5	c	3-37
6	c	3-38
7	b	3-42
8	d	3-41
9	d	3-44
10	a	3-43
11	e	3-45
12	c	3-44
13	b	3-47
14	c	3-48
15	b	3-48
16	a	3-49
17	a	3-50

Study Unit 3 Summary

In this lesson, you learned about the different types of chemical agents and how they affect the human. You also learned what actions to take before, during, and after a chemical strike.

Wrap Up

In the next study unit, you will learn the different procedures for warning reporting, and marking.

STUDY UNIT 4

WARNING AND REPORTING

Overview

Focus

Warning and reporting plays a key role in whether the defense against NBC warfare will be successful. When units encounter an agent, they must report the findings to higher headquarters so that adjacent units can be warned, but to do that, they must detect and identify the agent encountered. Identification of the agent will dictate what type of report is sent, what protective measures will be taken, and what the contamination marking procedures are.

Scope

This study unit includes information on the equipment used to detect, identify, and warn of an NBC attack. It also includes the proper procedures for reporting NBC data and marking of contaminated areas.

In This Study Unit

This study unit contains the following lessons.

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LESSON 1

ALARMS, SIGNALS, AND DETECTION

Introduction

Lesson Focus

A crucial element in the defense of an NBC attack is the ability to recognize the attack and warn or alarm friendly forces of the potential hazard. If used properly, NBC alarms and monitors will give personnel and units advanced warning of the threat. This warning enables them to take protective measures before contact, thus reducing possible casualties.

Content

This lesson includes guidance on the theory and fundamentals of the various NBC alarms, signaling devices, and detection equipment available to U.S. military forces.

Learning Objectives

At the end of this lesson, you will be able to

- Identify the individual verbal and visual alarm for signaling an NBC attack.
- Identify the various mechanical alarms used for an NBC attack.
- Identify the characteristics and purpose of M9 paper.
- Identify the characteristics and purpose of M8 paper.
- Identify the characteristics and purpose of the M256 series detection kit.
- Identify the characteristics and purpose of the M22 ACADA.
- Identify the characteristics and purpose of the Chemical Agent Monitor.
- Identify the capabilities and components of the Chemical Agent Point Detection System.
- Identify the capabilities and components of the Improved Point Detection System.
- Identify the capabilities and components of the Interim Biological Agent Detection System.

Continued on next page

Introduction, Continued

In This Lesson This lesson contains the following topics.

NBC Warning Signals

Individual Alarm

One of the most efficient means of informing personnel of an NBC hazard is the individual alarm. The individual alarm consists of a verbal and visual signal. Immediately upon receiving the signal, you should stop breathing, don your field protective mask, and pass on the alarm. Use common sense when in a possible NBC environment--if you see someone putting the mask on, it should be obvious what that means. You should not wait for the signal.

Verbal Alarm

- Chemical or biological attack. Repeat the word **GAS** at least three times.
- Radiological contamination. Repeat the word **FALLOUT** at least three times.

Visual Alarm

The visual alarm is the arms extended out from your sides parallel to the deck. Make a fist with both hands, bringing them up near your ears three times.

All personnel are required to give the alarm after protecting themselves. The passing of the alarms is considered part of the donning and clearing procedure.

Requirements for Additional Alarms

Unit standard operating procedures will dictate additional alarms and signals that may be used to warn of an NBC attack. Poor visibility, battlefield noise, and mission security may limit or hinder the individual signal from being effective; therefore additional methods can be used. The key to using additional alarms or signals is that all personnel must be aware of the correct alarm and they should not change from unit-to-unit or mission-to-mission.

Types of Additional Alarms

Examples of additional alarms, signals, and devices used to warn of an NBC attack are

- Sirens
- Air horns
- Vehicle horns. The format for the alarm should be predetermined within the unit so that everyone knows what the alarm is. For example, the alarm could be two short beeps followed by a two-second blast and ending with two more short beeps.
- Colored smoke
- Flares
- Air illumination

Chemical Alarms and Detection

Uses

A wide variety of devices can alert you to the presence of chemical contamination and detect what type of contamination is present. These devices can be used to give early warning to individuals and small units while other devices are used at higher echelons to aid in the reporting and decontamination procedures.

Be Sure to

When using the items discussed in this lesson, you should always

- Inspect to ensure serviceability (opened, not sealed properly, broken, smashed, or wet means the item may be unserviceable).
- Ensure the manufacture date and lot number is valid (this information will be provided by higher headquarters and unit NBC personnel).
- Always follow instructions provided with the piece of equipment.
- Always conduct two tests before unmasking or reducing MOPP levels.
- Consider all used or expended equipment hazardous waste that must be disposed of properly.
- Always follow pre-operation checks and warm-up procedures before using.

Continued on next page

M9 Chemical Agent Detector Paper

M9 paper or tape

- Is used for point detection and monitoring of chemical agents.
- Has an adhesive backing that allows it to be placed on personnel, individual equipment, or vehicles.
- Turns red or reddish brown or displays red spots when the tape comes in contact with a chemical, but it will not tell you the specific agent.
- Is issued in a dispenser box that has a serrated edge for cutting to designated lengths.
- Should be stored in its protective plastic bag when not in use.

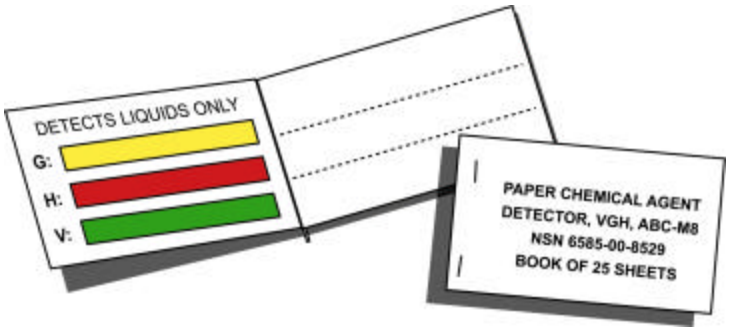
DESCRIPTION	DETECTION CAPABILITIES	LIMITATIONS (May cause false readings)	REMARKS	WARNINGS
M9 paper is issued in a 2-inch wide 30-foot long roll and can be individually carried.	Detects the presence of liquid chemical agents in about 10 seconds	• Brake fluid, DS2, insect repellent, petroleum products, antifreeze • Temperatures above 125 degrees Fahrenheit	• Temperatures below 32 degrees Fahrenheit will make reading time slower. • Will not work in water.	• At night, do not read with a red light. This can lead to a false interpretation of the paper. • Colorblind personnel should not interpret readings.

Continued on next page

M8 Chemical Agent Detector Paper

M8 Chemical Agent Detector Paper

- Is used for point detection and identification of chemical agents.
- Is contained in a small book form and designed to be carried in the mask carrier.
- Turns different colors depending upon the particular agent when the paper comes in contact with a chemical.
- Is used in conjunction with the vapor detection kit and stored in its protective plastic bag when not in use.



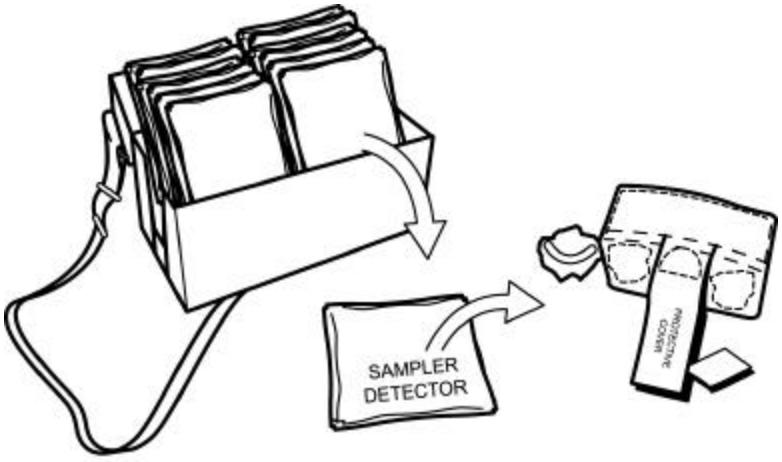
DESCRIPTION	DETECTION CAPABILITIES	LIMITATIONS (May cause false readings)	REMARKS	WARNINGS
M8 paper is issued in a book of 25 sheets perforated for easy removal.	• Detects liquid chemical agents in about 20 seconds • Yellow means a G series nerve agent • Red means a H series blister agent • Dark green means a V series nerve agent	• Brake fluid, DS2, insect repellent, petroleum products, antifreeze • Temperatures above 125 degrees Fahrenheit	• Will not work in water.	• At night, do not read with a red light. This can lead to a false interpretation of the paper. • Colorblind personnel should not interpret readings.

Continued on next page

M256 Chemical Agent Detector Kit

The M256 kit

- Is used to detect and identify vapor concentrations of chemical agents.
- Must be used with M8 paper to detect the presence of liquid agents.
- Has a laminated instruction card that is attached to the kit with explicit instructions for operation. Instructions are also located on each individual sampler inside the kit. A color code system is used to determine the type and concentration of the chemical agent.
- Uses eel enzyme vice horse enzyme. Eel enzyme can detect lower levels of nerve agent. Any type of mustard agent can be detected if the vapor is present.



Instructions for use are printed on each kit.

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M256 Chemical Agent Detector Kit, continued

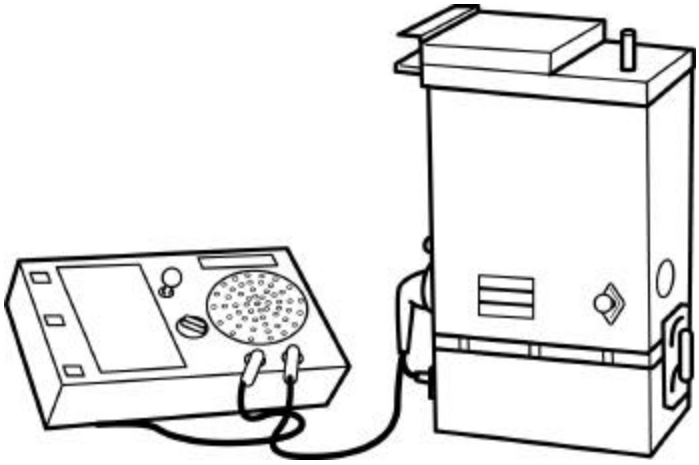
DESCRIPTION	DETECTION CAPABILITIES	LIMITATIONS (May cause false readings)	REMARKS	WARNINGS
• M256 kits consist of a hard plastic case with carrying strap. Each kit contains 12 individual samplers, a book of M-8 paper and a laminated instruction card.	• Detects chemical vapor hazards in 15-20 minutes. • Nerve- G and V series checked in star shaped test spot. • Blister- H series and CX checked in square test spot. Lewisite is checked by using the Lewisite tab. • Blood- AC and CK are checked in circle test spot.	• DS2, petroleum products, antifreeze • Temperatures above 125 degrees Fahrenheit	• Will not work in water. • Efficiency level of the kit goes down with the temperature. When the temperature reaches –25 degrees Fahrenheit, it will not work.	• At night, do not read with a red light, this can lead to a false interpretation of the paper. • Colorblind personnel should not interpret readings. • Do not use the kit in direct sunlight. It may give an inaccurate reading. • Each individual sampler contains 2.6 mg of mercuric cyanide which is considered hazardous waste. • Do not breathe the vapors or fumes that the test kit produces.

Continued on next page

M22 Automatic Chemical Agent Detection Alarm (ACADA)

Listed below are the characteristics of the M22.

- Is a man-portable, point-sampling system designed to detect and identify nerve and blister agents
- Has improved sensitivity, response time, and identification capability
- Can be programmed for new threat agents
- Operates independently after set-up, using both audible and visual alarms for warning
- Has great early warning ability when used with other like units around perimeters or other positions
- Has a communication interface for automatic warning and reporting
- Replaces the M8A1 alarm system



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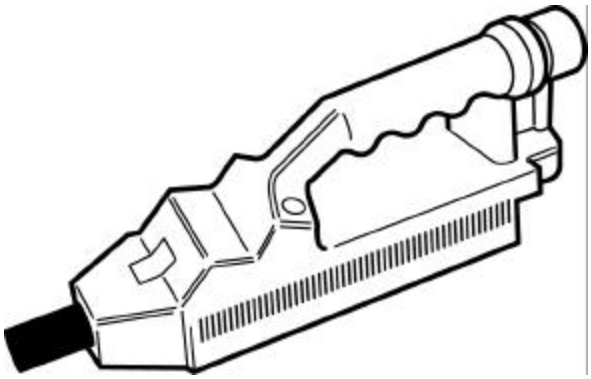
Chemical Agent Monitor (CAM)

The Chemical Agent Monitor

- Detects and measures the relative concentrations of nerve and blister agents in the immediate environment.
- Uses a liquid crystal display (LCD) that shows a bar graph measurement for each agent.
- Is used in decontamination operations and inside collective protection systems.

