

AFM 355-8

A I R F O R C E M A N U A L

DEFENSE

**AIRMAN'S MANUAL
FOR
DEFENSE AGAINST
CBR ATTACK**

1 JANUARY 1954

DEPARTMENT OF THE AIR FORCE

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Foreword

This Manual describes the basic facts about chemical, biological, and radiological (CBR) warfare; how the enemy may use these agents; and measures which may be taken to protect personnel. The Manual is published for the information and guidance of all Air Force personnel.

BY ORDER OF THE SECRETARY OF THE AIR FORCE:

OFFICIAL:

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THIS MANUAL CAN SAVE YOUR LIFE

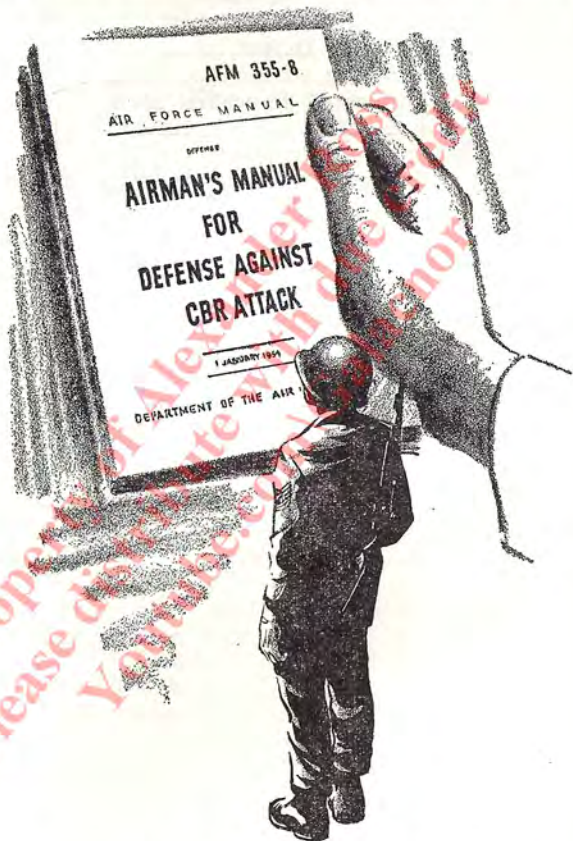


Figure 1. This Manual can save your life.

Chapter 1

INTRODUCTION

1. You Must Know the Score

a. This Manual is for you, airman. Its purpose is to help you perform your mission and live to tell about it (figure 1). To do this you've got to know the score—the true dangers of atomic, chemical, biological, and radiological warfare and what you can do to protect yourself against them.

b. Do you have any assurance that this type of warfare will *not* be used? None whatsoever. If the enemy believes it will be to his advantage to use these special weapons he will undoubtedly use them. When biological, chemical, or radiological warfare is used, harmful agents are released and casualties are almost certain. Casualties are airmen put out of action—sick, wounded, missing, or killed. CBR warfare will cause casualties just as high-explosive bombs, machine guns, or other weapons will produce casualties. However, whether you are a casualty or not will depend on one person—you! Learn *now* the skills needed to protect yourself. *You* will be the one to determine how well the enemy can use this type of warfare.

2. Why This Manual Was Written

By studying this Manual you will learn basic facts that you must know about biological, chemical, and radiological warfare. It will be good insurance on a very-valued possession—your life! The information is not detailed, nor will it answer all of your questions. Your unit passive defense officer and passive defense noncommissioned officer will give you additional information and training. This Manual is to serve as a guide and refresher on the training you have had or will receive (figure 2).

3. How To Get the Most Out of This Manual

To get the most from this Manual the objective (what you want to know) should be kept in mind. As you read this Manual, ask yourself the following questions:

What is CBR warfare? What agents can be used to injure or kill me?

How do CBR agents attack me?

How can I know when CBR agents are being used?

How can I protect myself from CBR agents?

If CBR agents successfully attack me, what can I do about it?

How can CBR agents be made harmless?

This Manual will give the facts which will answer these questions for you. Remember them!

YOUR GUIDE AND REFRESHER

This manual is for you, airman.
... Its purpose is to help you
perform your mission
and live to tell about it.



Figure 2. The purpose of this Manual.



YOU HAVE NOTHING TO FEAR

BUT FEAR ITSELF !

Figure 3. A fact in war or peace.

Chapter 2

WHAT IS CBR WARFARE?

4. A Triple Threat

In the past an airman was trained to deal with chemical warfare only. Today, in addition to chemical warfare, the airman must be ready to fight biological and radiological warfare. The three divisions of CBR warfare are defined in figure 4.

5. Why CBR Warfare Merits Respect

a. The purpose of CBR warfare is to produce casualties; it merits your respect.

b. Events similar to chemical warfare (also called CW or gas warfare) can be seen in everyday events. Many automobile drivers have died from the effects of carbon monoxide gas. Firemen also have been overcome by deadly fumes. You have probably used chemicals such as fly spray to kill flies. The chemicals used in CW are more deadly and cover larger areas than fly spray and are aimed at you as an airman.

c. Next, consider biological warfare (called BW or germ warfare). A few harmful germs are present in everyday living and result in diseases like colds or the GI's. Most contagious diseases like measles, mumps, or chickenpox are due to certain germs get-

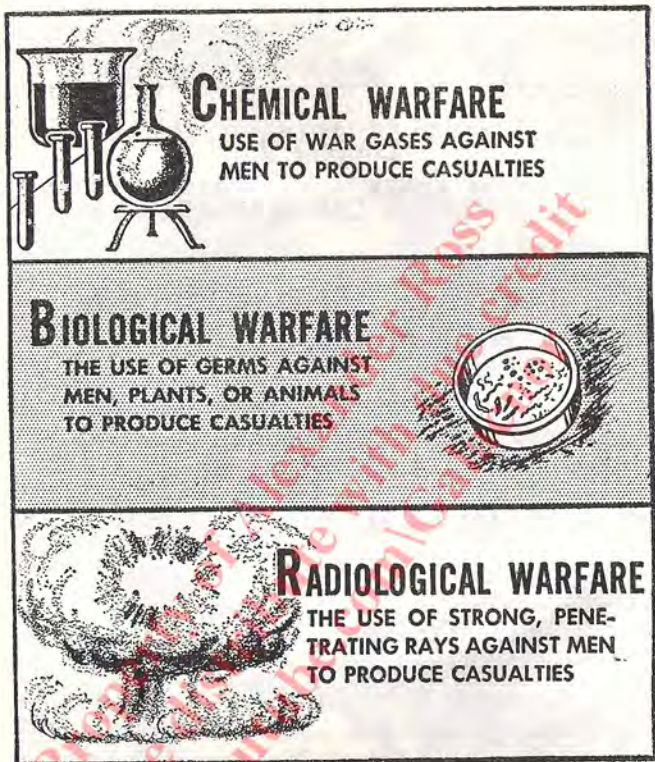


Figure 4. CBR warfare defined.

ting into the body. Only a small percentage of germs are so deadly that they can result in death. You may have had friends or relatives who got such germs and died. Germ warfare is a manmade attempt to use germs to produce disease or death in man, animals, and plants (figure 5).



Figure 5. Germ warfare.

d. Finally, certain traits of radiological warfare (RW) are not new to you. The painful results of overexposure to strong sunrays is a common experience. Taking X-ray pictures or X-ray treatments has to be carefully controlled. In the wrong hands, X-ray machines can be very dangerous and can cause severe sickness or death. Any ray that is powerful enough to penetrate your skin and damage your body cells merits respect (figure 6). In an atomic explosion radiation is present in dangerous amounts, although the heat and blast present are much more deadly.

6. How the Enemy May Use CBR Agents

Figure 8 shows common methods of spreading CBR agents. CBR agents are poisons in the form of gases, liquids, smokes, germs or germ products, and radioactive materials used in warfare to produce death, injury, or discomfort. The munitions in figure 7 are regarded as sound methods for spreading the agents checked. You can expect to run into these methods of dispersal in the event of CBR warfare. However, many other means of spreading CBR agents are possible. The enemy probably will use other methods for the purpose of surprise. Those shown in figure 7 may be the basis for most large-scale CBR attacks. Munitions may be filled with chemical, biological, or radiological agents.

7. How CBR Agents Attack

The makeup of chemical, germ, or radiological agents is entirely different. However, they do have

USE OF STRONG PENETRATING RAYS

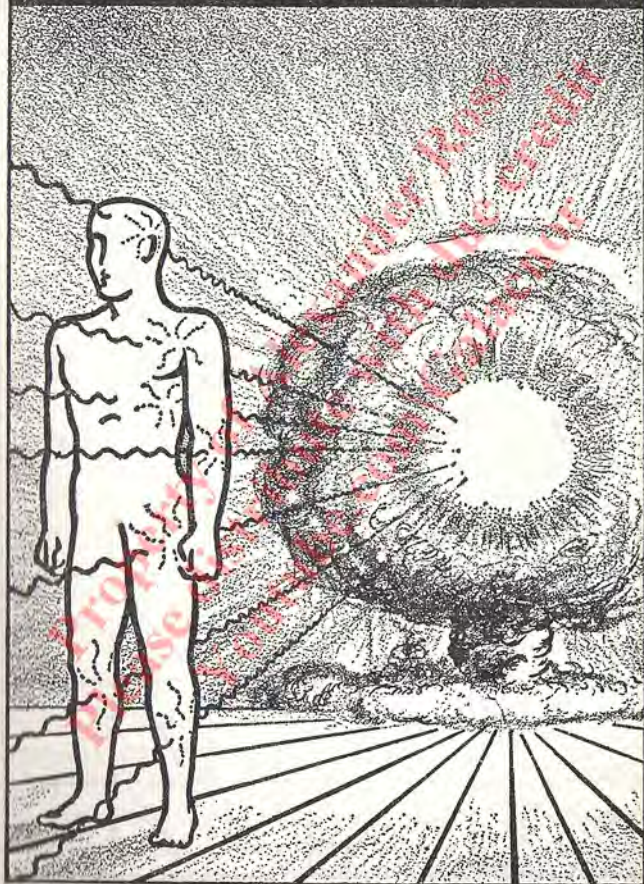


Figure 6. Radiological warfare.

SOME POSSIBLE MEANS OF SPREADING CBR AGENTS









		CW	BW	RW
	MORTAR AND ARTILLERY SHELL	✓		✓
	AIRPLANE SPRAY	✓	✓	✓
	GUIDED MISSILES AND ROCKETS	✓	✓	✓
	AERIAL BOMBS	✓	✓	✓
	CANDLES, POTS, LAND MINES, HAND GRENADES	✓		
	FREE BALLOONS		✓	
	INSECT CARRIERS		✓	
 WATER SUPPLY	SABOTAGE		✓	

Figure 7. The enemy may use many more.

certain factors in common. For example, all CBR agents are poisons designed to attack your body and injure or kill you. From your viewpoint, this common factor is very important. All CBR agents attack your body through one of the entrances shown in figure 8.

8. Protection Against CBR Agents

a. Protecting yourself against CBR agents is the big job. To protect yourself against any danger, you must know what the danger is, how it works, and be able to spot its presence. The next three chapters will give you this information. You will learn that protection against gas warfare is quite involved. Germ and radiological warfare are just as deadly as gas warfare. Sound protection against gas warfare is a good basis for protection against germ and radiological warfare.

b. After looking at figure 8, you may safely conclude that any equipment that will keep CBR agents out of your lungs or stomach (via your nose and mouth), your eyes, or your skin, will protect you. The types of protective equipment needed to block the entry of CBR agents into your body are described in the chapters which follow. As a well-trained airman, you must know how to use your protective equipment. Using this knowledge, you can outsmart any enemy who tries to destroy you by using CBR warfare.

c. To protect yourself against CBR warfare you will also need to know if an area is contaminated (covered with dangerous CBR agents). Figure 9 shows markers that will be posted in contaminated