The degree of hazard is displayed as follows:

Degree of Hazard	Bars Visible
Low	1-3
High	4-6
Very high	7-8



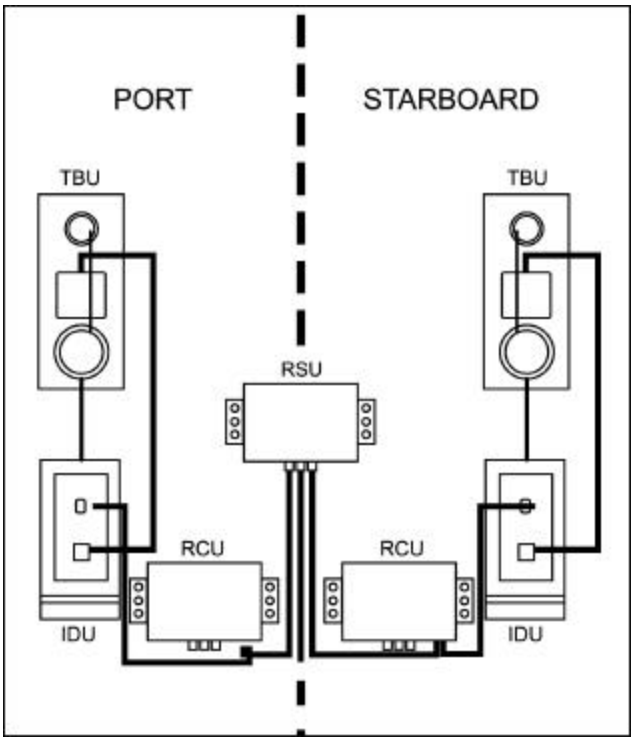
Chemical Agent Point Detection System (CAPDS)

Description

The CAPDS is a dual chemical detection system that is integrated into the ship's overall alarm system.

A dual or parallel system is needed aboard ship to monitor both the starboard and port sides. It is designed to detect very low levels of nerve agent and automatically signal by audible and visual alarms.

The unit is built to survive the harsh sea environment and the extreme electromagnetic effects found aboard Navy ships.



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Chemical Agent Point Detection System (CAPDS), Continued

Components

Each parallel system consists of the following components.

- **Through Bulkhead Unit (TBU)-** Uses a fan and electronic counter to pull outside air through the bulkhead sending it to the IDU pick-up tube.
- **Ionization Detection Unit (IDU)-** Consists of an alarm unit and power supply unit. The alarm unit uses a sensor cell block to check the air for contamination. The power supply unit provides power to the entire CAPDS.
- **Remote Control Unit (RCU)-** Provides the controls for personnel to operate the CAPDS. From this unit the system can be energized, tested, enabled, and disabled. This unit also allows monitoring and troubleshooting of all vital components, sub-components, power supply, airflow, alarms, and indicators.
- **Remote Status Unit (RSU shared by both units)-** The RSU monitors the port and starboard IDU's. The status of the units is presented both audibly and visually. RSU controls also allow the operator to enable or disable the alarm horns, control the output to the ships main alarm system, and to verify that power has been supplied to the detector.

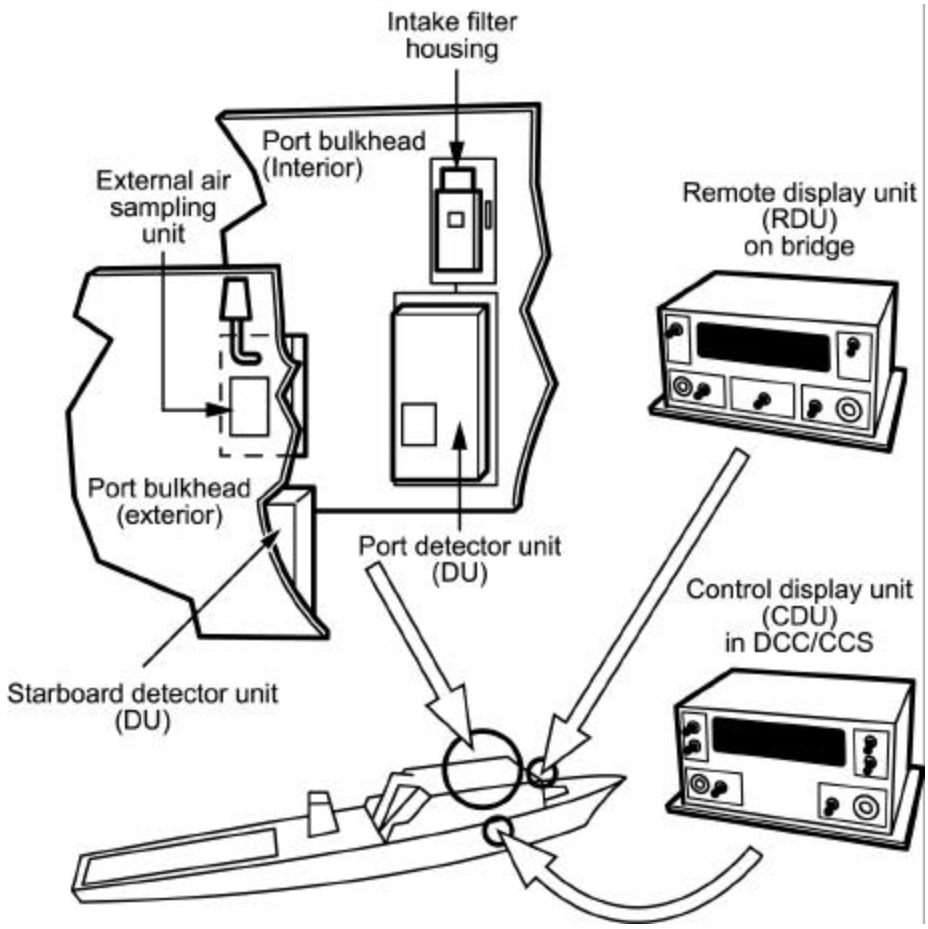
Improved Chemical Agent Point Detector System (IPDS)

Description

This unit is very similar to the CAPDS but with a real-time ability to detect the presence of much lower concentrations of agents.

The IPDS is a fixed detection system used to detect nerve and blister agent vapor hazards.

The IPDS also provides an alarm and agent identification data to the bridge, Damage Control Central (DCC), and the Central Control Station (CCS). Listed below are the components of the IPDS:



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Improved Chemical Agent Point Detector System (IPDS),
Continued

Components

- **Two External Air Sampling Units (EASU)**-Protrude through the exterior bulkhead of the ship and use a fan to pull in ambient air for sampling at a rate of 30 cubic feet per minute. A small amount of air is diverted to the detector unit (DU) at a rate of 4.5 liters per minute while the remaining sample is exhausted out of the ship.

- **Two Detector Units (DU)**-Contain algorithm software and Ion Mobility Spectroscopy (IMS) technology to analyze chemical vapors. An induced electrical field breaks the air sample into ions that an electrode analyzes and converts to an IMS signal. The IMS signal is then interfaced with the algorithm software for a vapor hazard match. If a match is found, the agent is identified and an alarm signal sent. The DU contains both a desiccant cartridge that filters sampled air and the power supply source for the unit.

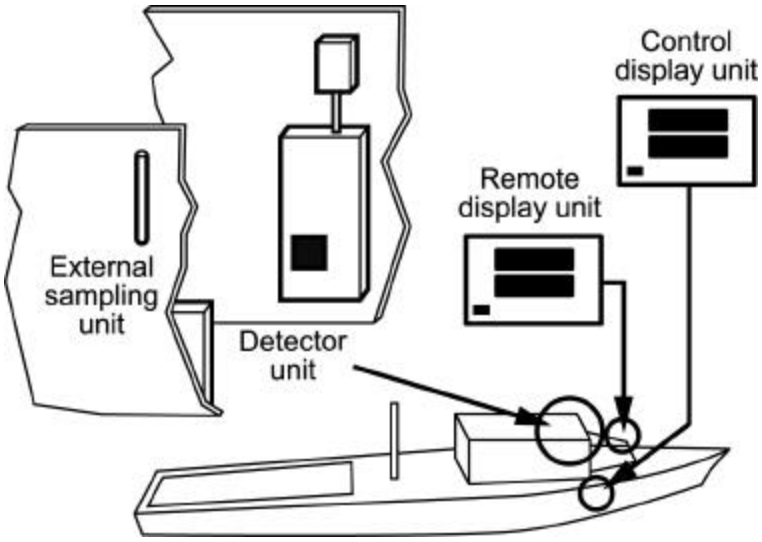
- **Control Display Unit (CDU)**-This unit is normally found in the DCC or CCS and houses all operational controls and switches that are associated with the unit. It also contains the circuit breaker that protects the system, test switches that control stimulant detection, local alarm controls, and alphanumeric displays. The CDU responds as directed by the DU with both printed messages and audible alarms.

- **Remote Display Unit (RDU)**- Located at the bridge, it is similar to the CDU except that it has no system control capability. This unit provides the same printed message and audible alarms as the CDU. Its primary purpose is to provide the bridge with real time data for evaluation.

Biological Alarm and Agent Detection System (BADS)

Description

The BADS is used aboard ship to monitor, collect, detect, and identify airborne biological agents. Samples may be taken manually or automatic samples can be taken when the system is in a state of alarm. The illustration below shows the components of the BADS.



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Biological Alarm and Agent Detection System (BADS),
Continued

Components

- **Detector Unit (DU)-** The DU is an electromagnetic interference shielded enclosure mounted on the superstructure of the ship. The two main components within the DU are the laser-based Aerodynamic Particle Sizer (APS) and Wet Cyclone Sampler. The DU collects air from the outside environment and redirects it to the APS. The APS measures and separates the aerosol particles into various size groups. When the APS detects a change in the sample it will automatically activate the Wet Cyclone Sampler which then mixes the sample with a buffered solution and deposits the mix into a sample bottle.

- **Display Collection System (DCS)-** The DCS is a computer system that monitors, collects, stores, and displays all sample data and global positioning system (GPS) data. It also provides the operator with full control over the system with alarms and warning signals. The system contains the computer, GPS, and Uninterruptible Power Supply (UPS). The GPS is hardwired to the ship's DCS and is used to plot the exact time and location that a positive sample was taken. The UPS provides an uninterrupted power supply to the unit should the ship's power fails.

- **Hand Held Assays (HHAs)-** HHAs are used to identify the specific biological agent. Each HHA contains eight separate panels. These panels are paper-like strips that have been coated with special antibodies that are specific to different biological agents. The mixture from the sample bottle is applied to the panels to detect an agent. If an agent is present it will bind to the strip producing a distinct colored bar (in theory this process is similar to M8 and M9 paper). It is recommended that the HHAs be refrigerated until needed.

Lesson 1 Exercise

Directions Complete items 1 through 10 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 What is the most efficient means of warning others about an NBC threat?

a. Sirens
b. Monitoring equipment
c. Radio communication
d. Individual alarm

Item 2 Sirens, horns, flares, and illumination are all examples of additional alarms. What is the key for all personnel using these alarms?

a. Be aware of the correct alarm.
b. Know how to use the various alarms.
c. Know the location of the alarms.
d. Carry at least one of the alarms with them at all times.

Item 3 M9 paper is issued in a

a. book of 25 sheets and detects liquid contamination hazards.
b. book of 25 sheets and identifies liquid contamination hazards.
c. 30-foot roll and detects liquid contamination hazards.
d. 30-foot roll and identifies liquid contamination hazards.

Item 4 M8 paper is issued in a

a. book of 25 sheets and detects vapor contamination hazards.
b. book of 25 sheets and identifies liquid contamination hazards.
c. 30-foot role and detects liquid contamination hazards.
d. 30-foot role and identifies liquid contamination hazards.

Continued on next page

Item 5

The M256 kit detects what types of contamination?

a. Nerve, blister, and blood
b. Nerve, blood, and choking
c. Nerve, blister, and choking
d. Blister, blood, and choking

Item 6

Select the item that best describes the M22 ACADA.

a. Man portable, point-sampling system, designed to identify nerve and blister agents.
b. Man portable, point-sampling system, designed to identify nerve and blood agents.
c. Vehicle mounted, point-sampling system, designed to identify nerve and blood agents.
d. Vehicle mounted, point-sampling system, designed to identify nerve and blister agents.

Item 7

If you are using the CAM and the liquid crystal display shows a reading of 4-6 bars, what degree of hazard is being shown?

a. Low
b. Medium
c. High
d. Very high

Continued on next page

Item 8

Select the statement that best describes the CAPDS.

a. Detects very low levels of nerve agent and contains the following main components: the TBU, IDU, RCU, and the RSU.
b. Detects nerve and blister agents and contains the following main components: the CDU, RDU, DU, and EASU.
c. Detects biological agents and contains the following main components: the DU, DCS, and HHAs.
d. Detects chemical agents and contains the following main components: the DU, DCS, and HHAs.

Item 9

Select the statement that best describes the IPDS.

a. Detects very low levels of nerve agent and contains the following main components: the TBU, IDU, RCU, and the RSU.
b. Detects nerve and blister agents and contains the following main components: the CDU, RDU, DU, and EASU.
c. Detects biological agents and contains the following main components: the DU, DCS, and HHA's.
d. Detects chemical agents and contains the following main components: the DU, DCS, and HHA's.

Continued on next page

Item 10

Select the statement that best describes the BADS.

a. Detects very low levels of nerve agent and contains the following main components: the TBU, IDU, RCU, and the RSU.
b. Detects nerve and blister agents and contains the following main components: the CDU, RDU, DU, and EASU.
c. Detects biological agents and contains the following main components: the DU, DCS, and HHA's.
d. Detects chemical agents and contains the following main components: the DU, DCS, and HHA's.

Continued on next page

Solutions

The table below lists the solutions to the exercise items. If you have any questions about these items, refer to the reference page.

Item Number	Answer	Reference Page
1	d	4-5
2	a	4-5
3	c	4-7
4	b	4-8
5	a	4-10
6	a	4-11
7	c	4-12
8	a	4-13/14
9	b	4-15/16
10	c	4-17/18

Summary

In this lesson, you learned about the different types of equipment and methods used to signal, warn, detect and identify NBC contamination.

In the next lesson, you will learn about NBC reports.

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LESSON 2

REPORTS

Introduction

Lesson Focus

It is important that higher headquarters collect and receive information from the entire battlefield and its surrounding area. It is even more crucial when this information pertains to weapons of mass destruction or NBC warfare. NBC reports are special reports used to pass information about NBC strikes and contamination to NBC control centers and commanders.

Content

This lesson includes information on the various types of NBC reports, why they are used, and how they are used.

Learning Objectives

At the end of this lesson, you will be able to

- Identify the purpose of an NBC 1 report.
- Identify the originator of an NBC 1 report.
- Identify the precedence of an NBC 1 report.
- Identify the required line items for an NBC 1 nuclear report.
- Identify the required line items for an NBC 1 biological report.
- Identify the required line items for an NBC 1 chemical report.
- Identify the different types of NBC reports.

Continued on next page

Introduction, Continued

In This Lesson This lesson contains the following topics.

Background on Reports

Uses

NBC reports are used to collect, report, and analyze information regarding NBC warfare for dissemination to units that have the possibility of coming into contact with the hazard. This information is also used by higher headquarters to determine what actions are to take place, such as upgrading protective levels and avoiding contaminated areas. The current mission and situation will always dictate these actions.

Format

The United States and its NATO allies all use the same format in the reporting system. This is to increase accuracy, speed of dissemination, and interpretation of the report. There are six basic reports in the system and they use a code lettering system to pass short message data that is specific to each letter of the report. These letters are called "line items" and will be discussed in greater detail later in this lesson.

Originator

NBC reports can be passed up or down the chain of command depending on the type of report. All reports may be passed to adjacent or supporting units as well as to other friendly forces. The unit standard operating procedures will dictate what command level forwards a certain type of NBC report. The only exception to this rule is the NBC 1 report. The NBC 1 report is normally initiated by lower level echelons and automatically sent to the next level in their chain of command. This is why all personnel must be familiar with the format and information contained within the report.

Precedence

A **flash** precedence will always be used to send the initial NBC 1 report. All subsequent reports will carry an **immediate** precedence.

NBC 1 Line Items

Format

As stated earlier, the reporting system uses a letter or line item to represent specific data on each report. Each report is designed to collect certain information. The same line item on an NBC 1 nuclear report will reflect different data than that of an NBC 1 chemical report. If you look at line item **H** below you can see the difference. The nuclear report specifies an air, surface, or subsurface burst while the chemical report displays the type of agent as being persistent or nonpersistent. Listed below and on the following pages is the line item information for all six types of NBC reports.

LINE	NUCLEAR	BIOLOGICAL/ CHEMICAL	REMARKS
A	Strike serial number	Strike serial number	Assigned by NBC center
B	Position of observer	Position of observer	Use coordinates or known location
C	Direction of attack from observer	Direction of attack from observer	Include the unit of measurement
D	Date and time of detonation	Date and time attack started	NUC: use Zulu time
E	Illumination time	Date and time attack ended	NUC: use seconds
F	Location of area attacked	Location of area attacked	Use grid coordinates or actual location
G	Means of attack	Kind of attack	State bomb, spray, artillery, mortar, etc.
H	Type of burst	Type of agent (persistent or nonpersistent)	
I	N/A	Number of munitions or aircraft	
J	Flash to bang time	N/A	Use seconds
K	Presence and size of crater	Description of terrain and vegetation	NUC: use meters
L	Cloud width at H+5 minutes	N/A	Degrees or mils
M	Cloud top or bottom angle or height at H+10 Minutes	N/A	NUC: angles in degree or mils and heights in feet or meters
N	Estimated yield	N/A	NUC: in KTs
O	Date and time for estimated contour line when not H+1	N/A	NUC: used when contours not plotted at H+1

Continued on next page

NBC 1 Line Items, Continued

LINE	NUCLEAR	BIOLOGICAL CHEMICAL	REMARKS
P	For radar purposes only	Predicted hazard area coordinates	
PA	For radar purposes only	Predicted hazard area coordinates	If wind speed is 10 km/h, this item is 010
PAR	Coordinates of external contours of radioactive cloud	N/A	NUC: 6 digit coordinates
PB	Direction of radioactive cloud	Duration of attack	In days, hours, and minutes
Q	Location of reading	Location of detection and type	Air or liquid
R	Dose rate or actual value of decay	N/A	NUC: in cGyph
S	Date and time of reading	Date and time of contamination reading	For initial sample or reading
T	H+1 date and time	Date and time of the latest survey of the area	NBC 5 and 6 reports only
U	1,000 cGyph contour line	N/A	Plot in red
V	300 cGyph contour line	N/A	Plot in green
W	100 cGyph contour line	N/A	Plot in blue
X	20 cGyph contour line	Area of actual contamination	NUC: plot in black CHEM: plot in yellow
Y	Direction of left and right radial lines	Downwind direction of hazard and wind speed	NUC: 4 digits for each line CHEM: 4 digits for direction and 3 digits for wind speed
Z	Effective wind speed and downwind distance of zone 1 cloud radius	N/A	3 digits. If wind speed is less than 8 kmph this line contains only the radius of zone 1
ZA	N/A	Significant weather phenomena	Use 6 digit code for weather
ZB	N/A		Some NATO forces will use GENTTEST
ZI		N/A	Removed from system by ATP 45/STANAG 2103

NBC 1 Report

NBC 1

The NBC 1 report, known as the **"observer's report**,**"** is the first report initiated when an NBC strike has occurred. This report is completed by personnel who have first-hand knowledge of the attack and is always sent up the chain of command.

NBC 1 Example

Line items B, D, H, and either C or F should always be reported when sending an NBC 1 report. Other line items may be used if the information is available. The required line items are in bold in the line item column.

LINE	NUCLEAR	**This column is an explanation of the information in the report. This information would not be sent with the report.**
B	NB062634	The position of the person or unit that saw the strike given in map coordinates.
C	90 DGG	The direction of the attack from the observer's location given in degrees grid north (DGG). DGM=Degrees Magnetic North, DGT= Degrees True North
D	201405Z	Date and time of attack given in Zulu time.
E	018	Illumination time in seconds.
F	LB206300 EST	Location of the attack in grid coordinates stating actual or estimated.
G	Aircraft	Means of delivery.
H	Surface	Type of burst used.
J	12	Flash to bang time in seconds.
L	15 DEG	Cloud width at H+ 5 given in degrees or mils.

NBC 2-6 Reports

NBC 2

The NBC 2 report is called the **"evaluated report"** and contains the quantified data from at least two or more NBC 1 reports. These reports are sent up and down the chain of command. Leaders use the information from the report to determine or adjust MOPP levels and other NBC defense considerations. The following line items must be reported in the NBC 2 report:

LINE	NUCLEAR	CHEMICAL BIOLOGICAL
A		
D		
F		
G		
H		
N		N/A
Y	N/A	
ZA	N/A	
ZB		

NBC 3

This report is used for **"immediate warning of expected contamination."** NBC control centers use NBC 2 reports and wind information to predict a downwind hazard or fallout area and are reevaluated every two hours. Unit leaders use this report when deciding a course of action depending on the mission and situation.

LINE	NUCLEAR	CHEMICAL BIOLOGICAL
A		
D		
F		
H		
N		N/A
PA	N/A	
PB	N/A	
Y		
Z		
ZA	N/A	
ZI	N/A	

Continued on next page

NBC 2-6 Reports, Continued

NBC 4

The NBC 4 report is known as the **"recon, monitor, and survey report."** This report is used when contamination is found through reconnaissance, monitor, or survey missions. NBC 4 reports are consolidated and updated as necessary to plot the suspected location and area of contamination.

LINE	NUCLEAR	CHEMICAL BIOLOGICAL
H	N/A	
Q		
R		N/A
S		
ZB		

NBC 5

The NBC 5 is used to report **"areas of actual contamination."** This report is prepared using the data from the NBC 4 report and consists of a series of grid coordinates. It may be revised when necessary and sent numerous times in a desired period. This is a very effective report to transmit decay rate and to warn of closed decontamination sites.

LINE	NUCLEAR	CHEMICAL BIOLOGICAL
A		
D	N/A	
H	N/A	
S	N/A	
T	N/A	
U		
V		
W		N/A
X	N/A	

Continued on next page

NBC 6

This is a **"summary"** report and reflects only chemical and biological attacks. Sent to higher headquarters only when requested, it is submitted by battalion-level NBC personnel. The report is in narrative form and contains as much information as possible.

LINE	CHEMICAL	BIOLOGICAL
A		
D		
E		
F		
G		
H		
I		
K		
Q		
S		
T		
X		
Y		
ZB		

Lesson 2 Exercise

Directions Complete items 1 through 8 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 What is the purpose of an NBC report?

a. Help predict enemy NBC strikes.
b. Collect, report, analyze, and disseminate information.
c. Locate idea areas for decontamination operations.
d. Pass the individual alarm to units near contamination.

Item 2 What two precedences are used to send an NBC report?

a. Initial and flash
b. Flash and secondary
c. Primary and immediate
d. Flash and immediate

Item 3 Who is the originator of an NBC 1 report?

a. The first person or unit below your chain of command
b. The first person or unit above your chain of command
c. Any person or unit with first hand knowledge that an attack has occurred
d. Any person assigned to an NBC team

Item 4 What are the required line items of an NBC 1 report?

a. B, D, H, and C or F
b. B, D, C, and H or F
c. D, H, F, and B or C
d. A, D, H, and C or F

Continued on next page

Lesson 2 Exercise, Continued

Item 5 The NBC 2 report is also known as the _____ report.

a. immediate warning of expected contamination
b. evaluated
c. recon, monitor, and survey
d. area of actual contamination

Item 6 The NBC 3 report is also known as the _____ report.

a. immediate warning of expected contamination
b. evaluated
c. recon, monitor, and survey
d. areas of actual contamination

Item 7 The NBC 4 report is also known as the _____ report.

a. immediate warning of expected contamination
b. evaluated
c. recon, monitor, and survey
d. areas of actual contamination

Item 8 The NBC 5 report is also known as the _____ report.

a. immediate warning of expected contamination
b. evaluated
c. recon, monitor, and survey
d. area of actual contamination

Continued on next page

Solutions

The table below lists the solutions to the exercise items. If you have any questions about these items, refer to the reference page.

Item Number	Answer	Reference Page
1	b	4-27
2	d	4-27
3	c	4-30
4	a	4-30
5	b	4-31
6	a	4-31
7	c	4-32
8	d	4-32

Summary

In this lesson you learned about the different types of NBC reports and how they are used.

In the next lesson, you will learn about the equipment used to mark contaminated areas, why these areas are marked, and how this is accomplished.

LESSON 3

CONTAMINATION MARKING

Introduction

Lesson Focus

After detecting the presence of contamination or locating a contaminated area, you must identify or mark the area. Marking hazard areas will prevent friendly units from possible contamination. If the situation and mission dictates, they can go around the hazard. If they must pass through the contaminated area, they will have sufficient warning to upgrade protective levels before entering the area.

Content

This lesson includes information on the different types of NBC markers, how markers are used, and the information needed before placing an NBC marker. Equipment used to mark an area is also discussed.

Learning Objectives

At the end of this lesson, you will be able to

- Identify the characteristics of a nuclear NBC NATO marker.
- Identify the characteristics of a biological NBC NATO marker.
- Identify the characteristics of a chemical NBC NATO marker.
- Identify the information required on NBC NATO markers.
- Identify the components of an NBC marking kit.

In This Lesson

This lesson contains the following topics.

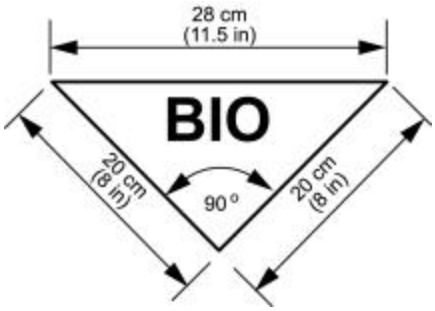
NBC Markers

Purpose

The purpose of an NBC marker is to identify equipment, vehicles, or land areas that are contaminated. This process warns friendly units of the potential hazard, thus reducing the spread of contamination.

Description

NBC markers are commonly known as contamination markers. They are NATO standardized by color, shape, and size. An NBC marker is a right-angled isosceles triangle. The base of the triangle is 11.5 inches with the sides being eight inches. The marker can be made of any material available. When posting the marker, make sure that the point of the triangle points down.



Nuclear

A nuclear or radiological marker has a white background with black lettering. The word **ATOM** appears on the front of the marker. The front of any marker should face away from the contamination so it is clearly identifiable when approaching that hazard.

Continued on next page

NBC Markers, Continued

Biological

A biological marker has a blue background with red lettering. The letters **BIO** appear on the front of the marker.