HOW CBR AGENTS ATTACK

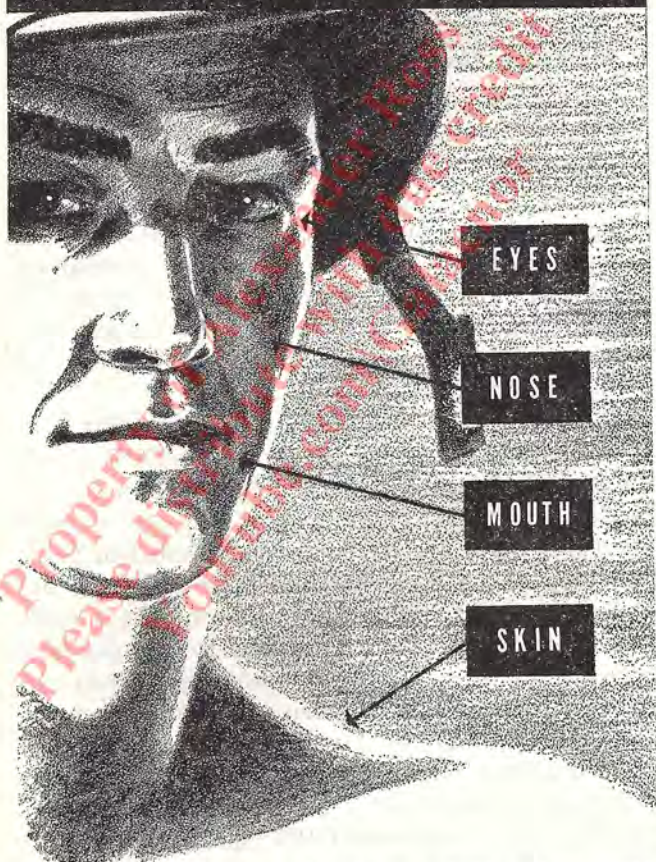
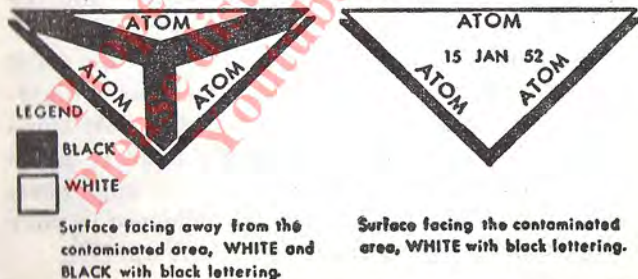
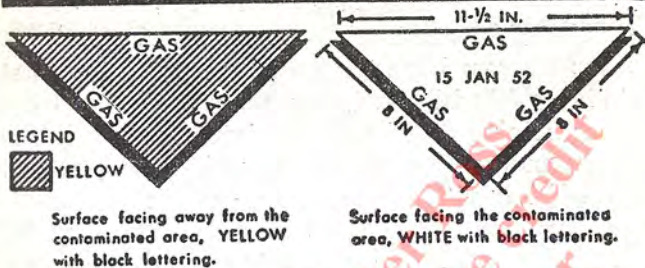


Figure 8. All defense is based on protecting these areas.

CONTAMINATION MARKERS



MATERIAL, WOOD, METAL, OR OTHER RIGID SUBSTANCE

Figure 9. Markers for contaminated areas.

areas. Study these signs until you can recognize them easily.

9. Self-Aid

During your basic training you learned that first aid is a skill which every airman must have. First aid is helping others who are injured. Self-aid is treatment that you give to yourself when injured. Self-aid is of vital importance in gas warfare. Self-aid is not as important in BW and RW as it is in CW. In gas warfare knowing how to apply self-aid is a "must." Self-aid may confuse you at first and seem difficult. Don't be discouraged. Your unit passive defense personnel will train you; this Manual will give you the know-how in clear, simple terms. By mastering self-aid for chemical agents you can greatly reduce the danger. Be prepared to rely on *yourself*, an aid man may not be present.

10. CBR Agents Made Harmless

It is possible to remove, neutralize, or destroy CBR agents by a method called decontamination. Decontamination is the process of making CBR agents harmless. Details of how you as an individual can do this will be described in the next three chapters. The fact that CBR agents can be made harmless should reduce fears that you may have. This will, in turn, build up your confidence in your ability to defend yourself against CBR warfare.

11. CBR Alarm System

Two types of alarm may be given in case of *any* enemy attack (figure 10).

GENERAL ALARM FOR EXPECTED ATTACK



SIREN



TELEPHONE



FIELD RADIO

LOCAL ALARM FOR DETECTED ATTACK



IF GAS ATTACK
GAS IS SHOUTED



MAKE UNFAMILIAR
SOUNDS FOR ALARM

Figure 10. Alarms for detected attack.

a. *General Alarm.* On an air base, the general alarm normally will be spread by sirens, whistles—and, in some cases, telephone or radio. Knowing the alarm signals for your base is a must. At this time your passive defense measures should be put into effect. Since no one knows what type of attack (CBR, high-explosives, or a combination) is going to take place, you must get your individual defense equipment, proceed to your designated station or shelter, and remain there until the “all clear” signal is sounded.

b. *Local Alarm.* It may be that a general alarm will not be sounded, because of the location of your particular unit, or, in the case of sabotage, you or your buddies may be the first to detect the attack. At any rate, as soon as a CBR attack is detected, the local alarm will be spread by rapidly and continuously striking devices which will make unfamiliar sounds, by shouting “gas” in case of a gas attack, or by shouting “spray” in case of a spray attack.

12. Your Objective

As an airman, your objective is to master the six skills listed in figure 11. Most of your CBR training will be based on mastering these objectives. Learning these objectives now will make the next four chapters easier to read and understand. Your CBR training will be interesting because you will know why such training is necessary.

13. The Payoff

When you have mastered the six skills listed in figure 11, the payoff will justify your efforts. You

EVERY AIRMAN MUST KNOW

- 1 The types of CBR agents and their effects.



- 2 How to spot the presence of CBR agents.



- 3 How to use his protective equipment.



- 4 How to care for his protective equipment.



- 5 How to perform self-aid.



- 6 How to remove CBR agents from himself and his equipment.



Figure 11. Training objectives.

and your unit will then be able to perform your mission successfully in the face of CBR warfare. This will be possible because knowledge will replace fear and panic with confidence and courage (figure 12).

KNOWLEDGE REPLACES FEAR



Figure 12. The payoff justifies the effort.

Chapter 3

DEFENSE AGAINST CHEMICAL WARFARE

Section I. WAR GASES

14. What They Are

War gases are toxic (poisonous) chemicals which can produce death, injury, or irritating effects. Actually, these agents may be found as solid particles, liquids, or gases.

15. Six Groups of War Gases

a. War gases attack the body and produce specific damages according to the nature of the gas used. You must learn and remember how they affect your body. This is known as the physiological (bodily) effect of war gases. Listed below is a simple breakdown of the six big groups of war gases—

- (1) Nerve gases.
- (2) Blood gases.
- (3) Blister gases.
- (4) Choking gases.
- (5) Vomiting gases.
- (6) Tear gases.

b. The chart at the end of this chapter (figure 43) lists some of the more effective gases that come under these six groups. Included are the symbols, smell,

color, symptoms, means of protection, and self-aid measures. Learning the contents of this chart will be a good foundation for your defense against gas warfare.

Section II. HOW WAR GASES AFFECT YOU

16. Nerve Gases

a. *Of Great Importance Because of Their Action on Your Nervous System Is a Group of Gases Called "G-GASES."* We will refer to them simply as *nerve gases*. They are quick killers. Very small amounts result in headache, dizziness, dimmed vision, and nausea. Upon entering your body through the nose, skin, or mouth, nerve gases interfere with breathing and may cause a tightness of the chest, convulsions, paralysis, and death. If you are in dim or artificial light, the first effect you will probably notice is a dimming of vision caused by contraction of the eye pupils to pinpoint size. This effect is a vital tipoff. Like the buzz of a rattlesnake, it is a warning not to ignore. *Mask and give the alarm.* Other immediate symptoms will be tightness of the chest, a running nose, nausea, stomach cramps, rapid breathing, and twitching muscles (figure 13). *Right here it must be stressed that protection against nerve gases requires four actions:*

- (1) Speed in detection.
- (2) Speed in masking.
- (3) Speed in giving the alarm.
- (4) Speed in self-aid.

b. Nerve gases are the newest group of war gases. They have never been used in combat. Unlike most

NERVE GAS IS A QUICK KILLER

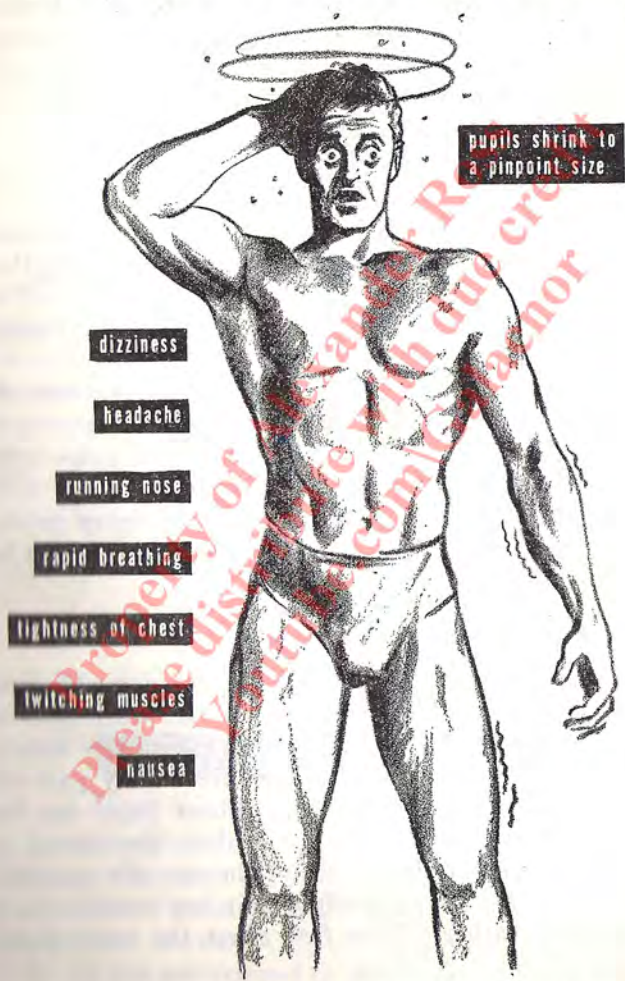


Figure 13. Nerve gas attacks the nervous system.

war gases, most nerve gases are odorless. This makes detection difficult. To play it safe, we must rely on detection devices to identify the presence of nerve gases. Mainly due to nerve gases, a new gas safety rule has been adopted. This rule is given in figure 40 near the end of this chapter. This rule applies only if CBR warfare has begun. *Know it.*

17. Blood Gases

Blood gases get their name because of the action they have on your blood. If you inhale blood gas, the blood cannot furnish oxygen to the body cells. This will cause the body tissues to suffocate and die (figure 14). Rapid breathing followed by violent convulsions are the main symptoms when a large amount of blood gas is inhaled. A mild exposure may produce headache, dizziness, and nausea. Blood gases will either cause a speedy death or complete recovery will take place within a few hours. Like nerve gases, blood gases are quick killers and speed in masking is essential.

18. Blister Gases

a. As the name tells you, blister gases cause blisters on your skin. The result can be far worse than a severe case of sunburn. In either liquid or vapor form, these agents irritate and blister any part of your body that they touch. Blister gases can be effective in small amounts. A drop the size of a pinhead will produce a blister the size of a quarter. Blister gases are more effective in hot weather than in cold weather. They first affect the moist parts

THE EFFECT OF BLOOD GASES

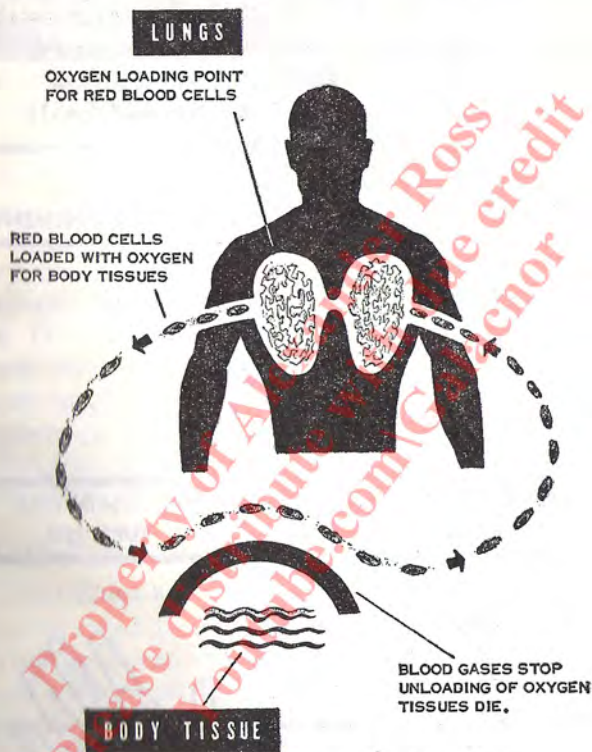


Figure 14. Blood gases are quick killers.

of the body (bend of arms and knees, armpits, and crotch). Men who are sweating are especially subject to severe burns. Blister gases are quick-acting (figure 15). To the victim this may not appear to be true. If you are exposed to blister gas, nothing will

BLISTER GASES CAUSE SEVERE BURNS AND BLISTERS

IF LIQUID BLISTER GAS GETS ON YOUR SKIN—ACT FAST!



MINUTES LATER...

TOO LATE FOR OINTMENT!

AN HOUR OR MORE LATER...