Chemical

A chemical marker has a yellow background with red lettering. The word **GAS** appears on the front of the marker.

Required Information on Markers

Information Placement

When marking a contaminated area, you should provide as much information as possible. Place the information on the back of the NBC marker.

Information Required

The information below must accompany each type of NBC marker.

MARKER	REQUIRED INFORMATION
Nuclear	Dose rate Date and time of reading Date and time of burst if known
Biological	Date and time of detection Name of agent if known
Chemical	Date and time of detection Name of agent if known

Marking Kit

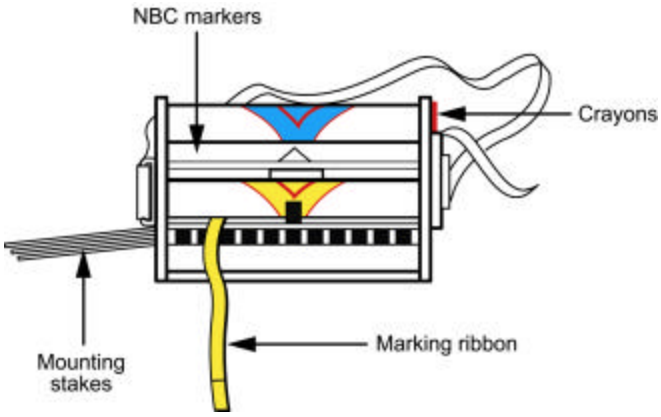
Contamination Marking

When marking a contaminated area, the NBC markers should be placed in obvious locations so friendly units can easily spot them. In some cases, the entire circumference of the contaminated area may need to be marked. When marking, the signs should be placed in close proximity of each other. In an area with heavy growth, it may be necessary to place the markers 10 to 15 meters apart so they are not missed. If an area contains two types of contamination, such as chemical and radiological, place the two markers beside each other.

Marking Set

The NBC contamination marking set is normally used when marking a contaminated area. The set is lightweight, individually carried, and contains all the equipment necessary to mark a contaminated environment. Listed below are the contents of the set.

- **NBC Markers -** The set has containers with 60 rolled plastic markers, 20 white flags for radiological contamination, 20 blue flags for biological contamination, and 20 yellow flags for chemical contamination.
- **Marking Ribbon-** 13 rolls of yellow marking ribbon are stored at the bottom of the set for attaching markers between objects.
- **Mounting Stakes-** The set has 48 stakes stored on the inside for attaching NBC markers and ribbon. The stakes are approximately 12 inches long and can be attached to each other to form various heights.
- **Crayons -** Crayons are contained in holders on the set and are used for marking the required information on the back of the NBC markers.



Lesson 3 Exercise

Directions

Complete items 1 through 5 by performing the action required. Check your answers against those listed at the end of this lesson.

Items 1 Through 3

Matching: For items 1 through 3, match the NBC marker in column 1 with its description in column 2.

Column 1	**Column 2**
NBC Marker	**Description**
___ 1. Nuclear	a. Yellow background with blue lettering
___ 2. Biological	b. Yellow background with red lettering
___ 3. Chemical	c. Blue background with red lettering
	d. White background with black lettering

Item 4

What required information is placed on the back of a nuclear contamination marker?

a. Type of contamination, date and time of reading
b. Dose rate, date and time of reading, date and time of burst
c. Dose rate, date and time of reading, date and time of burst, type of burst
d. Dose rate, date and time of reading, location of burst

Item 5

What are the components of an NBC contaminated marking set?

a. M8 or M9 paper, mounting stakes, marking ribbon, and NBC markers
b. M8 or M9 paper, marking ribbon, NBC markers, and crayons
c. Marking ribbon, NBC markers, crayons, and warning signs
d. Marking ribbon, NBC markers, crayons, and mounting stakes

Solutions

The table below lists the solutions to the exercise items. If you have any questions about these items, refer to the reference page.

Item Number	Answer	Reference Page
1	d	4-38
2	c	4-39
3	b	4-39
4	b	4-40
5	d	4-41

Study Unit 4 Summary

In this lesson, you learned about the different types of NBC markers, what information must be placed on the markers, and how a contaminated area is marked.

Wrap-Up

In the next study unit, you will learn about the different types of decontaminates, decontamination procedures, and the various types of decontamination equipment used.

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STUDY UNIT 5

DECONTAMINATION SYSTEMS, EQUIPMENT, AND PROCEDURES

Overview

Focus

After contamination is identified, it must be neutralized or removed from personnel, equipment, and gear. This must be done as soon as possible to minimize the spread of contamination and reduce casualties. Many forms of decontaminates are available in today's military to aid in this process. Certain decontamination procedures and systems have been implemented to facilitate the decontamination process. These procedures range from the individual level to entire ships.

Scope

This study unit includes information on the various types of decontaminates and how they are used. It also includes the procedures, equipment, and systems that may be used for decontamination purposes.

In This Study Unit

This study unit contains the following lessons.

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LESSON 1

DECONTAMINANTS

Introduction

Lesson Focus

Knowing what type of neutralizing agent or decontaminate to use on NBC contamination will help achieve maximum effectiveness. Different decontaminates have varying effects on a particular contamination type. Some decontaminates produce harmful side effects while others can damage certain equipment and gear. Understanding how to properly use decontaminates will enable units to safely regain combat proficiency in a timely manner while minimizing collateral damage.

Content

This lesson includes information on a wide variety of decontaminates, how they are used, precautions when using them, and what type of contamination they are most effective against.

Learning Objectives

At the end of this lesson, you will be able to

- Identify the types of standard decontaminates.
- Identify the types of non-standard decontaminates.
- Identify the types of natural decontaminates.

In This Lesson

This lesson contains the following topics.

Standard Decontaminates

Types

There are many types of standard decontaminates. We will discuss in detail the ones listed below.

- Decontaminating Solution #2 (DS2)
- Super-tropical bleach (STB)
- Soaps and detergents
- Calcium Hypochlorite (HTH)

DS2 Description

Decontaminating Solution #2 (DS2) is very effective against toxic chemical and biological agents. It has no effect against bacterial spores or radiological contamination.

The best results are accomplished when the solution is allowed to remain in contact with the contaminated surface for 30 minutes or longer and applied with a scrubbing motion. DS2 is generally applied with decontamination equipment but may be applied using brooms or swabs.

DS2 Cautions

The cautions listed below must be taken into consideration when handling DS2 because it

- Is irritating to the eyes and skin. Do not inhale the vapors. Always wear protective mask and gloves when using.
- Will ignite spontaneously on contact with STB.
- Is combustible with a flash point of 160 degrees Fahrenheit.
- Is damaging to masks in large quantities.
- Is corrosive to aluminum, tin, cadmium, and zinc.
- Will remove or discolor paint.
- Will cause detector paper to show false readings.

To prevent these problems, always flush with large amounts of water after use and treat DS2 as you would other flammable liquids.

Continued on next page

Standard Decontaminates, Continued

STB Description

Super-tropical Bleach (STB) is used for biological and chemical agents and is very effective against lewisite, V, and G agents. It does not work well against mustard agent at low temperatures. STB works best when applied to porous surfaces several times. STB can be used as a slurry paste when mixed with water or a dry mix when combined with earth.

STB Cautions

The cautions listed below must be taken into consideration when handling STB because it

- Will ignite spontaneously on contact with DS2 or liquid blister agent.
- Will give off toxic vapors on contact with G agent.
- Is not recommended for ship use and should be stored on top decks.
- Is corrosive to most metals and damaging to most fabrics.
- Is irritating to the eyes and skin. Do not inhale the vapors. Always wear protective mask and gloves when using.

To prevent these problems, STB should be stored away from combustible material and in an unheated facility.

Soaps and Detergent Description

Soaps and detergents are effective in physically removing radiological, biological, and chemical contamination. The best results are achieved when scrubbing the surface with hot water. The caution listed below must be taken into consideration when using soaps and detergents.

Soaps and Detergent Cautions

Casualty producing levels of contamination will remain in the runoff water. The runoff is considered a hazard and must be contained, if possible, and marked.

Continued on next page

Standard Decontaminates, Continued

HTH Description

Calcium Hypochlorite (HTH) is used against biological and chemical contamination. It is very effective against mustards, lewisite, V agents, and bacteria spores. It reacts much faster than STB, particularly against mustard and lewisite (within five minutes). A minimum of 15 minutes of contact is needed for it to be effective against biological agents. HTH can be used as a slurry paste when mixed with water or a dry mix when combined with earth.

HTH Cautions

The cautions listed below must be taken into consideration when handling HTH.

- Irritating to the eyes and skin. Do not inhale the vapors. Always wear protective mask and gloves when using.
- Is more corrosive than STB. It will destroy fabric.
- Will burn on contact with DS2, HD, and VX.
- Will give off toxic vapors on contact with G agent.
- Is not recommended for ship use and should be stored on top decks.

Non-Standard Decontaminates

Types

There are many types of non-standard decontaminates. We will discuss in detail the ones listed below.

- Oxidizing agents
- Iodine tablets
- Complexing agents
- Disinfectant chlorine
- Formalin (formaldehyde)
- Hyamine (benzethonium)
- Propanone (acetone)
- Solvents

Oxidizing Agent Description

Oxidizing agents include nitric acid, sodium dichromate, and potassium permanganate. These decontaminates are used on surfaces containing absorbed radioactive contamination. They can be applied to surface areas or items can be dipped into the solution.

Oxidizing Agent Cautions

Due to the corrosive nature of oxidizing agents, the exposure must be limited. The cautions listed below must be taken into consideration when handling oxidizing agents.

- Rinse with water and detergent after use.
- Must be used under the supervision of trained personnel.
- Requires the use of neoprene protective apron, boots, gloves, etc.
- Rubber NBC type protective gear offers limited protection.

Iodine Tablet Description

Iodine tablets are used to decontaminate biological agents when boiling of water is not possible or practical. In most cases, two tablets per canteen of water will be sufficient.

Iodine Tablet Caution

Concentrations in drinking water greater than those recommended are toxic.

Continued on next page

Non-Standard Decontaminates, Continued

Complexing Agent Description	Complexing agents are citric acid, tartanic acid, etc. These agents will remove, but not neutralize, absorbed radiological contamination. Complexing agents are used by spraying a film over the contaminated area and allowing a 30-minute contact period.
Complexing Agent Cautions	The cautions listed below must be taken into consideration when handling complexing agents: • Runoff from the decontamination area is considered a hazard and must be contained, if possible, and marked. • Rinse with water and detergent after use.
Disinfectant Chlorine Description	Disinfectant chlorine is used to remove biological agents from eating utensils, container exteriors, and food products that can be soaked. Items should be left in the solution for 30 minutes with occasional stirring.
Disinfectant Chlorine Cautions	The cautions listed below must be taken into consideration when using disinfectant chlorine: • Never use with vegetables or fruits that have been cut or peeled. • Always rinse items thoroughly before using. • Solution can be used only one time.

Continued on next page

Non-Standard Decontaminates, Continued

Formalin (Formaldehyde) Description

Formalin is used against biological contamination and works especially well against microorganisms and bacterial spores. It is used for interior decontamination of closed areas. The vapors should be allowed to remain in the enclosure for approximately 16 hours; then aerate until the odor is bearable for personnel to inhabit.

Formalin (Formaldehyde) Cautions

The cautions listed below must be taken into consideration when handling formalin:

- Vapors are very toxic. Protective clothing must be used.
- Agent will discolor and curl paper products.
- Leaves a white residue where used.

Hyamine (Benezethonium) Description

Hyamine is a very fast acting decontaminate against all types of bacteria. This solution will take effect within 5 minutes of contact. As a safeguard, the solution should be left in place for thirty minutes.

Hyamine (Benezethonium) Cautions

The cautions listed below must be taken into consideration when handling hyamine:

- Hyamine is highly toxic. The estimated fatal dose to a human is one to three grams.
- Not to be used on ships or aircraft.
- Wear protective mask when mixing powder.

Continued on next page

Non-Standard Decontaminates, Continued

Propanone (Acetone) Desciption

Propanone is used to remove chemical agents in cold or arctic conditions. Commonly obtained as paint thinner or nail polish remover, scrubbing will increase its effectiveness.

Propanone (Acetone) Cautions

The cautions listed below must be taken into consideration when using propanone. It

- Is extremely flammable.
- Does not neutralize agents, but will dissolve and remove them.

Solvent Description

Solvents are gasoline, JP-4, diesel fuel, kerosene, etc. They provide an adequate means of removing chemical agents. The longer the solvent is scrubbed onto the surface area the more effective it becomes.

Solvent Cautions

The cautions listed below must be taken into consideration when using solvents:

- May damage materials such as rubber and plastic.
- Runoff from the decontamination area is considered a hazard and must be contained, if possible, and marked.

Natural Decontaminates

Types

There are many types of natural decontaminates. We will discuss in detail the ones listed below.

- Water and steam
- Absorbents
- Sealants
- Weather/Time
- Burning

Water and Steam Description

Water can be used to remove radiological, biological, and chemical contamination from surface areas. Scrubbing the area with hot soapy water makes the process more effective.

Water and Steam Caution

Runoff from the decontamination area is considered a hazard and must be contained, if possible, and marked.

Absorbent Description

Earth, sawdust, and rags can be used to remove chemical contamination from surface areas. This technique is used when gear and equipment is needed to accomplish the current mission and no other means of decontamination is available.