... SKIN WILL TURN RED

STILL LATER SEVERE BURNS AND BLISTERS



Figure 15. Blister gases are quick-acting.

happen at once. One to several hours will go by before your skin starts to turn red. It will be hours or even days later before the blisters appear. However, the damage is done during the first few minutes of exposure. That is the reason why speed will be stressed in the section on self-aid.

b. The damage to the eyes may be worse than the effects on the skin. Gases, even liquids, may only mildly irritate the eyes at first; or there may be no pain at all. In a few hours, however, your eyes will smart, become inflamed, and be sensitive to light. Tears and great pain will follow, and permanent injury may result. Some blister gases will cause immediate pain in the eyes.

c. If breathed into your lungs, blister gases will inflame the throat and windpipe and will produce a harsh cough. In serious exposure this may result in pneumonia and death. Quick detection of blister gases plus prompt protection against entry into the eyes, lungs, or skin is vital in order to escape harm.

19. Choking Gases

Your lungs are the target for choking gases. If you can avoid breathing them, you are safe since they do not harm your skin or digestive system. Choking gases will actually choke an unprotected airman. If large amounts enter the lungs, the lungs will become filled with liquid, and death may result from a lack of oxygen (figure 16). Your protective mask gives you complete protection against all choking gases. The *instant* you suspect the presence of a war gas, carry out these three actions as quickly as possible—

a. Stop breathing.

CHOKING GAS ▶ CAUSES THE LUNGS
TO FILL WITH LIQUID



Figure 16. Choking gases are fast and deadly.

b. Put on your protective mask.

c. Clear your mask.

Protective mask drill will make you letter-perfect in these steps.

20. Vomiting Gases

a. Inhaling vomiting gases makes you sick. A sense of fullness in the nose, a severe headache, intense burning in the throat, and tightness and pain in the chest are the general symptoms. These are followed by uncontrollable coughing, violent sneezing, nausea, and finally vomiting.

b. Remember that symptoms may be delayed several minutes. If you should inhale vomiting gas before you get your protective mask on, you might get sick after your mask is on. It would be natural, then, to think that the mask is leaking and to take it off. If you do this, however, you will be exposed to more gas. This would be disastrous if vomiting gases were combined with blister, blood, or choking gases. It is quite possible that the enemy might do just this. The result would kill or seriously injure the airman who took his mask off because he was sick.

c. *You must wear your protective mask as long as gas is present. Pull it away from the chin (don't take it off) during the actual vomiting.* The protective mask offers adequate protection against vomiting gases. Keep it on as long as gas is present. The undisciplined airman, feeling terribly sick, will remove his mask and die. The disciplined airman, with as great an urge to take off his mask, will keep it on and live (figure 17). Effects of vomiting gases usually pass within 3 hours.

VOMITING GASES MAKE YOU SICK



Figure 17. Effect of vomiting gases.

21. Tear Gases

Tear gases are the least toxic of the six groups of war gases. They are discussed in this Manual because you may encounter them during your training. They may also be used in civil riots to disperse the crowds or to squelch prison riots. The vapors of tear gases produce sharp, irritating pain in the eyes, resulting in an abundant flow of tears (figure 18). There is usually no permanent damage to the eyes, and the effects wear off quickly. For a short time you may not be able to see. The protective mask, put on *before* tear gases get into your eyes, will give complete protection. One of the purposes of the gas chamber exercise is to prove to you how effectively your protective mask protects against gases which attack you through the nose, mouth, or eyes.

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YOU WILL LEARN ABOUT TEAR GASES

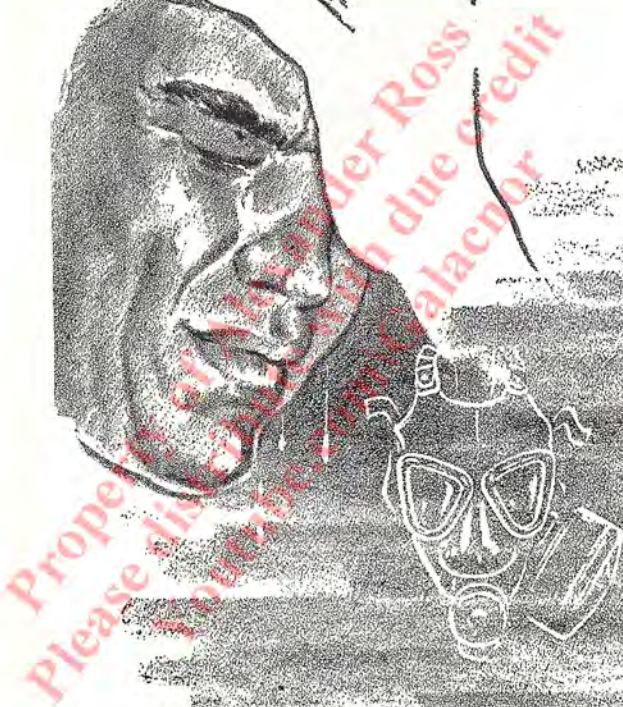


Figure 18. Tear gases.

Section III. HOW TO DETECT THE PRESENCE OF WAR GASES

22. Using Your Five Senses

a. *Your Nose.* You cannot rely on your nose as a foolproof means of detecting war gases. Although many gases do have a characteristic odor, many others have little odor at all. Any one gas may smell quite differently to different individuals. A mixture of gases will smell different than any one gas taken by itself. When in combat, you will learn rapidly to identify those odors which are common to the battlefield—anything which smells different from usual must be assumed to be gas. Put on your mask. Then, if it is not gas, your unit passive defense personnel will tell you it is safe to unmask. Detection of war gases by smell is still a quick and easy method when the gas has an odor (figure 19). The chart at the end of this chapter gives the odor of gases that have odors. However, some of the new types of war gases (particularly the nerve gases) have very faint odors or are odorless. To most men phosgene smells like new-mown hay or fresh-cut corn. A few men may get an odor of anything from roses to sauerkraut. The main point is this—**WITH WAR GASES THAT HAVE AN ODOR, DISCOVER WHAT ODOR YOU ASSOCIATE WITH EACH TYPE OF GAS.** Then if phosgene smells like clover to you, give the alarm and quickly mask when you detect a cloverlike odor.

b. *Your Eyes.* Since war gases may be in one of three physical states—solids, liquids, or vapors—

FEW WAR GASES ARE ODORLESS

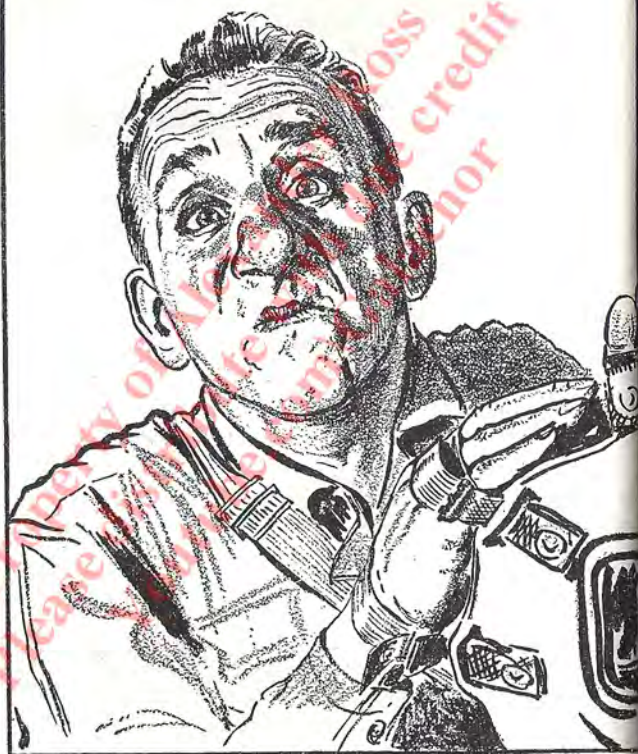


Figure 19. Your nose can smell most war gases.

your sense of sight may help detect their presence. Mustard gas, unless of a purified type, is dark brown in its liquid state. Therefore, as a liquid, it may be easy to detect, and would appear as oily, dark patches on leaves and buildings. However, mustard changes slowly to a colorless gas. As a gas it is still very toxic, but your eyes are of no aid as a means of detection. Nerve gases may be either a colorless liquid or a colorless vapor. Although you can't see nerve gases, your eyes may help you by detecting the munitions the enemy uses to spread them. Most war gases have some color in the solid or liquid states, and some can be seen in the vapor state as mist or thin fog immediately after bombs or shells burst. An alert pair of eyes, trained to be on the constant watch, is a valuable asset in detection of many war gases (figure 20). In the presence of gases that are very hard to detect without the use of detection devices, you must watch your buddies constantly for any of the symptoms described in paragraphs 16-21.

c. *Your Ears.* Once you know the methods the enemy is using to spread war gases, experience will enable you to detect the sounds of his chemical munitions. For example, artillery shell filled with gas might sound quite different from HE shell in flight and upon explosion. Artillery shell filled with gas would probably make much less noise because in most cases the burster is required only to open the shell or bomb case and release the agent. Experience gained in gas attacks will increase the value of your ears in detecting the presence of gases (figure 21).

d. *Your Sense of Taste and Feel.* You can taste and feel gas to some extent. A feeling of irritation

ALERT EYES MAY DETECT SOME GASES



GAS VAPORS-AIRPLANE SPRAY AND BOMBS



LIQUID GAS IN PUDDLES AND ON VEGETATION



BE SUSPICIOUS OF SMOKE SCREENS



Figure 20. Examples of visible clues.

THE EXPLOSION OF GAS BOMBS
MAY SOUND DIFFERENT



Figure 21. Experience will aid detection by sound.

in the nose, eyes, or skin is an urgent warning to protect yourself. A strange taste in food, water, or cigarettes may tell you they have been contaminated (figure 22). Spit them out!

23. Your Detection Equipment

This Manual does not go into detail on mechanical detection devices used to identify war gases. The actual demonstration of these items during your training and the clear instructions that come with them will make it easy for you to use these devices. The point is that you are not completely dependent upon your five senses in gas identification. In addition to a gas detector kit which your unit will have, the other items shown in figure 23 will be used to aid you in gas detection.

24. Gas Detection—a Great Challenge

Every airman must develop the alertness of an old Indian scout like Daniel Boone. Any clues indicating that CW may be present (paragraph 22) should be reported at once. A "trigger happy" airman can be a menace to his unit. To be "gas alert" when gas warfare is being employed, is vital to the survival of you and your unit. You must give the alarm and mask at the first sign of gas. This does not mean that you should be "gas happy" and give false gas alarms. It means that the gas safety rule, which tells when to mask (figure 40), must be obeyed as soon as CBR warfare is used.

BEWARE OF ANYTHING YOU PUT IN YOUR MOUTH

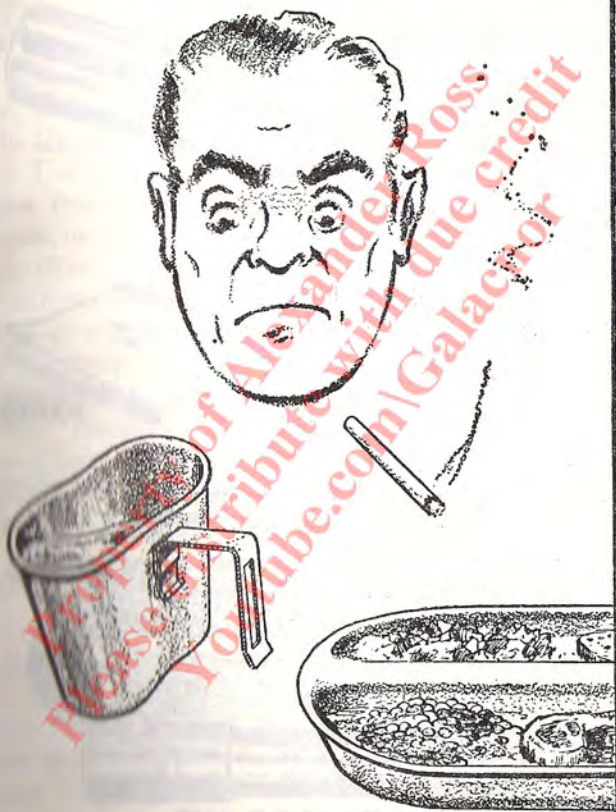


Figure 22. Your tongue may help you detect.

CHEMICAL DETECTION DEVICES



CRAYON

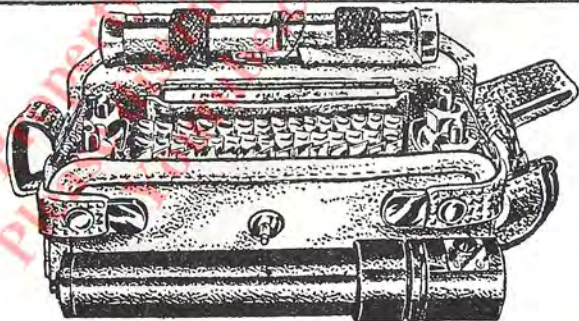


PAINT



PAPER

INDIVIDUAL ITEMS



DETECTOR KIT

Figure 23. Gas detection items.

Section IV. HOW TO PROTECT YOURSELF FROM WAR GASES

25. General

There are several ways of protecting yourself from war gases. In the order of their efficiency, they are as follows:

- a. Avoid areas where war gases exist.
- b. Quickly detect the presence of war gases.
- c. Use your protective equipment to prevent war gases from entering your body through the nose, mouth, or skin.
- d. Give yourself quick and correct self-aid when contaminated. It doesn't take a genius to see the value of suggestion a above. However, since an air base is a very-likely CBR target, a good airman has to learn to face these dangers and meet them successfully. Detection and self-aid are covered in paragraphs 22 through 24, and in paragraphs 31 through 40.
- e. Decontaminate your equipment.

26. Avoiding Gas

a. If your unit is hit by a CBR attack, it may be that you can't stay out of all contaminated areas. After a gas attack, *if your mission permits* and you don't expose yourself to other enemy weapons, you may seek areas that are less contaminated. This might be practical for an air-raid attack on an air-base, but troops defending against an enemy local ground attack are often limited in their ability to move around.

b. If the gas attack were on a very small scale, you might seek an upwind area. This is done by walking into the wind away from the gassed area. The occasions for doing this will probably be very rare. Most gas attacks will cover too large an area.

c. Selecting routes on high ground may be advisable. Gas is usually heavier than air and tends to settle in low places. Cellars, trenches, gullies, and valleys are examples of places to avoid whenever possible. Woods, tall grass, and bushes tend to hold gas vapors (figure 24).

27. Your Protective Mask

a. Your protective mask is as vital to you as a life jacket is to a sailor or as a parachute to a flyer (figure 25). Because your protective mask is so important, its use and care are discussed in a separate chapter (ch. 6). Two facts can be stated here—

(1) Your protective mask is the world's best.

(2) It will protect your face, eyes, and lungs from all known war gases, if properly adjusted.

b. Chapters 4 and 5 show how the protective mask helps protect you from BW and RW. *Your protective mask is your most valuable item in defense against CBR warfare.* It is easy to understand how it works. It is easy to take good care of it. It is easy to learn to wear it properly. There is no excuse for any airman to be ignorant about his protective mask.

28. Your Protective Clothing

Any uniform can be chemically treated to protect you from the vapors of blister gases. This is called

AVOID SUCH AREAS IF MISSION PERMITS

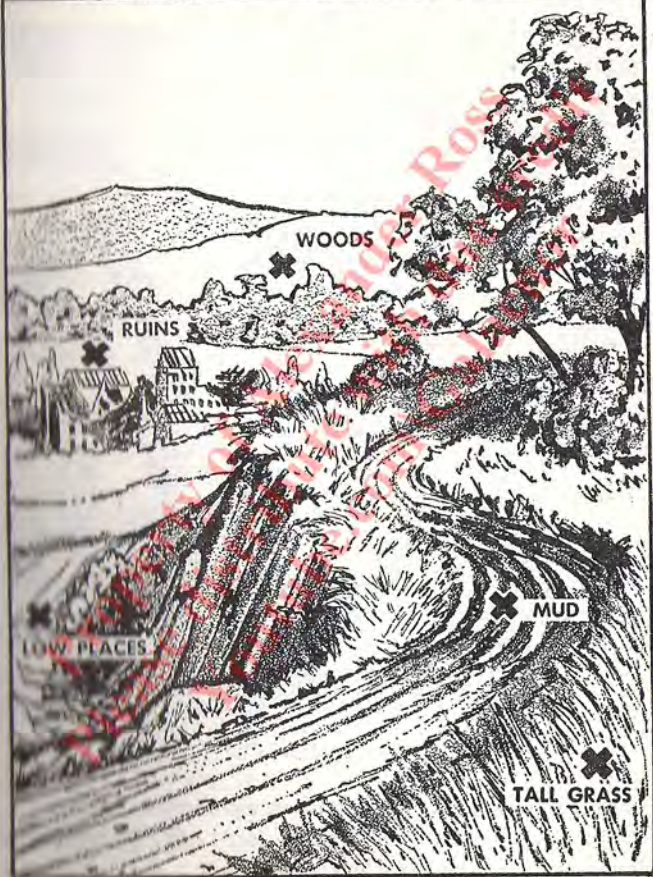


Figure 24. War gases collect here.

THE MASK PROTECTS



Figure 25. Protection starts with your mask.

impregnating (soaking with a protective material). Impregnated clothing does not offer protection against war gases in the liquid state. Any drops of liquid blister or nerve gas will quickly go through

impregnated clothes. Any part of your clothes which becomes contaminated by liquid splashes must be ripped off immediately and the skin decontaminated. To protect you against droplets or splashes of blister or nerve gases, a protective cover may be issued. This protective cover serves the same purpose as a raincoat in keeping your clothes from getting wet (contaminated). You must take great care when walking through contaminated weeds, tall grass, or brush. Just as you must watch your buddy for physical signs of exposure to a chemical agent, you must also watch his clothing for signs of liquid contamination.

29. Protecting Your Feet

When a war gas is present in liquid form, you are almost certain to walk on contaminated ground. A protective dubbing may be issued to you to use against this hazard. Protective dubbing helps to make shoes resistant to war gases. However, the dubbing does not destroy or neutralize war gases; it just delays their penetration of the leather. Liquid nerve and blister gases penetrate shoes very fast if they are not covered with protective dubbing. Be very careful to cover all of the seams of your shoes with protective dubbing. It will slow down the penetration (figure 26). Since protective dubbing only slows down penetration of liquid gases, footwear must be decontaminated as soon as possible. Details of how to decontaminate your shoes are given in paragraphs 41 through 45.

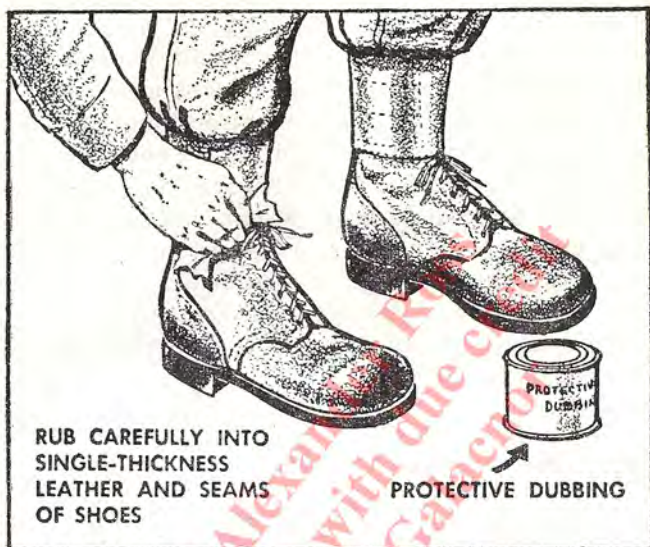


Figure 26. Seams get careful attention.

30. Care of Your Equipment

The Army and the Air Force are constantly developing and testing new and better types of protective equipment. Any form of CBR warfare will find the American serviceman better equipped and better trained than his enemy counterpart. Regardless of how much money and time is spent giving you the best possible protection, one factor is squarely up to you. *You are responsible for the proper care of your protective mask and all protective equipment issued to you.* If you fail to take this responsibility seriously, it may mean painful injury or death to you and may mean success to the enemy.

Section V, HOW TO APPLY SELF-AID

31. Introduction

Self-aid is what you do for yourself. First aid is what you can do for your buddy. A knowledge of both is necessary. If you inhale gas, get it in your eyes, in your digestive system, or on your skin, self-aid becomes vital. Speed in applying self-aid is as essential as speed in correctly fitting your protective mask. The self-aid directions that follow are fairly detailed. This is necessary since *what you do in the first seconds after exposure is all-important*. Sloppy procedure or failure to apply self-aid at once may result in an unnecessary casualty. Serious or even fatal results may follow. *Study and remember the following pages on self-aid.*

32. Fundamentals of Self-Aid

a. *Your Responsibility.* Self-aid, personal decontamination, is your responsibility. If battle conditions at the time of exposure require you to keep fighting, you will decontaminate as soon as possible. In an attack on your base, it will be a tragic error for you to wait for someone else to give you first aid. The need for speed requires you to be your own aid-man.

b. *Time Limits.* Since there are definite time limits after which self-aid becomes useless, immediate self-aid or personal decontamination is all-important if you are exposed to war gas. Decontamination by either neutralizing (making the chemical agent harmless) or removing the agent, or both, should be done before serious injury occurs. If you

4

STEPS

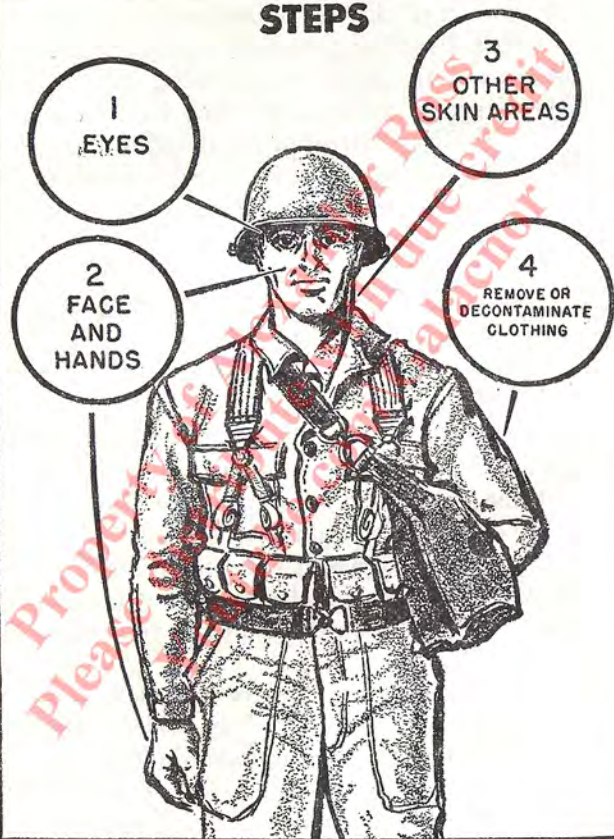


Figure 27. Order of applying self-aid.

have been contaminated with liquid nerve gas or blister gases, you must perform several self-aid measures as rapidly as possible. Speed is essential in self-aid, and since you may not know whether you have been contaminated with liquid nerve gas or liquid blister gas, the following standard procedure must be used to prevent injury from liquid agents:

(1) Decontaminate eyes and face if splashed with liquid.

(2) Don mask.

(3) Inject atropine if effects of nerve gas have begun.

(4) Blot excess liquid agent off the skin.

(5) Tear away contaminated clothing.

(6) Rinse contaminated areas with water. (Removes nerve gases.)

(7) Apply protective ointment. (Neutralizes blister gases.)

c. The self-aid procedure for specific gases is shown in the following paragraphs, and should be employed if the agent has been identified.

33. The Protective Ointment Kit

This kit is issued for your use in applying self-aid to reduce or avoid injury from war gases. It contains the following items (figure 28):

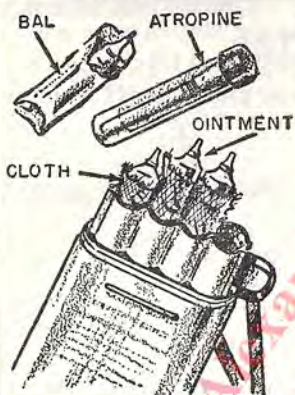
a. Three tubes of protective ointment.

b. One tube of BAL eye ointment.

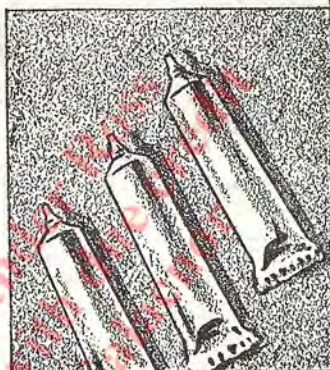
c. One atropine injection.

Directions for using these items are printed on the containers.

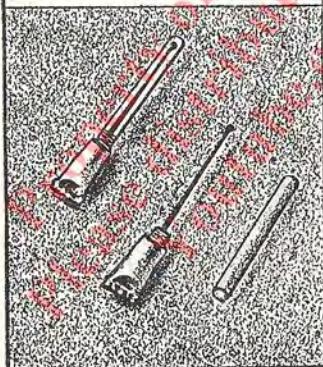
SELF-AID



PROTECTIVE OINTMENT KIT



3 TUBES OF OINTMENT



**ATROPINE INJECTION
FOR NERVE GAS ONLY**



BAL FOR EYES ONLY

Figure 28. Three items in protective kit.

34. Self-Aid for Nerve Gases

a. Mask at once if you notice any of the following symptoms:

(1) Tightness in your chest and difficulty in breathing.

(2) Running nose or excessive coughing.

(3) A painful sensation in your eyes.

(4) Your sight blurring or dimming.

(5) The pupils of your buddy's eyes shrinking to pinpoint size.

(6) A faint, sweetish, fruity odor. (This will be very rare as most of the nerve gases are odorless.)

b. If you are told that your pupils are getting very small, or if you are having trouble breathing and your chest feels tight, take the atropine injector from your protective ointment kit (figure 29). The directions for use are as follows:

(1) Unscrew needle cover and remove. Be careful not to lose the wire loop!