Absorbent Cautions

The contamination is transferred to the absorbent, which then becomes a contamination hazard that must be disposed of properly.

Sealant Description

Concrete, paint, asphalt, etc. may be used to physically seal or shield all three types of contamination. For every 3 inches of earth used to cover nuclear contamination, the dose rate is reduced by approximately one half. One inch of asphalt will completely absorb alpha and beta radiation.

Sealant Cautions

The cautions listed below must be taken into consideration when using sealants.

- Areas covered must be marked with the appropriate NBC marker.
- A break in the sealant will expose the contamination hazard.

Continued on next page

Natural Decontaminates, Continued

Weather/Time Description	Weather and time will decrease the effects of chemical and biological agent. As time goes on, radiation will decay at a faster rate. Using time as a means of decontamination is the least preferred method because it can only be used when the mission and situation permits.
Burning Description	Controlled burning will destroy biological and chemical agents.
Burning Approval Required	Approval from a general officer must be given to perform this operation.
Burning Caution	Creates a downwind hazard area requiring strict control of the site.

Lesson 1 Exercise

Directions Complete items 1 through 4 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 Select the answer that describes the types of standard decontaminates.

a. Paint, STB, iodine tablets, and sealants
b. DS2, STB, detergents, and HTH
c. STB, iodine tablets, oxidizing agents, and formalin
d. DS2, oxidizing agents, formalin, and hyamine

Item 2 Select the answer that describes the types of non-standard decontaminates.

a. STB, iodine tablets, HTH, and sealants
b. DS2, STB, detergents, HTH, and formalin
c. Iodine tablets, oxidizing agents, formalin, and hyamine
d. DS2, concrete, oxidizing agents, and formalin

Item 3 Select the answer that describes the types of natural decontaminates.

a. STB, iodine tablets, detergents and sealants
b. DS2, STB, detergents, and HTH
c. Iodine tablets, oxidizing agents, formalin, and propanone
d. Water and steam, concrete, asphalt, and absorbents

Item 4 What is the general concern when using a decontaminate that removes the contamination instead of neutralizing it?

a. The runoff or absorbent is now considered a hazard
b. The amount of time it takes to decontaminate
c. Specialized equipment must be used
d. The corrosive properties of the decontaminate

Continued on next page

Solutions

The table below lists the solutions to the exercise items. If you have any questions about these items, refer to the reference page.

Item Number	Answer	Reference Page
1	b	5-4
2	c	5-7
3	d	5-11
4	a	5-11

Summary

In this lesson, you learned about the different types of decontaminates and how they are used.

In the next lesson, you will learn about the various types of decontamination procedures.

LESSON 2

DECONTAMINATION PROCEDURES

Introduction

Lesson Focus

The presence of NBC hazards greatly affects the overall combat readiness of personnel and units. Performance is degraded when units are required to operate behind the shield of protective equipment. When this occurs, unit leaders must take steps to bring the unit safely back to the desired level of proficiency. This is accomplished by performing decontamination on various levels depending on the mission and situation.

Content

This lesson provides information on how, when, and why decontamination should take place at the small unit level and higher.

Learning Objectives

At the end of this lesson, you will be able to

- Identify the purpose of decontamination.
- Identify the types of decontamination.
- Identify the levels of immediate decontamination.
- Identify the purpose of operational decontamination.
- Identify the phases of operational decontamination.

In This Lesson

This lesson contains the following topics.

Decontamination (Decon)

Purpose

The purpose of decontamination is to regain the combat readiness of personnel, equipment, and units. Protective posture levels, shelters, and gear provide only temporary relief. To restore the operating tempo, the contamination level must be dramatically reduced or removed entirely. The four decon principles are **speed**, **need**, **limit**, and **priority**.

Considerations

Before decontamination can take place, many factors must be taken into consideration. The situation and mission always determine how and when to decontaminate. Some factors to think about when planning to decontaminate include

- Place
- Time
- Time available
- Terrain
- Weather
- Enemy location
- Priority (what gear/equipment is decontaminated first)
- Equipment available
- Resources available
- Supporting units to assist

Levels

The three levels of decontamination are immediate, operational, and thorough. The situation will dictate what level of decontamination is to take place. Detailed information will be given on the different levels in the upcoming sections.

Immediate Decon

Purpose

The purpose of immediate decon is to remove as much contamination as possible as quickly as possible. You learned from previous lessons that the longer you are in contact with the contamination, the greater the risk of becoming a casualty. Skin decon, personal wipe down, and operator's spray down are types of immediate decon designed to reduce hazard levels quickly at the individual and small unit level. In the last lesson, you learned about absorbents and how they are used. If the preferred method is not available, you can use an alternate method or absorbent.

Skin Decontamination

Skin decon is preformed on an individual basis, within one minute of contact, and without direction or command from leaders. The M291 Skin Decon Kit (SDK) is the preferred method of removing contamination from the skin. The SDK will be discussed in greater detail in the next lesson. The chart below outlines the basic procedures for skin decon.

CONTAMINATION	METHOD	REMARKS
Nuclear	Wash Brush	
Biological	HTH Soap and water	
Chemical	SDK Soap and water	Cloth material may be used. Do not rub the contamination into the skin. Use the pinch and blot method to lift contamination up and away from the skin.

Continued on next page

Immediate Decon, Continued

Personal Wipe Down

Personal wipe down is most effective when conducted within 15 minutes of contact. Personal wipe down is used to clean individual gear such as the mask, weapon, and helmet. The M295 Individual Equipment Decon Kit (IEDK) is the preferred method of removing contamination from these items. The IEDK will be discussed in greater detail in the next lesson. The chart below outlines the basic procedures for personal wipe down.

CONTAMINATION	METHOD	REMARKS
Nuclear	Brush Wash	Avoid breathing the dust particles while cleaning.
Biological	Soap and water	
Chemical	IEDK	Use detector paper and equipment to identify and locate contamination.

Operator's Spray Down

Operator's spray down is used to decontaminate larger pieces of mission essential gear such as vehicle interiors and weapons systems. Portable decontamination apparatuses such as the M11 and M13 are used to conduct an operator's spray down within 15 minutes of contact. The M11 and M13 will be discussed in greater detail in the next lesson. The chart below outlines the basic procedures for operator's spray down.

CONTAMINATION	METHOD	REMARKS
Nuclear	Brush Wash Scrape	Remove one to two inches of topsoil from around fighting positions to reduce the level of radiological contamination affecting you.
Biological	Bleach M11 M13	
Chemical	IEDK M11 M13	Use detector paper and equipment to identify and locate contamination.

Operational Decon

Purpose

Operational decon consists of a MOPP gear exchange and vehicle wash down. It allows temporary relief from MOPP 4, limits the spread of contamination, and facilitates additional decontamination.

Phases

Operational decon consists of three distinct phases: preparation, execution, and site clearance. Command and control of the operation will be dictated by the scope of the operation. Command can be at the company level, battalion level, or division level.

Preparation

The preparation phase starts with the decision to decontaminate and ends when the site is ready for operation. Listed below are the steps involved in the preparation phase.

STEP	ACTION	REMARKS
Decon Assessment	The decon assessment is used to determine the number of personnel and equipment that needs to be decontaminated. The type of contamination, if known, is also considered.	Detector paper and equipment is used to accomplish this step.
Coordination	Request for support is made at this time. The request must include decontamination equipment and supplies. The request must be approved or the decon operation cannot take place.	Additional support for site security and alternate decon teams is requested.
Site Selection	The site may have been determined in the operation order or selected due to the current situation. The site should be off the main route but with easy access. The area should be large enough for the element being decontaminated and have good overhead cover. A good water source and adequate drainage are also necessary.	Plan on 100 gallons of water per vehicle.
Linkup	The site leader coordinates the linkup with the contaminated unit and guides them into the site. Security of the site is established and assembly areas designated. The entrance, exit, and flow are established.	Radio communication is imperative for this action.
Site Setup	Site setup is complete when all gear and equipment is in position and ready. All decontamination equipment should be operationally checked and warmed up. New MOPP suites should be in place at the MOPP gear exchange site.	Runoff should be considered when positioning decontamination equipment.

Continued on next page

Operational Decon, Continued

Execution

The execution phase begins when positive control has been established over the site and ends when the last vehicle and person has been decontaminated. Listed below are the steps involved in the execution phase.

STEP	ACTION	REMARKS
Site Control and Security	The site leader controls the movement and flow of vehicles into the wash down lanes. Site security includes physical security of the area, but its main focus is contamination control lines and exit points. Units can only enter and exit at designated points. If additional support is not available the contaminated unit provides security.	If a two-lane site is being used, an assistant site leader may be needed for control. A two-lane site is merely two wash down lanes that are parallel.
Processing	When heavy or power driven decontamination equipment is used the processing rate is approximately three minutes. The flow will be much slower when decontamination takes place without heavy equipment. The MOPP gear exchange should take no longer than 60 minutes per squad sized element.	The buddy team or triple buddy team method is generally used at the MOPP gear exchange site.

Site Clearance

Site clearance begins when the last vehicle and person has been decontaminated and ends when the NBC 5 report is submitted. Listed below are the steps involved in the site clearance.

STEP	ACTION	REMARKS
Cleanup	The site leader ensures that all expendable gear is properly buried or sealed in appropriate shipping containers. All mission essential gear is decontaminated and loaded for transport.	Detection equipment is used to ensure all gear is clean prior to leaving the site.
Marking and Reporting	The site leader will ensure the site is marked with the appropriate information and that a NBC 5 report is submitted to higher headquarters.	

Summary

Remember that this is a basic overview of the procedures and that many sub-steps need to be performed to execute a safe and efficient operational decontamination.

Thorough Decontamination

Purpose

Thorough decon is designed to significantly reduce or completely eliminate contamination. This is an in-depth process that is time consuming and resource intensive. It also requires assistance from supporting units. Listed below are a few considerations when planning a thorough decon.

- Generally conducted in rear areas beyond enemy fire
- Additional support needed (to dig sumps, drainage ditches, etc.)
- Environmental concerns
- Such a large scale decontamination will limit site selection
- Availability of water (500 gallons per vehicle)
- Coordination (contaminated units, re-supply, engineers, aircraft, etc.)

Phases

Thorough decon consist of planning, preparation, execution, and total decon site closure. Each phase has dozens of sub tasks and steps that must be preformed.

Summary

A brief overview was given on thorough decon due to the fact that it is such a large-scale operation and not in the scope of NBC individual survival measures. In most cases, trained NBC teams would bear a large portion of the responsibility in facilitating decontamination.

Lesson 2 Exercise

Directions Complete items 1 through 5 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 The purpose of decontamination is to

a. identify the type of contamination.
b. regain the combat readiness of personnel, equipment, and units.
c. restrict the use of area, personnel, and equipment.
d. provide relief from MOPP 4, limit the spread of contamination, and facilitate additional decontamination.

Item 2 What are the three levels of decontamination?

a. Skin decon, operational, and thorough
b. Skin decon, wipe down, and spray down
c. Immediate, operational, and thorough
d. Preparation, execution, and clearance

Item 3 What are the levels of immediate decontamination?

a. Skin decon, operational, and thorough
b. Skin decon, personal wipe down, and operator's spray down
c. Immediate, operational, and thorough
d. Preparation, execution, and site clearance

Item 4 The purpose of operational decontamination is to

a. identify the type of contamination.
b. regain the combat readiness of personnel, equipment, and units.
c. restrict the use of area, personnel, and equipment.
d. provide relief from MOPP 4, limit the spread of contamination, and facilitate additional decontamination.

Continued on next page

Item 5

What are the phases of operational decontamination?

a. Skin decon, operational, and thorough
b. Skin decon, wipe down, and spray down
c. Immediate, operational, and thorough
d. Preparation, execution, and site clearance

Continued on next page

Solutions

The table below lists the solutions to the exercise items. If you have any questions about these items, refer to the reference page.

Item Number	Answer	Reference Page
1	b	5-16
2	c	5-16
3	b	5-17
4	d	5-19
5	d	5-19

Summary

In this lesson, you learned about the different types of decontamination procedures and how they are used. You also learned when they should be used and at what level.

In the next lesson, you will learn about the different types of decontamination equipment and antidotes used.

LESSON 3

DECONTAMINATION EQUIPMENT, SYSTEMS, AND SHIPBOARD PROTECTION

Introduction

Lesson Focus

Decontamination involves more than just wiping your skin or spraying water on your equipment and gear. To properly decontaminate using the methods stated in the previous lesson, you must be familiar with the systems and equipment used. If you have a basic understanding of how and why this gear is used, you will be one step closer in surviving on the NBC battlefield. When aboard ship, there are certain procedures that must be followed to limit or reduce the amount of chemical, biological, and radiological (CBR) casualties. CBR bills and other documents are used in protecting the ship against contamination. These documents give strict guidance in the actions to take for decontamination and protection. Fighting a CBR war while afloat is a very demanding mission that can only be accomplished by thorough doctrine, training, and education.

Content

This lesson provides information on what type of decontamination equipment is to be used for the various types of decontamination procedures and situations. The different type of collective protection systems and the doctrine that guides shipboard CBR operations is also covered.