(2) Keeping needle end up, push wire loop down firmly until inner seal breaks, then pull wire out.

(3) Jab needle deep into muscle (thigh, arm, etc.).

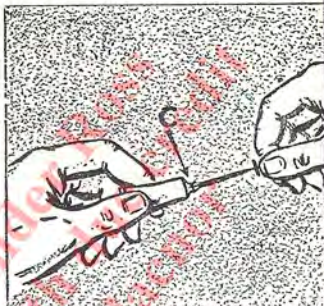
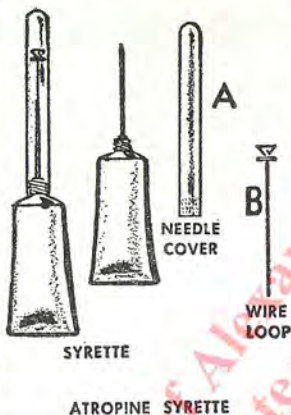
(4) Squeeze tube slowly from sealed end until empty.

Caution: ATROPINE IS FOR USE ONLY IN NERVE GAS POISONING.

(Another type of injector may be issued to you. Complete directions for its use will be included with the injector.)

e. Tips on the use of the atropine injector:

USE ATROPINE FOR NERVE GAS ONLY



UNSCREW NEEDLE COVER 'A', GRASP WIRE LOOP 'B', AND PUSH WIRE IN TO PIERCE INNER SEAL 'C', TURNING IF NECESSARY. PULL OUT AND DISCARD WIRE.



THRUST NEEDLE INTO MUSCLE ALL THE WAY.



INJECT BY SQUEEZING TUBE. SQUEEZE ALL ATROPINE OUT OF TUBE.

Figure 29. Atropine injector.

(1) Inject the needle into a large muscle in the buttocks, thigh, or upper arm.

(2) Place point of needle against skin, and then with firm pressure force the needle through the skin into the muscle all the way. You will feel little pain, only a slight pricking sensation.

(3) If it is not advisable to expose a large muscle because of the possibility of further contamination, the needle may be injected through the clothing.

d. PRECAUTIONS IN APPLYING SELF-AID FOR THE NERVE GASES:

(1) *Do not take an injection of atropine until you are sure you need it.* Pinpointing of the eye pupils or blurred vision along with a tightness in the chest and a hard time breathing are signs that you need it. If you do inhale some nerve gas, atropine counteracts it and will make you feel better.

(2) If you have inhaled a really large dose of nerve gas vapor, you may need more than one injection of atropine to relieve your symptoms. If the symptoms are steadily becoming worse or if the first injection does not relieve you in 5 minutes, or if your mouth is not dry in 5 minutes, get an extra injector from a buddy who has escaped being gassed, or from an aidman. Give yourself a second injection. Inject this one in a different muscle.

(3) If your difficulty in breathing is not relieved by the second injection, you may take *one more* atropine injection or have a buddy give it to you. *Do not take more than three of these atropine injections on your own.* More than three are dangerous. Depend on the medical men to give you addi-

tional atropine, above three injections. *If you are an aircrew member and have taken atropine, do not fly until checking with the flight surgeon!* Atropine can paralyze your eyes so that they will not focus.

(4) If you get good relief from the atropine and can breathe freely again, carry on with your duties. *Dryness of the mouth is a good sign.* It means that you have had enough atropine to overcome the dangerous effects of the nerve gas.

(5) If you should get a drop or splash of liquid nerve gas in your eye, *instant action* is necessary to avoid serious injury. Open your canteen as fast as possible and tilt your head back so that your eyes look straight upward. Slowly pour water into the contaminated eye to flush it out. Hold the eye open with the fingers, if necessary. Pour the water slowly so that the irrigation will last not less than 30 seconds. This irrigation must be done in spite of the danger of breathing nerve gas vapor. Get your mask on quickly after completing the irrigation. Then if symptoms of nerve gases (a above) develop, give yourself atropine.

(6) If liquid nerve gas gets on your skin or clothing, fast action is needed to get rid of it. Blot the liquid off your skin with one of the cloths from your protective ointment kit, your handkerchief, or a piece of cloth torn from your outer clothing. Do this by pinch blotting, so as not to spread the contamination. Then, immediately flush the contaminated area with water. Next, quickly remove contaminated clothing. Blot off the contamination and decontaminate with soap and soapy water. Then carry on with your combat duties. Meanwhile, watch

for twitching of the muscles under the contaminated area. If none develops in the next half hour and you have no tightness in your chest, your decontamination was successful and you can forget it.

(7) If twitching of the muscles under the area of contaminated skin does develop, do not wait for the appearance of other symptoms, but give yourself an injection of atropine *at once*. If no other symptoms develop, one injection of atropine is enough. The atropine does not relieve the local twitching of the muscles, but this twitching is not dangerous.

(8) Avoid water and food that may be contaminated with nerve gases. Let the Medical Service, USAF, check for safety before you use them. If you have swallowed contaminated food or water, and all of these symptoms occur—increased flow of saliva, nausea, pains in the stomach or a tightness in the chest—take atropine.

35. Self-Aid for Blood Gases

If you are a victim of blood gas, immediately put your mask on and avoid unnecessary movements. If you have received a large dose, you need an aidman. He will give you *amyl nitrite* to inhale and will administer artificial respiration if you need it. You may be issued amyl nitrite ampoules. In that event, you can give the amyl nitrite to yourself. Just squeeze the ampoule until it pops. Insert two ampoules inside the facepiece of your mask under the eye lens (figure 30). Repeat this at intervals of 3 or 4 minutes until normal breathing returns, or until a total of eight ampoules are used.



MASK!



AMYL NITRITE



BREAK AMPOULE



INSERT INSIDE EYEPiece



REMAIN QUIET

Figure 30. Treatment for blood gases.

36. Self-Aid for Blister Gases

Since mustard gas is a typical blister gas, knowledge of self-aid for mustard will be a basis for self-aid against all blister gases. For liquid mustard on the skin take the following actions:

Blot it off, using a pinching motion to keep liquid from spreading.

Apply your protective ointment. **Caution:** Do not apply protective ointment near the eyes.

Scrub your skin with soap and water followed by plenty of clear water. If there is no soap and water, blot off the first coat of protective ointment. When scrubbing, pay special attention to areas not covered by clothing (neck and ears), to the belt area, to hairy regions, and to the pubic (private) region.

Apply protective ointment again and let it remain (figure 31).

Wear the gas mask at all times when any mustard *vapor* can be detected. No decontamination procedure is of any value, as the damage is done as rapidly as mustard *vapor* strikes the eye, although the full extent of the injury may not appear for several hours.

a. *For the Eyes.* If liquid blister gas gets in your eye, treat it instantly, as every second counts. The decontamination procedure is the same for all types of blister gases. (Figure 32.)

(1) Open the protective ointment kit and remove the small tube of BAL eye ointment from the lid of the kit. Break off the tip of the tube.



SECONDS COUNT-ACT FAST!



PINCH-BLOT



APPLY AND RUB IN OINTMENT



USE SOAP



APPLY OINTMENT AGAIN

Figure 31. Protective ointment for blister gas.

SECONDS COUNT ACT FAST!

FIRST

→
apply BAL
rub for
1 minute



THEN

←
flush eye
with water
for 30 seconds
to 2 minutes



Figure 32. Removing blister gas from the eyes.

(5) Remove clothing which is contaminated with liquid blister gas. This applies both to ordinary clothing and to impregnated protective clothing. Decontaminate small areas with protective ointment or soap and water. It may be that the contamination is too great to handle with the equipment you have. In this case, cut out the contaminated parts or don't wear the clothes. When you are able, boil them with soap and water. This will make them safe to wear. The only exception to this is when the contaminating drops are very, very small (size of a pinhead or smaller) and you are wearing both impregnated outer clothing and impregnated long underwear. The chemical in your impregnated clothes will take care of very small droplets.

37. Self-Aid for Vomiting Gases

Put on your protective mask and wear it in spite of coughing, sneezing, salivation, or nausea. Lift the mask from the face briefly, if necessary, to permit vomiting or to drain saliva from the facepiece (figure 33). Clear your mask each time you adjust it to your face and before you resume breathing. *Carry on your duties as vigorously as possible; this will help lessen and shorten the symptoms.* Defense duties usually can be performed in spite of the effects of vomiting gases.

38. Self-Aid for Choking Gases

Put on your protective mask *immediately* upon detecting any phosgene in the air. The odor is like new-mown hay or fresh-cut corn. Phosgene can

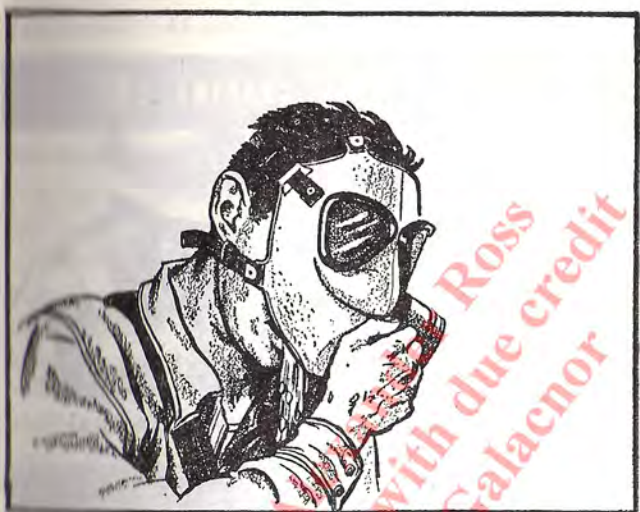


Figure 33. Lift the facepiece of mask to vomit.

also be detected by irritation of the eyes or by change in the taste of your cigarette (may become tasteless or offensive in taste). Try not to breathe while masking. Even if you have inhaled some phosgene, continue with your defense duties. If, however, you have a very hard time breathing, feel nauseated, or vomit, take it easy. Avoid unnecessary movement (figure 34).

39. Self-Aid for Tear Gases

Put on your protective mask, cover the outlet valve, and blow hard to clear the mask. Keep your eyes open as much as possible. When vision clears, carry on your duties. When it is safe to remove your mask, blot away tears, but do not rub your eyes

IF YOU INHALE CHOKING GAS



mask!



carry on your duties



if breathing is difficult, keep as warm and quiet as possible

Figure 34. The mission comes first.

(figure 35). If liquid or solid agent has entered your eye (rare occurrence), force your eye open and flush it with water.

40. Self-Aid for Screening Smokes and Incendiaries

a. Most smokes that are used to screen enemy or our own tactical movements are harmless. The first exposure to the type of smoke called FS causes coughing which soon passes. If you are in a heavy concentration of other smokes for a long time, you may start to cough, choke, or feel other irritations. Your protective mask will prevent this. Put it on if there are any physical signs that you are inhaling too much smoke. Always mask in the presence of enemy smoke. The enemy may use smoke to conceal CBR agents.

b. Incendiaries (materials that start fires) can cause severe burns. If the clothing is on fire, smother the fire as quickly as possible with any material that is available, such as coats or blankets. If nothing is available, smother the flame by rolling on the ground. Remember never to run as this increases the fire and creates panic. Self-aid for burns caused by incendiaries is the same as for any severe burn. Special treatment is used for white phosphorus (WP) because it continues to burn unless the air is shut out. Self-aid for WP is as follows:

(1) If burning particles of phosphorus strike and stick to your clothing, take off the contaminated clothing as quickly as possible, before the WP burns to the skin.

(2) If WP strikes your skin, smother the flame with water, a wet cloth, or urine.

TEAR GAS



AFFECTS THE EYES



DON'T RUB EYES



FACE THE WIND



LOOSEN CLOTHING

Figure 35. Self-aid is simple.

(3) Keep the WP particles covered with wet materials (such as a wet cloth or even mud) to keep out air until you can remove the particles.

(4) Attempt to remove the WP particles with your knife, bayonet, a stick, or other available objects. It may be possible to remove some of the particles by rubbing with a wet cloth (figure 36).

Section VI. HOW TO REMOVE WAR GASES

41. Decontamination

Decontamination can be done by removing, neutralizing, or destroying the agent. The purpose of personal decontamination is to remove toxic agents from your body or personal equipment before serious injury occurs. An example of removing is pinch-blotting mustard gas from your skin. Neutralizing is applying protective ointment to make the agent harmless. Destroying is burning or burying a contaminated cloth which was used to blot off mustard gas (figure 37).

42. Almost Anything Goes

Common sense and quick thinking play a big role in personal decontamination. As an airman, you may have to rely on whatever you have on hand to remove war gases from your skin, eyes, or equipment. If liquid nerve or blister gases touch any part of your body, remove them as fast as you can. If you are caught without the best removers, like ointment or soap and water, then use anything that is available. It may be mud, gun oil, or urine. A crude

IF WP PARTICLES GET IN YOUR SKIN



Figure 36. Self-aid for WP.

LIQUID WAR GASES

3 WAYS TO DECONTAMINATE



1

REMOVE

BLOTTING—SCRUBBING WITH
WATER AND SOAP—WEATHERING

2

NEUTRALIZE

USING CHEMICAL
SOLUTION



3

DESTROY

BURNING—BURYING



Figure 37. Chemical agents made harmless.

remover may get off only two-thirds of the agent, but it is better than nothing. You must keep in mind the fact that nerve and blister gases penetrate very fast. *You can't wait for help. Get them off!*

43. Soap and Water

Soap is excellent for removal of war gases. Cold water, while not as good as warm water, does dilute or weaken chemical agents. Hot, soapy water removes agents in a hurry. If the combat situation permits taking a bath or shower, do so. *Leave your mask on until after you have washed your hair and thoroughly scrubbed yourself.* Then remove the



Figure 38. *Scrub as carefully as a doctor does.*

mask and wash your face. As mentioned in paragraph 36, exposed regions and hairy regions should be given extra attention.

44. Protective Ointment for Emergency Decontamination

a. You may decontaminate personal equipment with protective ointment, but remember that the main use of the ointment is for self-aid. Do not use it on your equipment unless you have plenty or can get more. Emergency decontamination of equipment that you have to use is shown in figure 39.

b. If your weapon is contaminated, blot off the liquid. Spread the ointment on the contaminated metal, wood, or leather. Rub in well and let it remain for 15 minutes, then wipe all surfaces dry. As soon as you can, strip down your weapon, clean it thoroughly, and oil all parts.

c. To decontaminate entrenching tools or similar equipment, scrape off the contaminated earth. Apply ointment to all contaminated surfaces except the blade. Leave the ointment on for 15 minutes, and then wipe it off. Decontaminate the blade by plunging it repeatedly into uncontaminated soil or by washing it with soap and water.

d. Your protective mask is very liable to contamination when you are putting it on and while you are wearing it. Yet you cannot throw a contaminated mask away. If liquid mustard gets on your facepiece, remove it because mustard will seep through the rubber. After you have blotted off all the liquid you can, use the ointment, leaving it on



Figure 39. Protective ointment may be used to decontaminate.

for 15 minutes. Then wash with soap and water. If you get liquid mustard inside the facepiece, put more ointment on the facepiece and cover your face with ointment where the contaminated facepiece will touch. If the eyepiece is splashed, scrub it with soap and water. Do not get protective ointment on the eyepiece as it will injure the lens. It may be that later you will need a new mask or facepiece. Airing a mask for 24 to 48 hours usually will remove the danger of gas vapors.

45. How To Decontaminate Clothing and Footwear

a. If your clothes have been exposed to just gas vapors, airing them will normally do the trick. If small droplets or liquid splashes are present, soap and water are needed. Wool clothes should be washed in soapy, lukewarm water. Cotton clothes may be boiled. If a good solvent like gasoline is available, it may be used on clothes before they are washed.

b. Combat boots or shoes should be scrubbed with soap and water. Use a stiff brush for scrubbing. Rinse in clear water at least two times. Air them as long as possible.

c. Don't wear contaminated clothes or footwear until gas detectors show they are free from chemical agents. Your unit passive defense personnel will show you how to determine this. If the defense situation makes the decontamination of clothes or footwear impossible, avoid wearing the contaminated articles until you can do a good job of decontamination. If it is a case of wearing contaminated

clothes and shoes or nothing, do the best job of decontaminating possible. Remember paragraph 42—**ALMOST ANYTHING GOES.**

Section VII. CONCLUSION

46. The Gas Safety Rule

Figure 40 gives you the gas safety rule. Learn it. Once gas warfare has started, the ability to perform your mission and live to tell about it may well depend upon your knowing and using this safety rule.

47. When To Remove Your Mask

a. There is only one safe way of knowing when to remove your mask. Wait until the person in command gives you permission to remove masks. Passive defense personnel conduct thorough tests with the detection kit (figure 41). If the passive defense personnel find no evidence of gas, they report this fact to the person in command who gives you permission to remove your mask. The rule to remember is *YOU MUST NOT REMOVE YOUR MASK UNTIL GAS DETECTORS PROVE THE AREA IS FREE FROM GAS.*

b. In an emergency only, if you have an excellent reason for removing your mask and no detector kit is available, you may remove the mask momentarily. If no strange odor or sensation can be detected, the area may be regarded as free from gas. Only one man of a group should conduct the test. This is an **EMERGENCY PROCEDURE ONLY !!** If any odor or physical sensations indicate the presence of gas, mask immediately. If a symptom of a nerve

THE GAS SAFETY RULE

Once Gas Warfare has started

The protective mask should be put on whenever an alarm is sounded. In the absence of an alarm, you will know when to mask if you obey the following rule.

THE SAFETY RULE IS:

IF FOR NO OBVIOUS REASON YOU HAVE

- ① Dimming of vision and difficulty in focusing on close objects
- ② Irritation of the eyes
- ③ Sudden headache
- ④ A feeling of choking or tightness in the chest or throat
- ⑤ A running nose

OR IF THERE IS

- ⑥ Enemy bombardment
- ⑦ Suspicious smell
- ⑧ Suspicious liquid
- ⑨ Enemy smoke

THEN THE PRESENCE OF A WAR GAS MUST BE ASSUMED AND THE PROTECTIVE MASK WORN UNTIL PASSIVE DEFENSE PERSONNEL TEST FOR GAS.

Figure 40. Gas safety rule.

KEEP YOUR MASK ON



Figure 41. Testing for gas.

gas occurs, such as the vision dimming, take an atropine injection at once. Obey the gas safety rule to avoid becoming a gas casualty.

46. Be Prepared

You now know the important facts about gas warfare. You know the damage that war gas can do to your body. You know the ways of detecting gas, protection used, self-aid measures, and methods of personal decontamination. This chapter has been fairly detailed because so many of the principles used in CW are sound in defense against BW and RW. Therefore, you should study this chapter and the chemical agent chart (figure 43) until you understand and can remember the facts presented. Do not hesitate to ask questions of your unit passive defense officer or noncommissioned officers. Finally, *do not let anyone undersell the threat of gas warfare to you.* The fact that World War II was fought without gas warfare is no guarantee that it will not be used in the future. Development of more powerful war gases like the nerve gases makes this method of warfare too effective to be ignored. Experience has proved that international law or propaganda may not prevent the use of CBR warfare. The smart airman will follow the sound advice of the well-known motto BE PREPARED (figure 42).

BE PREPARED



AT ALL TIMES

Figure 42. Sound advice.

Chemical Agent	Odor	Color/State	Concentration	Exposure	Protection	First Aid
NERVE GASES		Colorless or sweetish, fruity.	Colorless or brownish liquid or colorless gas.	One to five minutes exposure to very low concentrations causes pinpoint size of eye pupils. Difficulty in seeing. Running of the nose. Slight exposure causes severe tightness in the chest, dry throat, headache. Moderate concentrations may cause death in several hours. Exposure to high concentrations can cause death in a few minutes.	Protective mask and protective clothing.	MASK. Inject atropine. If liquid, blot off skin, and remove contaminated clothes.
	G					
BLOOD GASES		Almond flavoring, peach kernels.	Colorless liquid or gas.	Dizziness, headache, convulsions, and unconsciousness.	Protective mask.	MASK. Inhale amyl nitrite. Keep warm and quiet. Drink warm liquids.
	AC CK	Pungent, irritating.				

See footnotes at end of table.

Figure 43. Chemical agent reference chart.

Physiological effects	Agent symbol	Odor	Color and state in field	Symptoms after exposure	Protection	Self-aid
HD	Odorless or garlic, horseradish, wild onions.	Light to dark brown oily liquid or colorless gas.	No immediate symptoms. One-half hour to 36 hours later irritation of eyes, itching, redness and blistering of skin, coughing, hoarseness, and vomiting.	Protective mask and protective clothing.	EYES: If no immediate pain, wash out with water. If immediately painful, squeeze BAL into the eyes. SKIN: Pinch-blot all liquid from the skin. Rub on protective ointment. Scrub contaminated skin with soap and water. Rinse with lots of clear water. Do all of this decontaminating within 3 minutes. Remove contaminated clothing. MASK at once or as soon as self aid is given to the eyes.	
HN	Faint fishy odor.	Colorless to pale yellow liquid or colorless gas.	During or shortly after exposure vision is blurred. Later effects on eyes and skin are similar to mustard (HD).			
L	Highly irritating; smells like geraniums in low concentrations.	Light to dark brown oily liquid or colorless gas.	Immediate stinging and pain of eyes and skin. Redness and blistering of skin appear quickly. Irritates nose, throat, and lungs and causes sneezing, coughing, and chest pain. Nausea and vomiting are often prominent.			

BLISTER GASES

Chapter 4

DEFENSE AGAINST BIOLOGICAL WARFARE

Section I. GENERAL

49. What Is Biological Warfare?

Biological warfare (BW) is the deliberate use of germs or their poisonous products to produce disease, injury, or death in man, animals, or plants. It is the intentional use of biological agents that makes BW new and dangerous. You have been waging an individual fight against germs since you were born. The doctor who delivered you at birth made certain that your eyes were disinfected—free from dangerous germs. Your mother guarded you against disease by frequently bathing your body, sterilizing your milk bottle, and keeping you away from people with colds. Later you were vaccinated to protect you from smallpox. One of the first things you did on becoming an airman was to take “shots” to protect you from diseases like typhoid fever (figure 44). During World War II, airmen in tropical areas were careful to take atabrine to guard against malaria. *Any belief that biological warfare concerns a new or mysterious superweapon is not based on fact.* Our fight against disease-producing germs has been going on

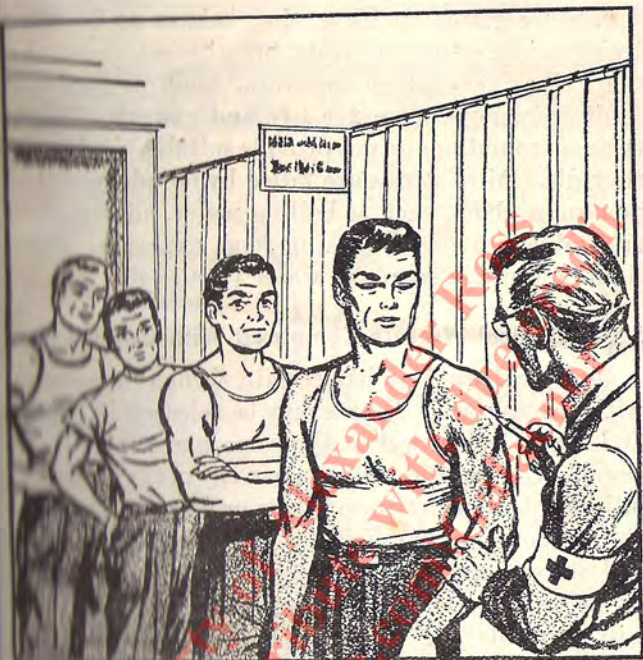


Figure 44. Taking "shots" to fight disease.

for hundreds of years. BW is a manmade attempt to produce disease on a large scale.

80. Characteristics of BW Agents

a. Most germs are not harmful to man, animals, or plants. Many, in fact, are helpful. Yeast is used in the manufacture of bread and beer. Molds are used to ripen cheese. Only a few types of germs produce disease.

b. Since germs are alive, they behave as do other living things—they multiply, breathe, eat, grow, and die. They depend on moisture, food, and certain limits of temperature for life and growth. When their surroundings do not provide suitable conditions they die. Most germs are killed by simple acts that you know about, such as boiling water, adding chlorine tablets to water, cooking food, exposure to sunlight, and use of soap and water (figure 45).

51. Biological Warfare Compared With Gas Warfare

Biological warfare has certain things in common with gas warfare. Germs may be released in the air and travel downwind in the same manner as a gas cloud. Unless a protective mask is worn, germs may be inhaled and thus cause injury or death. They are able to contaminate clothing and equipment, food and water supplies. Some germs may last in the target area for long periods of time. The majority will probably die in a few hours. However, the presence of BW agents, unlike most chemical agents cannot be detected by your five senses or by chemical detectors. They can be determined only by laboratory examination. The time between exposure to BW agents and the beginning of disease symptoms will usually be a matter of days rather than hours. Men exposed to equal amounts of germ agents will react differently. Some may escape disease entirely, some may have a very mild attack, and some may become seriously ill.