Continued on next page

Introduction, Continued

Learning Objectives

At the end of this lesson, you will be able to

- Identify the Ml1 Decon Apparatus, Portable (DAP).
- Identify the M13 DAP.
- Identify the M291 skin decon kit.
- Identify the M295 individual equipment decon kit.
- Identify the purpose of the Nerve Agent Antidote Kit (NAAK).
- Identify the M17 Lightweight Decon System (LDS).
- Identify the purpose of the collective protection system.
- Identify the purpose of the selected area collective protection system.
- Identify the purpose of the counter measures wash down system.
- Identify the purpose of the chemical hazard awareness guide.
- Identify the purpose of a CBR bill.

In This Lesson

This lesson contains the following topics.

Decontamination Equipment

M11 DAP

The M11 Decon Apparatus, Portable (DAP) is similar in operation to a fire extinguisher and is used for operator's spray down during immediate decontamination procedures. The M11 has a detachable container that holds one quart of DS2. The container can be used again by simply refilling it with DS2. A nitrogen cylinder is used to pressurize and dispense DS2 from the spray head assembly. The unit can spray up to 8 feet and can decontaminate an area approximately 135 square feet. When the temperature falls below 32° Fahrenheit, two cylinders are needed to empty the contents of the container. The M11 should not be used to decontaminate personnel and sensitive equipment.

M13 DAP

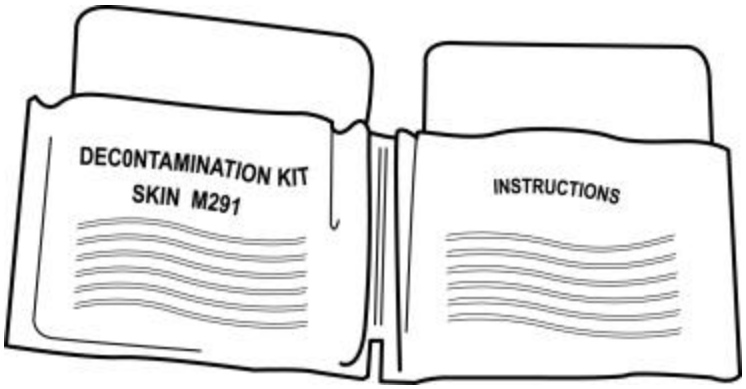
The M13 Decon Apparatus, Portable (DAP) is used primarily for operator's spray down during immediate decontamination procedures. The 5-gallon disposable container stores DS2 that is sprayed on vehicle and equipment surfaces. The system has a wand with a scrubbing brush attached at the end to assist in the removal of contamination. A hand pump is used with the M13 to decontaminate an area of approximately 1,200 square feet. The DS2 container cannot be refilled and the unit should not be used to decontaminate personnel and sensitive equipment.

Continued on next page

M291 SDK (Skin Decon Kit)

The purpose of the M291 Skin Decon Kit (SDK) is to decontaminate areas of the skin that have been exposed to forms of liquid contamination. The kit consists of six sealed packets in a wallet-like pouch designed to be carried on your person. Two packets used together will decontaminate approximately 200 square inches. The kit can also be used to decontaminate individual gear. The steps for using the kit are listed below.

STEP	ACTION	REMARKS
1	Tear open packet at the tear line.	Directions are located on each individual packet and the tear line is visible and marked.
2	Remove and unfold the pad.	The pad is also called an applicator.
3	Place two fingers inside the pad.	The pad contains a black decontamination powder.
4	Scrub the contaminated area with the pad until it is completely covered in the black powder.	The powder can remain on the skin for an indefinite amount of time and can be removed with soap and water.
5	Repeat steps with another kit if required.	The pad can be discarded as normal trash.



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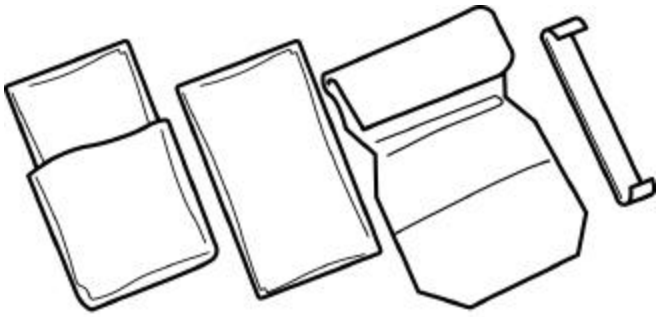
Decontamination Equipment, Continued

M295 IEDK

The purpose of the M295 Individual Equipment Decon Kit (IEDK) is to decontaminate individual equipment such as your protective mask, gloves, weapon, and helmet. The kit consists of four sealed packets in a carrying pouch. The contents of the packets can be irritating to the eyes and skin. The procedures for using the kit are listed below.

STEP	ACTION	REMARKS
1	Tear open packet and remove the wipe down mitt.	Directions are located on each individual packet.
2	Place hand inside the mitt.	
3	Scrub the contaminated area with the mitt until the contaminated area is completely covered in the black powder.	The mitt contains a black decontamination powder that should not come in contact with the eyes or open wounds.
4	Repeat steps with another kit if required.	The powder should be flushed from the area after decontamination is complete. The pad can be discarded as normal trash.



Instructions for use are printed on each kit.

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Decontamination Equipment, Continued

NAAK

The Nerve Agent Antidote Kit (NAAK) is not used in the sense of a decontaminate or a piece of decontamination type equipment, but as an antidote. The NAAK is used to counter the effects of nerve agent poisoning. The kit consists of two auto-injectors that are designed to penetrate your protective clothing and outer garments. The injectors are contained in a plastic safety clip and stored in the mask carrier for protection. They are administered in 10-15 minute intervals depending on the severity of the symptoms to a maximum of three complete sets. If a casualty has the advanced symptoms of nerve agent poisoning, the sets can be used one after another. If the casualty has initial symptoms, one set is used and that person is observed for 10-15 minutes to determine if another set is needed.

Administering the NAAK

The table below gives a description on how the nerve agent antidote kit is to be administered. The directions for the proper use are printed on each individual injector.

STEP	ACTION	DESCRIPTION	REMARKS
1	Remove the small injector from the safety clip.	The small injector contains atropine and helps counter the effects of nerve agent poisoning.	The atropine injector is labeled number one. It will fit only in the side of the safety clip that has a number "1" on it.
2	Place the top, or needle end, against the inner portion of the thigh and apply pressure. The spring will inject the needle. Hold in place for ten seconds.	This area is to be used because it will help the atropine get into the blood stream as quickly as possible.	Ensure the injector is not positioned as to where it can strike the bone. This is a concern with personnel with small thigh areas.
3	Remove the needle and place the needle end through the outer garment pocket flap and bend the needle over.	This is done to ensure accountability in the event the casualty becomes unconscious.	Only three atropine injectors can be administered to any one person.
4	Remove the large needle from the safety clip.	The large injector contains 2-PAM chloride and helps enhance the effects of the atropine.	The 2-PAM chloride injector is labeled number two. It will only fit in the side of the safety clip that has a number "2" on it.
5	Repeat steps two and three using the 2-PAM chloride injector.		

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Decontamination Equipment, Continued

CANA

The Convulsant Antidote for Nerve Agent (CANA) auto injector is similar in operation to the NAAK auto injectors except it is very distinguishable with two flanges on the exterior. The injector holds two milliliters of Diazepam to ease muscular convulsions and is administered only by the buddy system to a person incapacitated by nerve agent poisoning.

NAPP

The Nerve Agent Pretreatment Pyridostigmine (NAPP) is used in conjunction with the NAAK and enhances the survivability rate when personnel encounter nerve agents. The NAPP is a set of 21 tablets taken at eight-hour intervals until none is left or direction is given to stop use. Unit commanders will give the order to start treatment based on the current threat, situation, and possible contact with nerve agents. The NAPP set has directions on the outer wrapper and should be refrigerated until the point of issue.

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Decontamination Equipment, Continued

M17 LDS

The M17 Lightweight Decon System (LDS) is used during operational and thorough decontamination procedures. It is a two-man portable pump and heating unit that has an internal power source. This system has several capabilities and can be used in a wide variety of decontamination operations. Listed below are the major components of the M17 LDS.

COMPONENT	DESCRIPTION
Engine and fuel tank	A two-cycle air-cooled engine that provides power to the pump and heater fan
Heater fuel can	Stores heater fuel
Pump and heater	Pumps and heats water
Tool kit	Contains tools necessary to perform maintenance on the system
Accessory kit	Contains all items needed to make the system operational
Cover	Provides protection from the elements when the system is not in use
Water tank	A collapsible tank that can hold 3000 gallons of water
Branch hose	Allows the connection of two separate pressure hoses to the assembly
Pressure hose	Transfers heated water from the branch hoses to the shower, spray wands, or injector
Showers	Used to provide showers for personnel
Spray wands	Hand held and trigger operated for decontamination of equipment
Injector	Used to mix water and decontaminates
Accessory box	Provides storage for all accessories
Quick disconnect plug	Allows one of the branch hoses to be plugged
Igniter plug	Used in the burner assembly to heat water

Illustration

Shipboard Protection

HVAC

Knowing the process of how air travels throughout a ship will give you a better understanding of how to protect yourself from contamination. Heating, Ventilation, and Air Conditioning (HVAC) systems are used on all Naval surface ships to supply ventilated air to interior compartments and spaces. Fresh air is retrieved from the outside environment by fans. The air is then filtered, conditioned (heated or cooled), the moisture removed, and circulated inside the ship. When a ship encounters a contaminated environment the interior of the ship is sealed or secured, denying the agent access. In areas that cannot be secured, the protective mask is used.

CPS

A Collective Protective System (CPS) is very similar to HVAC system except that it uses chemical, biological, and radiological (CBR) filters. This system is designed to filter out agents in a vapor, liquid aerosol, and solid aerosol form. The system can also filter wet and dry biological aerosols. The purpose of this system is to provide an environment that is free of contamination where protective equipment is not needed. The two levels of protection a CPS can provide are described in the chart below.

ZONE	CAPABILITY
TP ZONE	A Total Protection (TP) zone completely filters CBR agents of any physical state from entering the enclosed environment. An atmospheric overpressure is maintained at the zone boundaries so that the only leakage is from the inside out. Air locks are used to prevent pressure loss when a person enters or exits the zone.
LP ZONE	Limited Protection (LP) zones are used when a compartment requires a high airflow (machine shop) and using overpressure is not feasible. These areas use High Efficiency Particulate Air (HEPA) filters to filter chemical and biological aerosols. HEPA filters do not trap chemical vapors making a protective mask necessary.

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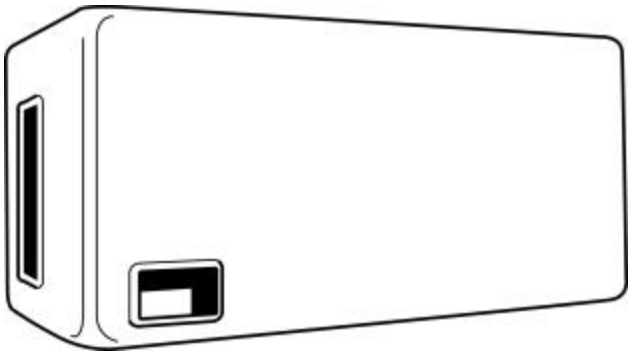
CPS Levels

The ship's design, mission, operational requirements, and cost specify the level of CPS protection on newly constructed ships. The levels are broadly defined and may even vary between ships of the same class. The chart below shows the level and amount of protection.

LEVEL	PROTECTION
I Shelter Envelope	This level provides protection for 40% of the crew. The areas protected are berthing, messing, and battle dress facilities.
II Minimum Operational Envelope	This level expands the level I envelope to include operational functions that can be integrated into the ships design. Level II protection puts emphasis on survival in the event of an NBC surprise attack.
III Maximum Operational Envelope	This level is designed to provide sufficient TP coverage for mission requirements except for flight deck and well deck operation.

SACPS

Selected Area Collective Protection Systems (SACPS) are a retro or backfit concept. The SACPS was developed for installation on ships that were constructed prior to the CPS being introduced. The system provides protection to older ships. Selected areas of older ships that are deemed vital to the ships overall mission can be backfitted for CPS coverage. SACPS fans and CBR fans are integrated into the existing HVAC system to acquire SACPS zones or "safe havens."



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CMWDS

The purpose of the Counter Measures Wash Down System (CMWDS) is to decontaminate the exposed decks and bulkheads of a ship. The system uses a dry pipe sprinkler to provide a high-pressure screen of moving seawater over the surface of the ship. Sprinkler nozzles spray vertical areas while flush nozzles cover the deck with water creating a film that reduces the contamination level. When the system is activated prior to an attack, the contact hazard is lessened because the agent will not be able to penetrate surface areas as effectively. The system is designed to allow for partial operation if mission requirements prevent the use of the entire CMWDS. Listed below are some concerns when using the system.

- Use of the system will severely impact flight deck operations.
- Using the system will reduce the amount of seawater available for operations such as firefighting.
- Seawater could have an adverse affect on weapons, radar, and other equipment.

Continued on next page

C-HAG

The purpose of the Chemical Hazard Awareness Guide (C-HAG) is to aid ship commanders in their decision making responsibilities while in a chemically contaminated environment. The C-HAG is a chart that cross references agent type, wind speed, deck temperature, and the existing CMWDS situation to estimate hazard durations. The information provided was derived from using simulations in a controlled environment and should be used only as a guideline. The chart below is an example of the estimated hazard duration of an H-blister agent.