WAYS OF KILLING GERMS

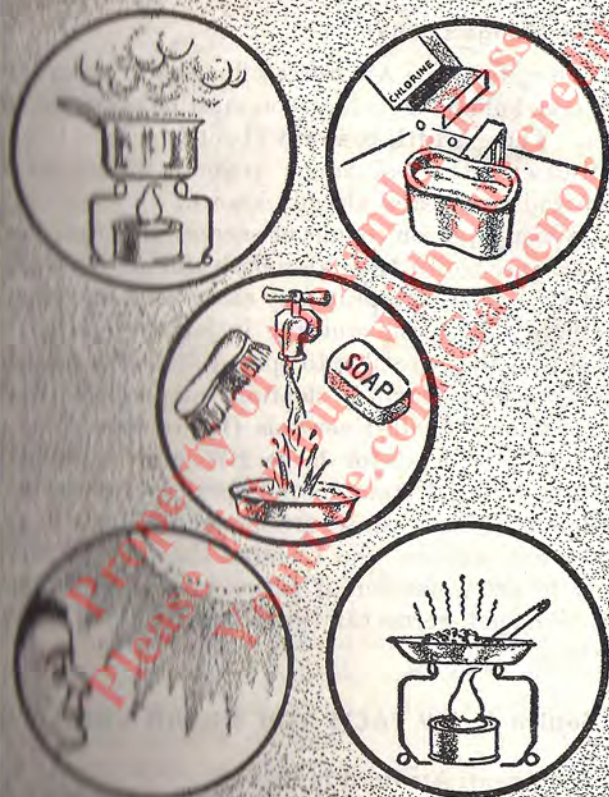


Figure 4b. Good defenses against BW.

52. How BW Agents Attack Your Body

BW agents or their poisonous products attack your body by the same routes as chemical agents—through your nose, mouth, or skin. Stop their entry into your body and you are safe from BW.

53. The Dangers of BW

a. In spite of the Air Force's fine health program BW does hold dangers that you must be prepared to meet. There is little to worry about from new kinds of diseases. The real danger to you is in new ways of spreading diseases already known.

b. When a person coughs or sneezes, tiny drops of moisture are blown from his mouth and nose into the air. If he is ill, the spray may carry harmful germs to others. Scientists working in laboratories have found that they are able to spread disease germs in much the same way—by floating the germs in fine sprays or mists called aerosols (figure 46). Aerosols might be used for large BW attacks. They could be released from special sprayers carried by airplanes. When diseases are spread through the air in aerosols, anyone who breathes the mist is very likely to get a number of germs in his lungs. In that vital spot, germs can easily take hold and cause illness.

Section II. BW FACTS YOU SHOULD KNOW

54. BW Agents Are Hard To Detect

a. There is no simple method of detecting BW agents. They are micro-organisms (germs), which

AEROSOLS ARE FINE SPRAYS OR MISTS

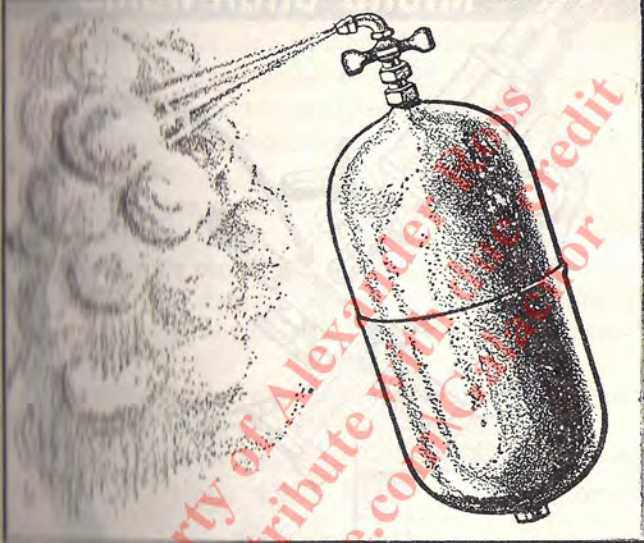


Figure 46. A simple type of aerosol.

means that they are so small they can be seen only under a microscope (figure 47).

b. The detection and identification of BW agents requires several days or weeks and can be done only by trained men. This cannot be done simply by putting contaminated material under a microscope. Diagnosis must be made from material taken from sick animals, plants, or people, or from their symptoms. You will be informed if BW agents are present and the defensive measures required.

MICRO-ORGANISMS

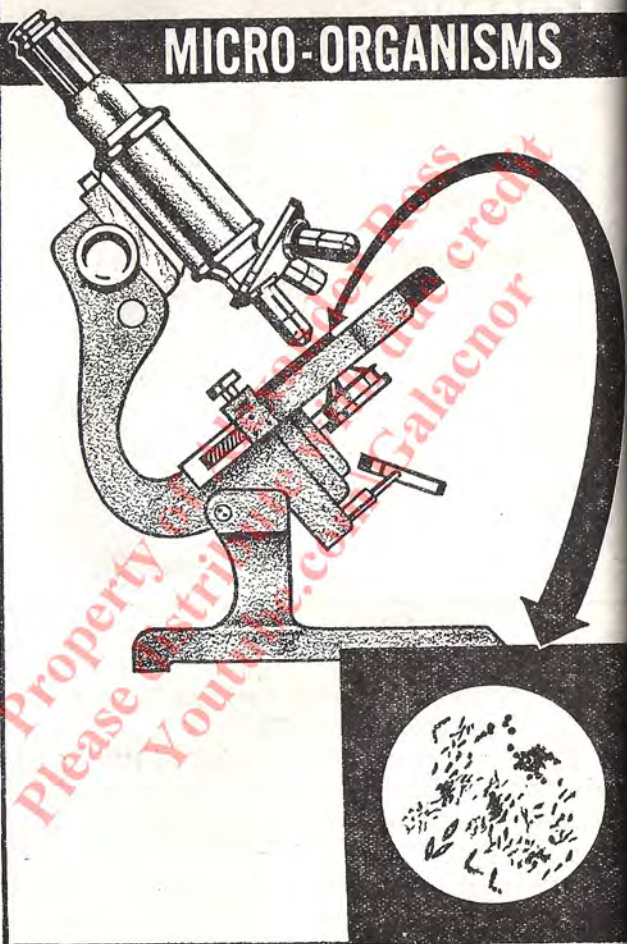


Figure 47. A microscope is needed to see BW agents.

c. You cannot see, feel, or taste germs spread in a BW attack. Yet you must do what you can to help detect a BW attack at the earliest possible moment. Every clue counts. A prompt report of suspicious clues might lead to the prevention of many cases of illness and might even prevent deaths. You should inform medical personnel or your unit passive defense officer of any strange illness you or your buddies have. Report at once any food or water that has made you ill.

d. The appearance of certain clues may warn us or cause us to suspect a BW attack. You can assist in detection by reporting to your commanding officer or unit passive defense officer the location of any of the following suspicious items or circumstances (Figure 48).

(1) Enemy aircraft dropping unidentified material or spraying unknown substances.

(2) New and unusual types of shell and bombs, particularly those which burst with little or no blast.

(3) Smokes and mists of unknown nature.

(4) Unusual substances on the ground or on vegetation, such as unexplained glass bottles or other breakable containers lying around.

(5) Unusual numbers of sick or dead animals, such as dogs or livestock.

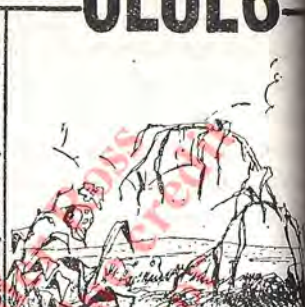
e. Collection of samples for investigation will be done by specially trained airmen. Actual confirmation that a BW attack has been made will be given by the Medical Service, USAF. BW clues that you discover may greatly help in determining the kind

BIOLOGICAL WARFARE

CLUES



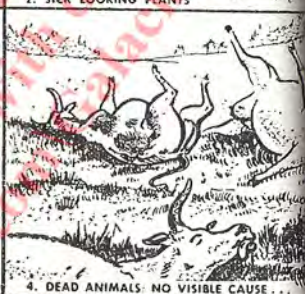
1. PLANE, SPRAYING, DROPPING OBJECTS



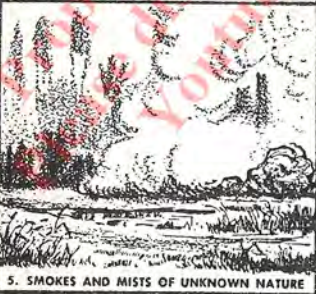
2. SICK LOOKING PLANTS



3. SICK ANIMALS: DOGS, CATTLE, ETC. . .



4. DEAD ANIMALS: NO VISIBLE CAUSE . . .



5. SMOKES AND MISTS OF UNKNOWN NATURE



6. LOW-BLAST, ODD SHELLS OR BOMBS

Figure 48. Report clues to your unit passive defense officer.

of agents the enemy has used. This knowledge will make a good defense possible.

55. How To Protect Yourself From BW

a. Defense against BW, like defense against CW, is neither simple nor easy. Individual protection against BW attack includes the use of protective equipment. Your protective equipment used for defense against gas warfare may be used for defense against BW. You will find that your best line of defense against BW is the natural resistance of your own body. Keep yourself in top physical condition. Every time you drill, engage in physical exercise or sports, hike, or eat good meals, you are preparing strong defenses against BW (figure 49). A high standard of personal cleanliness and careful attention to field sanitation are your best insurance against the spread of disease. Such steps are bolstered by the "shots" you get from time to time.

b. Inhaling airborne germs is a great danger in BW. Your protective mask, therefore, is an important item. A properly fitted mask which has been kept in good condition will greatly reduce the danger of your inhaling germs present in the air. Since you cannot detect the presence of biologic agents, you may be ordered to use your protective mask and protective equipment until the danger has passed. Your commander will base his decision upon information received from intelligence reports and the advice of his technical staff or higher headquarters.

c. Germs must actually get inside your body to cause disease. However, if a great many germs col-

PHYSICAL FITNESS



Figure 49. *The best line of defense.*

fect on your skin, they might get into your body in several ways, such as through your nose or mouth. Cuts or open sores are open doors to germs trying to enter your body. Be sure to keep them bandaged (figure 50). Any type of clothing will give you some protection against BW. The degree of protection depends upon the size of the pores in the fabric and the number of layers of clothing worn. In order to keep out germs and disease-bearing insects such as mosquitoes, fleas, and ticks, it is important that the shirt and jacket collars be fastened, sleeves rolled down, cuffs buttoned, trouser legs wrapped or tucked inside the combat boots, and all other clothes tied down to stop entry of germs which may be in the air or on the ground. The uniform you use for protection against chemical agents gives a higher degree of protection against BW agents than your ordinary clothing.

86. Treatment for BW Casualties

If you've ever had measles, you will remember that you had no idea when or where you were exposed. Several days after you were exposed to the germ you began to feel sick. Then the red rash appeared. Diseases caused by BW appear in this same way. Take preventive "shots" for some diseases. If you contract a disease from BW in spite of the "shots," you will get the best treatment that the medical men can give you.

WRONG

RIGHT



Figure 50. Cover all cuts and sores.

57. Procedure in Case of BW Attack

Once the alarm is given for an actual BW attack or before entry into an area suspected or known to be contaminated by BW agents, you will—

- a. Put on protective mask.
- b. Button clothing. Tie clothing at wrists and ankles with string or extra shoelaces.
- c. Wear gloves if available.
- d. Use the above measures until you are otherwise directed.

58. Decontamination

a. If you are exposed to BW agents, take a bath or shower as soon as the combat situation permits. *Leave your protective mask on!* After you have washed your hair and thoroughly scrubbed yourself with soap and water, remove the mask and wash your face. A fingernail brush is a good item to have in order to remove dirt under your nails. Brush your teeth frequently—the roof of your mouth and tongue, as well as the gums and teeth. Change your clothes as they probably are contaminated. Your passive defense officer will insure that all washable clothes are decontaminated at the first opportunity.

b. You should always be careful what you eat and drink in combat. If you are told that a BW attack has been made, you must be doubly careful. One of the easiest ways to get germs inside your body is to swallow them along with food and water. Don't forget that food and water are the natural homes of many disease producers. A few germs in your food may grow into millions in a very short time. Learn the 10 commandments for defense against BW. (Figure 51).

59. Six Survival Tips for Biological Warfare

a. **REPORT SICKNESS PROMPTLY.** If you or your buddies get sick, notify your unit medical personnel immediately (Figure 52).

b. **KEEP YOURSELF AND YOUR LIVING QUARTERS CLEAN.** Don't help germs by making things easy for them. Germs have trouble living

10 COMMANDMENTS FOR DEFENSE



1 put on mask



2 button clothing
wrists and ankles



3 wear gloves
if available



4 take shower
mask on



5 change clothes

Figure 51. When BW is employed.

AGAINST BIOLOGICAL WARFARE



6 don't chew grass or leaves



7 consume only approved food and water



8 don't bathe in lakes or ponds



9 don't neglect preventive medicine



FRONT



BACK



remember this sign it means the area is contaminated

Figure 51—Continued.

PLAY IT SAFE ...