Counter Measures Wash Down (CMWD) Situation	**Wind Across Deck Area (Knots)**	**Estimated Deck Temperature (Fahrenheit)**		
		30°	**60°**	**90°**
		Hazard duration times (minutes and/or seconds)		
No Pre-Wet No Wash Down	0-4	72:00+	24:00+	6:00
	5-20	20:00	4:00	1:00
	21-40	12:00	3:45	0:55
	Over 41	10:00	3:30	0:55
No Pre-Wet 15-Minute Wash Down	0-4	18:00	2:00	1:45
	5-20	2:45	1:15	0:30
	21-40	2:30	1:00	0:25
	Over 41	2:00	1:00	0:25
Pre-Wet 15-Minute Wash Down	0-4	9:00	1:15	0:30
	5-20	1:30	1:00	0:20
	21-40	1:30	1:00	0:20
	Over 41	1:10	0:55	0:20

CBR Bill

A ship's CBR bill is very similar to a standard operating procedure. A CBR bill provides guidance for defensive measures concerning NBC operations. It also provides strict guidance to be used for protection and decontamination after a strike has occurred. The CBR bill is an extremely detailed document that outlines the responsibilities of every billet aboard ship. The elements of a CBR bill include enclosures, responsibilities, preparatory measures, active measures, nuclear phase, chemical phase, biological phase, and summary of actions.

Lesson 3 Exercise

Directions Complete items 1 through 11 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 What best describes the M11 DAP?

a. A nitrogen cylinder used to dispense 1 quart of DS2 up to eight feet away covering 135 square feet.
b. A hand pump and brush used to dispense five gallons of DS2 covering 1,200 square feet.
c. A nitrogen cylinder used to dispense five gallons of DS2 up to eight feet away covering 135 square feet.
d. A hand pump and brush used to dispense 1 quart of DS2 covering 1,200 square feet.

Item 2 What best describes the M13 DAP?

a. A nitrogen cylinder used to dispense 1 quart of DS2 up to eight feet away covering 135 square feet.
b. A hand pump and brush used to dispense five gallons of DS2 covering 1,200 square feet.
c. A nitrogen cylinder used to dispense five gallons of DS2 up to eight feet away covering 135 square feet.
d. A hand pump and brush used to dispense 1 quart of DS2 covering 1,200 square feet.

Item 3 What best describes the contents of the M291 kit?

a. One set of sealed packets capable of decontaminating 200 square inches of contaminated skin.
b. Two sets of sealed packets capable of decontaminating contaminated equipment.
c. Six sealed packets capable of decontaminating contaminated skin.
d. Six sealed packets capable of decontaminating contaminated equipment.

Continued on next page

Item 4

What are the contents of the M295 kit?

a. Two sets of sealed packets with each set capable of decontaminating 200 square inches of contaminated skin.
b. Four sealed packets capable of decontaminating individual equipment.
c. Three sets of sealed packets with each set capable of decontaminating contaminated skin.
d. Three sets of sealed packets with each set capable of decontaminating contaminated equipment.

Item 5

What are the contents of the NAAK?

a. A packet containing 21 tablets taken every eight hours.
b. Two auto injectors that ease muscular convulsions.
c. One auto injector that counters the effects of nerve agent.
d. Two auto injectors that counter the effects of nerve agent.

Item 6

The M17 LDS is used during

a. operational and thorough decontamination. It has a self-contained heating unit and is powered by an external source.
b. operational and thorough decontamination. It has a self-contained heating and pump unit.
c. immediate decontamination. It has self-contained heating and pump unit.
d. immediate decontamination. It has a self-contained heating unit and is powered by an external source.

Continued on next page

Item 7 CPS

a. uses HEPA filters to filter out vapors, liquid aerosol, and solid aerosol forms of chemical agents. Can also filter out wet and dry biological aerosols.
b. uses CBR filters to filter out vapors, liquid aerosol, and solid aerosol forms of chemical agents. Can also filter out wet and dry biological aerosols.
c. is used to backfit older ships to provide protection in a contaminated environment.
d. uses a dry pipe system to lessen the contact hazard time of CBR agents.

Item 8 The SACPS

a. uses HEPA filters to filter out vapors, liquid aerosol, and solid aerosol forms of chemical agents. Can also filter out wet and dry biological aerosols.
b. uses CBR filters to filter out vapors, liquid aerosol, and solid aerosol forms of chemical agents. Can also filter out wet and dry biological aerosols.
c. is used to backfit older ships to provide protection in a contaminated environment.
d. uses a dry pipe system to lessen the contact hazard time of CBR agents.

Item 9 The CMWDS

a. uses HEPA filters to filter out vapors, liquid aerosol, and solid aerosol forms of chemical agents. Can also filter out wet and dry biological aerosols.
b. uses CBR filters to filter out vapors, liquid aerosol, and solid aerosol forms of chemical agents. Can also filter out wet and dry biological aerosols.
c. is used to backfit older ships to provide protection in a contaminated environment.
d. uses a dry pipe system to lessen the contact hazard time of CBR agents.

Continued on next page

Item 10 The C-HAG provides all the necessary information to

a. decontaminate the various types of CBR contamination.
b. estimate the contact hazard times of the various types of CBR contamination.
c. understand the billets and responsibilities concerning CBR defensive measures.
d. understand the various types of collective protection systems aboard ship.

Item 11 The CBR bill provides all the necessary information to

a. decontaminate the various types of CBR contamination.
b. estimate the contact hazard times of the various types of CBR contamination.
c. understand the billets and responsibilities of every billet aboard ship concerning CBR defensive measures.
d. understand the various types of collective protection systems aboard ship.

Continued on next page

Solutions

The table below lists the solutions to the exercise items. If you have any questions about these items, refer to the reference page.

Item Number	Answer	Reference Page
1	a	5-27
2	b	5-27
3	c	5-28
4	b	5-29
5	d	5-30
6	b	5-32
7	b	5-33
8	c	5-34
9	d	5-35
10	b	5-36
11	c	5-36

Study Unit 5 Summary

In this lesson, you learned about the different types of decontamination equipment and systems used to restore operating tempo. You also learned the various types of collective protection used aboard ship and what documents are used to facilitate CBR operations.

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NBC INDIVIDUAL SURVIVAL MEASURES

REVIEW LESSON EXAMINATION

Review Lesson

Introduction

The purpose of the review lesson examination is to prepare you for the final examination. We recommend that you try to complete your review lesson examination without referring to the text, but for those items (questions) you are unsure of, restudy the text. When you finish your review lesson and are satisfied with your responses, check your responses against the answers provided at the end of this review lesson examination.

Directions

Select the ONE answer that BEST completes the statement or that answers the item. For multiple choice items, circle your response.

Item 1

The mission of the Manhattan Project was to develop

a. biological weapons.
b. nerve agents.
c. an antidote for anthrax.
d. an atomic bomb.

Item 2

Which of the following events confirmed U.S. suspicions that the Soviets had an extensive biological weapons program?

a. Accusations made during the Korean War followed by an investigation by international authorities
b. An explosion at a biological weapons plant followed by an outbreak of anthrax
c. A widespread outbreak of Bubonic plague that sweeps across Europe killing thousands
d. The testing of an anthrax bomb off the Soviet coast that leaves the area uninhabitable for years

Continued on next page

Item 3 Chemical weapons were used for the first time during which of these wars?

a. World War I
b. World War II
c. Vietnam War
d. Gulf War

Item 4 Which of the following countries has a well-developed nuclear weapons program and conducted its first nuclear weapons tests in 1998?

a. China
b. Sudan
c. Pakistan
d. Syria

Item 5 The information in an NBC threat brief is used to

a. determine which troops to deploy and authorize humanitarian aid.
b. plan offensive maneuvers and reveal enemy intentions.
c. inform deployed troops and conduct contingency planning.
d. establish what training to conduct and plan decon operations.

Item 6 In which section of a current NBC threat brief would you find information on the enemy's long-range capabilities?

a. Enemy threat policy
b. Enemy weapons program
c. Enemy delivery system
d. Enemy security system

Continued on next page

Item 7 Who must authorize United States use of nuclear weapons?

a. Military commanders
b. Secretary of Defense
c. President
d. NATO

Item 8 The Geneva Protocol is accepted as international law and bans what method of warfare?

a. Nuclear only
b. Chemical only
c. Biological and chemical
d. Riot control agents and chemical

Item 9 Which of the following is true regarding U.S. policy on the use of chemical weapons?

a. They may only be used against numerically superior enemy forces.
b. They may only be used to retaliate to a chemical attack.
c. They may never be used under any circumstances.
d. Their use must be authorized by the President.

Item 10 U.S. policy states that non-lethal weapons will not be used as primary weapons in war except under specific circumstances. Which of the following is an instance that allows this use?

a. Operations involving the need to make large areas of the battlefield uninhabitable
b. Operations involving a numerically superior force
c. Supply and logistics operations involving time-sensitive items
d. Rescue missions involving densely populated areas

Continued on next page

Item 11 The M40 field protective mask is designed to protect your eyes, face, and respiratory tract from

a. chemical and biological agents and certain types of radioactive fallout.
b. chemical agents, ammonia, and certain types of radioactive fallout.
c. carbon monoxide, biological agents, and most volatile toxic substances.
d. chemical agents, toxic chemicals produced by fires, and toxins.

Item 12 Components of the M40 field protective mask are items

a. that will protect you even if they are assembled improperly.
b. that enhance the operation and degree of comfort you experience.
c. that are vital to the functioning of the mask.
d. incorporated into the design to make the mask more versatile.

Item 13 Which of the following items of the M40 field protective mask provides a containment area to hold air exhaled from the nose?

a. Airflow detector
b. Nosecup assembly
c. Outlet valve
d. Quick disconnect coupling

Item 14 When you are performing an serviceability check on your M40 field protective mask, what are you looking for when inspecting the airflow deflector?

a. The flanges are intact and have no rips or tears in the mounting holes.
b. The assembly is seated firmly against the front side of the voicemitter.
c. It is in proper alignment so that it may be grasped by the teeth.
d. It fits properly into the M1 canteen cap.

Continued on next page

Item 15

Which of the following items are authorized cleaning materials for your M40 field protective mask?

a. Isopropyl alcohol and non-medicated soap
b. Medicated soap and potable water
c. Boiling water and isopropyl alcohol
d. Abrasive detergent and potable water

Item 16

You are preparing to wear your M40 field protective mask carrier in the shoulder position. You have just put the shoulder strap over your shoulder and attached its D-ring to the short strap hook. What is the next step?

a. Hook the waist strap to the D-ring.
b. Bring the waist strap from the backside between the legs.
c. Hook the waist strap to the round ring.
d. Fold the shoulder strap and tuck it into the waist strap pocket.

Item 17

When stowing your M40 field protective mask, where should the second set of outserts be stored when not in use?

a. In the inner pocket of the carrier
b. In the outer pocket of the carrier
c. Inside of the facepiece
d. Outside on the facepiece

Item 18

You have just fitted your M40 field protective mask and need to check it for a proper fit. Which of the following describes how to do this?

a. Cover the openings at the bottom of the outlet valve and exhale.
b. Tighten the head harness straps evenly and equally from top to bottom.
c. Cover the inlet port of the canister and inhale.
d. Run your finger around the edges of the facepiece.

Continued on next page

Item 19

What is the first step in removing the M40 mask?

a. Loosen the bottom two straps (chin straps).
b. Remove the mask from the head.
c. Fold the hood if you are using one.
d. Store the mask properly in the mask carrier.

Item 20

What is the individual training standard for donning, clearing, and sealing your M40 mask?

a. 6 seconds
b. 9 seconds
c. 12 seconds
d. 20 seconds

Item 21

You are performing the steps to drink water while wearing your M40 mask. What should you do once you have blown into the canteen to create positive pressure?

a. Raise and invert the canteen to drink.
b. Insert the quick disconnect coupling into the M1 cap.
c. Remove the external drink tube from its protective pouch.
d. Check the M1 cap and quick disconnect coupling for contamination.

Item 22

Which of the following describes the characteristics of the MCU-2/P's vision capabilities?

a. The mask has a large, flexible single lens.
b. The mask has a large, rigid single lens.
c. The mask has two teardrop-shaped flexible lenses.
d. The mask has two teardrop-shaped rigid lenses.

Continued on next page

Item 23

What is the last step in fitting the mask?

a. Tighten the straps, one at a time, by giving them two or three quick and short tugs.
b. Shake your head quickly from side-to-side and up-and-down.
c. Look down at your nose to check if the mask is centered on your face.
d. Push the mask as high on your face as possible.

Item 24

You are sealing your MCU-2/P protective mask. You have an airtight seal if the mask

a. does not collapse after a drink tube leak check.
b. remains collapsed after a negative pressure check.
c. bulges slightly after a negative pressure check.
d. collapses after a drink tube leak check.

Item 25

The _____ straps are the first ones loosened in doffing your MCU-2/P protective mask.

a. forehead
b. neck
c. head harness
d. quick-don

Item 26

You are positioning the inner drink tube of your MCU-2/P protective mask so you can take a drink of water. Once the inner drink tube is in your mouth what should you do?

a. Allow air from the mask to enter the canteen.
b. Twist the M1 cap to ensure water can flow through it.
c. Raise the canteen and drink.
d. Blow into the canteen to create positive pressure.

Continued on next page

Item 27 A permeable fabric _____ to pass through it.

a. allows moisture and air
b. allows only moisture
c. will not allow either moisture or air
d. will not allow moisture

Item 28 Your protective ensemble consists of a protective mask, helmet cover, and protective overgarment. What items complete the ensemble?

a. Work gloves or black shells and footwear covers
b. Chemical protective gloves and footwear covers
c. Combat boots and chemical protective gloves
d. Utilities and work gloves or black shells

Item 29 GVOs are made of

a. olive drab vinyl and have elastic fasteners.
b. an elastomer blend and have plastic buckle fasteners.
c. butyl rubber and have eyelets with bootlaces for closing.
d. black vinyl and have plastic buckle fasteners.

Item 30 The minimum duration of the BDO protective qualities is _____ days.

a. 14
b. 30
c. 90
d. 120

Continued on next page

Item 31 In anticipation of a chemical attack, you have been directed to don your protective ensemble and have already donned your overgarment trousers and jacket. What do you don next?

a. Footwear covers
b. Helmet cover
c. Protective mask
d. Chemical protective gloves

Item 32 What does MOPP mean?

a. Mission Organized Preventive Posture
b. Military Oriented Preventive Posture
c. Military Organized Protective Posture
d. Mission Oriented Protective Posture

Item 33 While MOPP can protect you in an NBC environment it also has several disadvantages. Which of the following is increased by MOPP?

a. Heat stress
b. Morale
c. Stamina
d. Motor skills

Item 34 Which of the following is a factor involved in MOPP analysis?

a. Time of year
b. Attack indicators
c. Enemy intentions
d. Troop preparedness

Continued on next page

Item 35 You have been directed to MOPP 2. You should wear your overgarment,

a. only.
b. and mask.
c. overboots, and helmet cover.
d. overboots, and gloves.

Item 36 Which of the following is performed at Navy MOPP 2?

a. Fit your mask and maintain it at battle stations.
b. Place your mask in its carrier and wear the carrier.
c. Install a new canister on your mask and check its condition.
d. Don your mask and secure the hood around it.

Item 37 Which of the following is a procedure used when sleeping in MOPP?

a. Assign one person to check on all sleeping individuals.
b. Perform MOPP-gear exchange before going to sleep.
c. Determine which items of protective clothing can be removed.
d. Use the buddy system to check each other while sleeping.

Item 38 What is the primary purpose of MOPP gear exchange?

a. Replaces contaminated ensembles that are near expiration with new ones
b. Provides a means of moving more quickly to higher MOPP levels
c. Restores the normal operating tempo of a unit working in MOPP
d. Allows individuals to relieve themselves in a safe environment

Continued on next page

Item 39 Which of the following is a consideration in selecting a MOPP gear exchange site?

a. Good drainage
b. Dense cover
c. On a main route
d. Organic resources

Item 40 What items of MOPP gear are actually replaced with new items during buddy-team MOPP gear exchange? Protective overgarment

a. and mask.
b. mask and gloves.
c. footwear covers and gloves.
d. footwear covers, gloves, and mask.

Item 41 What method of MOPP gear exchange is considered an emergency method?

a. Triple buddy-team
b. Buddy-team
c. Individual
d. Rapid

Item 42 The NBC _____ report is submitted as part of the MOPP gear exchange close-out procedures.

a. 3
b. 4
c. 5
d. 6

Continued on next page

Item 43 Which of the following best describes the yield of a nuclear weapon?

a. The amount of radioactive material used to produce the weapon
b. The area of terrain showing blast effects expressed in square miles
c. The amount of TNT required to release the equivalent amount of explosive energy
d. The percentage of the fissionable or fusionable fuel that was consumed in the explosion

Item 44 A nuclear detonation releases a tremendous amount of energy. Which of the following comprises the largest percentage of this energy?

a. Initial radiation
b. Thermal radiation
c. Residual radiation
d. Blast or shockwave

Item 45 Gamma rays are given off during a nuclear explosion. Which of the following is most effective in shielding this type of radiation?

a. Aluminum
b. Concrete
c. Layered clothing
d. Water or paraffin

Item 46 What is the first thing you should do if you are caught away from shelter during a nuclear attack?

a. Move to the nearest object and sit facing away from the blast.
b. Move to the nearest object and stand facing away from the blast.
c. Drop to the ground and put your arms and hands under your body.
d. Drop to the ground and curl into a ball with arms and feet over your body.

Continued on next page

Item 47 Which of the following is an example of a tactical use of biological weapons?

a. Contaminating an enemy's water supply
b. Introducing a plant disease that leads to crop failure
c. Contaminating a portion of the battlefield
d. Causing an illness that weakens enemy units

Item 48 Which of the following is true regarding persistent biological agents? They

a. cause long-term effects or illness in humans.
b. cause immediate, short-term effects or illness in humans.
c. remain in the release area for extended periods of time.
d. evaporate very quickly from the release area.

Item 49 What type of toxins attack the intestinal tract?

a. Cytotoxins
b. Dermotoxins
c. Enterotoxins
d. Neurotoxins

Item 50 A vector is

a. the container used in low tech delivery that contains the agent.
b. an animal that produces toxins, such as venom, inside its body.
c. the lining in a bursting munition that shields the agent from the charge.
d. an organism that carries a pathogen from one host to another.

Item 51 Good sanitation, proper hygiene, and being well rested are examples of actions to be performed _____ a biological attack.

a. before
b. during
c. after
d. following

Continued on next page

Item 52 Which of the following should be performed during a biological attack?

a. Identify the agent
b. Perform proper hygiene
c. Assume MOPP4
d. Mark the attack area

Item 53 Which of the following should you do after being attacked with what appears to be a biological agent?

a. Submit an NBC 5 report
b. Determine attack indicators
c. Decontaminate
d. Assume MOPP4

Item 54 Chemical agents

a. incapacitate, defoliate, or signal.
b. injure, disease, or control.
c. kill, injure, or incapacitate.
d. control, maneuver, or deny.

Item 55 In general, what is the form of most non-persistent agents?

a. Liquid or solid
b. Vapor or liquid
c. Aerosol or vapor
d. Solid or aerosol

Item 56 What symptoms might an individual who has come in contact with a chemical agent thought to be a blood agent have?

a. Lips and fingertips turn pink or purple
b. Sensation of drowning while on dry land
c. Reddening of the skin followed by blisters
d. Inability to concentrate or solve problems

Continued on next page

Item 57 Which of the following is an action that should be performed before a chemical attack?

a. Disperse units, personnel, and equipment as much as possible.
b. Move all decontamination equipment to a central area in the rear.
c. Distribute all resources over a wide area keeping like items together.
d. Keep units, personnel, and equipment as close together as possible.

Item 58 Enemy forces are attacking your unit with a chemical agent. What is the first thing you should do?

a. Don, clear, and seal your protective mask.
b. Mask victims of chemical poisoning to reduce further exposure.
c. Give the signal that a chemical attack is occurring.
d. Prepare for multiple attacks by seeking cover.

Item 59 Which of the following is an action to be performed after a chemical attack?

a. Agent identification
b. Camouflage equipment
c. Administer first aid
d. Conduct NBC training

Item 60 What is a key factor in using additional NBC alarms?

a. All personnel are aware of the correct alarm.
b. The most accessible audible alarm should be used.
c. Each unit should have a different alarm.
d. The correct number of alarms are on hand.

Continued on next page

Item 61 Which of the following chemical detection devices can be used to detect blood agents?

a. M9 Paper
b. M256 Series Detector Kit
c. M22 ACADA
d. CAM

Item 62 The NBC _____ report is known as the "observers' report."

a. 1
b. 3
c. 4
d. 6

Item 63 Who is the originator of an NBC 1 report for a biological attack?

a. Reconnaissance crews
b. The observing unit
c. The NBC control center
d. Higher headquarters

Item 64 Which of the following is a required line item on an NBC 1 report?

a. Alpha – Serial strike number
b. Echo – Time/date group of the attack
c. Golf – Means of delivery
d. Hotel – Type of agent and height of burst

Item 65 The following are components of an NBC contamination marking set, NBC markers,

a. wooden stakes, heavy twine, and indelible pen.
b. colored flags, marking ribbon, and indelible pen.
c. mounting stakes, marking ribbon, and crayon.
d. M8 paper, heavy twine, and crayon.

Continued on next page

Item 66 You are marking an area that has been contaminated by a chemical agent. Which of the following describes the NBC marker you will use?

a. A red triangle with "GAS" in yellow lettering
b. A yellow triangle with "GAS" in red lettering
c. A white triangle with "CHEM" in red lettering
d. A yellow triangle with "CHEM" in black lettering

Item 67 You are completing the data required on an NBC NATO marker for radiological contamination. Which of the following must be included?

a. Name/unit of individual placing the marker and date/time of marking
b. Date/time of detection and type of detection device used
c. Date/time of attack and height of burst
d. Dose rate and date/time of reading

Item 68 What are the four decon principles?

a. Reduce, contain, limit, restore
b. Speed, need, limit, priority
c. Analyze, need, contain, remove
d. Priority, resources, time, restore

Item 69 What are the three levels of decontamination?

a. Personal, mechanical, operational
b. Hasty, thorough, complete
c. Immediate, operational, thorough
d. Immediate, delayed, long-term

Item 70 What are the three types of decontaminants?

a. Quick, delayed, slow-acting
b. Hazardous, non-hazardous, non-chemical
c. Stock, special-order, natural
d. Standard, non-standard, natural

Continued on next page

Item 71 What immediate decontamination technique is used to remove contamination from individual equipment and gear?

a. Operator's spray down
b. Individual equipment decon
c. Detailed equipment decon
d. Personal wipe down

Item 72 What are the three phases of operational decontamination?

a. Formation, implementation, completion
b. Assessment, coordination, termination
c. Preparation, execution, site clearance
d. Site setup, washdown, marking

Item 73 What procedures are performed during operational decontamination?

a. MOPP-gear exchange and vehicle washdown
b. Personal wipe down and equipment decon
c. Detailed equipment decon and vehicle spray down
d. Operator's spray down and MOPP-gear exchange

Item 74 Which of the following decontamination devices consists of six individual decon packets containing an applicator pad filled with black decontamination powder?

a. ABC-M11 DAP
b. M13 DAP
c. M17 LDS
d. M291 SDK

Continued on next page

Item 75 The purpose of a ship's CBR Defense Bill is to

a. determine the amount of CBR defense training required.
b. establish SOPs for dealing with the effects of a WMD.
c. determine enemy CBR weapons, capabilities, and personnel.
d. establish the chain of command after a CBR attack.

Item 76 You are in a Total Protection Zone of a ship with a Collective Protection System (CPS). What protective gear must you wear?

a. Mask only
b. Mask and chemical protective gloves
c. Mask and chemical protective overgarment
d. No protective clothing or mask is needed

Item 77 The Selected Area Collective Protection System (SACPS) provides

a. three levels of CBR protection ranging from safest on lower decks to least safe on upper decks.
b. CBR protective areas on exposed decks for crew members who cannot leave those stations.
c. non-pressurized CBR protection on lower decks for mission essential equipment.
d. CBR protection for mission essential spaces and/or berthing compartments.

Item 78 Which of the following is a disadvantage to using the Countermeasures Washdown System (CMWDS)? It

a. reduces the store of fresh water available.
b. impacts flight deck operations.
c. has adverse effects on firefighting equipment.
d. can only be operated for 15 minutes.

Continued on next page

Review Lesson Solutions

Answers

The table below lists the answers to the review lesson examination items. If you have questions about these items, refer to the reference page.

Item Number	Answer	Reference
1	d	1-5
2	b	1-8
3	a	1-9
4	c	1-6
5	c	1-11
6	c	1-11
7	c	1-18
8	c	1-19
9	c	1-19
10	a	1-20
11	a	2-4
12	c	2-4
13	b	2-10
14	a	2-22
15	a	2-24
16	c	2-26
17	a	2-25
18	c	2-32
19	a	2-32
20	b	2-33
21	a	2-36
22	a	2-79
23	a	2-83
24	b	2-84
25	c	2-83
26	d	2-34
27	a	2-42
28	b	2-46

Continued on next page

Answers, continued

Item Number	Answer	Reference
29	a	2-47
30	b	2-45
31	a	2-60
32	d	2-53
33	a	2-55
34	d	2-57
35	c	2-61
36	b	2-64
37	d	2-71
38	c	2-65
39	a	2-65
40	c	2-67
41	c	2-69
42	c	2-69
43	c	3-5
44	d	3-7
45	b	3-10
46	c	3-13
47	c	3-25
48	c	3-25
49	c	3-23
50	d	3-23
51	a	3-28
52	c	3-30
53	c	3-31
54	c	3-35
55	c	3-37
56	a	3-43
57	a	3-48
58	a	3-49

Continued on next page

Answers, continued

Item Number	Answer	Reference
59	a	3-50
60	a	3-49
61	b	4-10
62	a	4-30
63	b	4-30
64	d	4-30
65	c	4-41
66	b	4-39
67	d	4-40
68	b	5-16
69	c	5-16
70	d	5-3
71	d	5-18
72	c	5-19
73	a	5-19
74	d	5-28
75	b	5-36
76	d	5-33
77	d	5-34
78	b	5-35