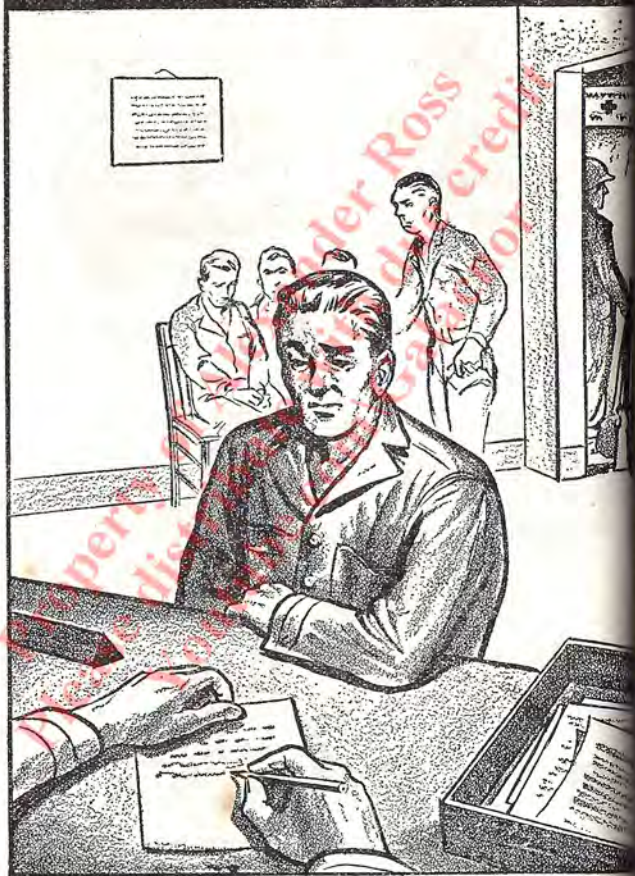


Figure 52. Report sickness promptly.

in clean places. If you keep clean, the odds increase that you won't get sick (Figure 53).

e. DON'T NEGLECT PREVENTIVE MEDICINE. Take pills, "shots," or vaccinations when you are told to do so.

d. KEEP YOUR NOSE, MOUTH, AND SKIN COVERED. When BW agents are known to be present or are suspected of being present, use your mask and other protective clothing or two layers of ordinary clothing to keep them out of your body (Figure 54).

e. KEEP YOUR FOOD AND WATER PROTECTED. Bottled or canned foods are safe after a BW attack if the seals are not broken. Food in the open will be contaminated. If in doubt, boil the food for 10 minutes. That will kill most of the germs.

f. KEEP ALERT TO ANY SIGNS OF BW ATTACK. Any clues such as new or unusual types of shells or bombs, strange material sprayed by airplanes, smokes or mists of unknown nature, or strange substances on the ground should be reported to your commander immediately.

g. WATCH OUT FOR BW "BOOBYTRAPS." The enemy may challenge your discipline and self-control by making available all sorts of tempting items of food. To eat or drink these contaminated items may mean death (figure 55).

USE THEM OFTEN

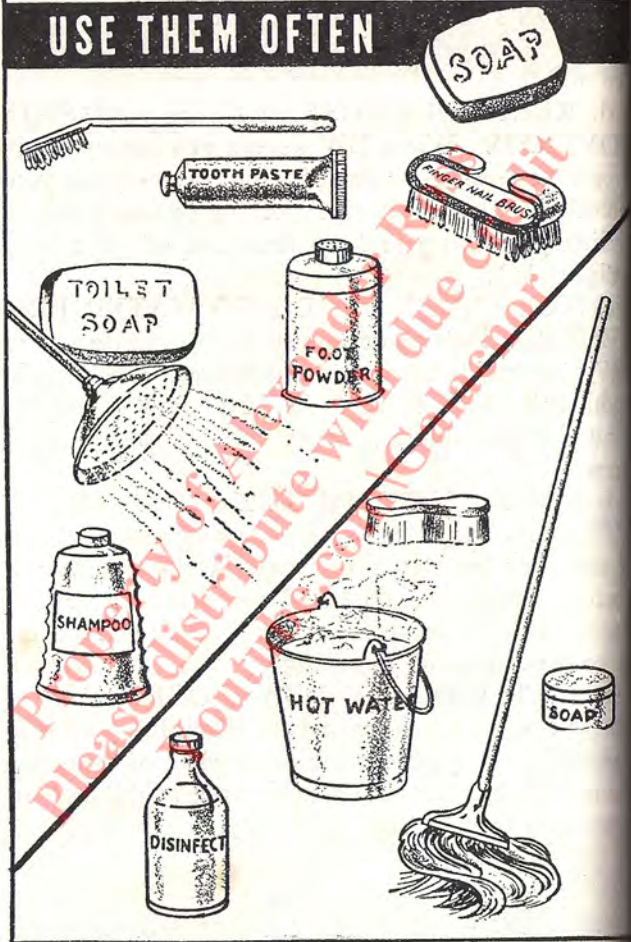


Figure 53. Keep yourself and your living quarters clean

**IN CBR WARFARE PROTECTIVE CLOTHING
GIVES ADDITIONAL PROTECTION**



Illustration: Keep your nose, mouth, and skin covered.

60. Kill the Rumors

a. GERM WARFARE WILL NOT DESTROY ENTIRE ARMIES OR AIR FORCE COMMANDS. Germ warfare is a special weapon for use against special targets.

b. TALK OF POISONS THAT CAN KILL MILLIONS IS NONSENSE. Toxins, which are special kinds of poisons, can be deadly. But there are definite, practical limits to distributing them. Civilian stories of 1 ounce killing millions of people are silly. You might as well talk of dividing one aspirin tablet evenly among the 11 million people in the greater New York area.

c. NO "MYSTERY GERMS" CAN CAUSE TERRIBLE EPIDEMICS. Epidemics are not likely to be caused by BW. Even if epidemics are started, we can stop them quickly. The reason plagues used to sweep through whole populations was that our ancestors did not have the fine health program we have today (figure 56).

THESE may be the silent 'Booby Traps' of the future



**DELIBERATE
CONTAMINATION OF BEER,
WINES, CANDY, ETC...
LEFT BEHIND BY
THE ENEMY**



Figure 46. Self-discipline gets a supreme test.

KNOW ALL THE FACTS



Figure 56. Kill the rumors.

IN A NUTSHELL

BIOLOGICAL WARFARE

Deliberate use of germs or their poisonous products to produce disease or death in man, animals, and plants.

1. HEALTH

Guard your health by good diet, sleep, and exercise. A clean body and sanitary living quarters prevent the spread of germs.

2. SHOTS

Keep your "shot" record up to date. Shots increase body resistance to disease and may save your life.

3. PURITY

Eat approved foods and drink pure water. Enemy agents may try to contaminate food and water. Contaminated food or water can cause sickness or death.

4. REPORT

Be alert. Report suspicious activities. The enemy may use sabotage and other means of employing BW agents. Report unusual sickness to the medics.

5. COVER

Germs must enter your body to cause disease. Your protective mask and clothing properly worn will protect you.

6. AVOID

Avoid restricted areas. You help the enemy if you catch and spread disease.

7. SCRUB

Scrub hands and face with soap and water frequently. Take a complete bath as often as possible.

8. STERILIZE

Clothing should be either boiled, scrubbed with soap and water, dry cleaned, or aired in the sun.

9. RUMORS

Remember your training. Spreading rumors may cause panic. Don't alarm others by repeating or exaggerating what you hear.
KEEP YOUR HEAD OR A GERM MAY KEEP YOU.

REMEMBER

Your best defense against BW is a strong, healthy body.
TAKE CARE OF IT!

Figure 57. Self-protection against BW.

Chapter 5

DEFENSE AGAINST RADIOLOGICAL WARFARE

Section I. GENERAL

61. What Is Radiological Warfare?

a. The explosion of an atomic bomb, like that of an ordinary bomb, causes damage by heat and blast. In addition, the atomic explosion presents a third danger—radiation (figure 58). As an airman, you do not need to become an expert on the atomic bomb. However, there are some facts that you must understand to protect yourself from this weapon and RW.

b. Radiological warfare (RW) is the use of agents or materials which give off strong, penetrating rays to produce casualties. The substances which emit these rays are said to be radioactive. More accurately, RW means the deliberate contamination of an area with radioactive agents or materials for the purpose of contaminating personnel or equipment. Every atomic bomb that explodes releases these rays. However, it is also possible to produce such rays by the use of special weapons without the heat and blast of an atomic explosion. In either case, the rays would be the same. Defense against these rays would be the same. Therefore, this chapter will

BLAST - HEAT - RADIATION

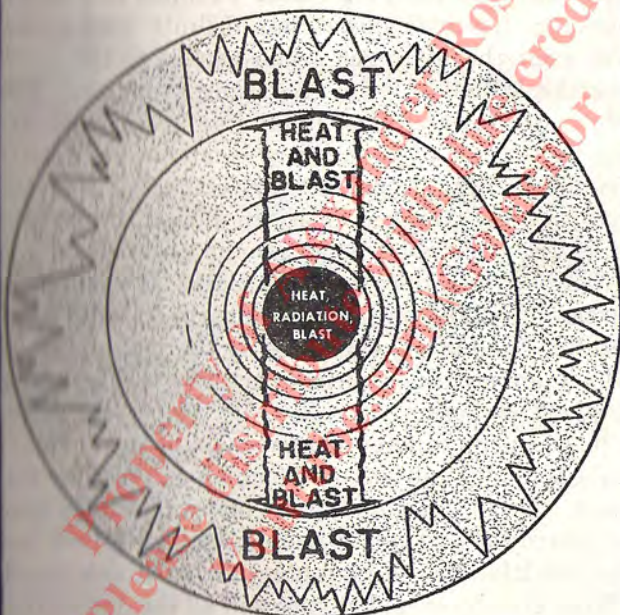


Figure 5B. Three effects of an atomic explosion.

cover defense against RW as it occurs when an atomic bomb explodes.

62. Nature of Atomic Explosions

a. To begin with, you must realize that the atomic bomb is just another way of causing an explosion. While an atom bomb holds more death and destruction than man has ever before wrapped in a single package, its total power has definite limitations. Not even the hydrogen bomb can blow the earth apart or kill all of us by mysterious radiation. The effects of heat and blast in an atomic explosion are similar to those of an ordinary bomb but are greatly magnified. For example, it is estimated that the majority of average American houses up to 100 miles from the point of an atomic explosion would be badly damaged by heat and blast. It would take several thousand ordinary bombs to get the same results. Radiation, therefore, is the major way in which an atomic explosion actually differs from an ordinary explosion.

b. The main difference between an ordinary large scale bombing and atomic bombing is the time element. In an ordinary attack many buildings may be destroyed and many people may be killed, but the attack lasts several minutes. In an atomic attack a large area is covered at once and all the destruction occurs at one time (figure 59). This does away with the time you have to reach cover between the first and last explosions in ordinary bombings.

NO TIME TO DIG IN



OBJECTIVE



UNDER HIGH EXPLOSIVE ATTACK



UNDER ATOMIC ATTACK

Figure 39. HII vs. atomic attack.

63. Effects of Atomic Explosions

a. The effects of blast in an atomic explosion are due to the violent change in pressure at the point of explosion. There is a great wave of increased pressure outward followed by a returning wave of decreased pressure. It is these two waves of pressure that cause the great destructive damage. More than half the total energy of an atomic explosion is in the form of *blast*.

b. The heat produced after the explosion is due to the fireball that is formed. Its temperature is hotter than the surface of the sun. The fireball is almost gone in less than 3 seconds. Uncovered areas will blister and burn as far as several thousand feet.

c. Although radiation is the least important effect of an atomic explosion, it has received much attention. To many, this weapon has an air of mystery. Predictions were made that Hiroshima would never again be a safe place to live. Many rumors dealt with horrible injuries and sickness due to radiation. However, Hiroshima has been rebuilt. Crops grown in that area are safe to eat. The people are healthy and normal. The truth is that heat and blast caused most of the injuries.

64. Types of Injury Caused

Atomic bombs injure men in three ways (figure 60)—

Blast injuries—largely mechanical injuries caused by flying debris, or falling buildings.

Heat and flash injuries—injuries caused by heat from the ball of fire, or secondary fires.

A DEADLY TRIPLE THREAT: RAYS—HEAT—FALLING OBJECTS



Figure 60. Atomic bombs injure in three ways.

Radiation injuries—sickness caused by prompt rays or lingering radioactivity.

Many casualties, of course, will receive a combination of two or even all of the above types of injuries. For example, an unprotected airman may be killed by a piece of timber, be burned to death, or be killed by radiation if he is less than 800 yards from the center of the blast when the bomb goes off. Since either of the three injuries would be fatal, then which came first would make little difference.

a. *Blast Injuries.* Very few injuries are caused directly by the blast of an atomic explosion as the body can withstand pressures greater than that required to knock down the strongest buildings. Ruptured eardrums are the largest single injury occurring as a direct result of the blast and they are of infrequent occurrence. The greatest number of injuries are caused as an indirect result of the blast. These are the injuries received from such causes as falling buildings, flying objects, and shattered glass.

b. *Heat and Flash Injuries.* It is estimated that at least 50 percent of the deaths in Japan were caused mainly by flash burns due to the release of tremendous heat at the instant of detonation. Some injuries were caused by fires started by the explosion. People within 2 miles of the blast received painful flash burns on exposed faces and arms. Temporary blindness may occur if you are looking directly toward the explosion. Do not be frightened by this temporary blindness. Do not run around aimlessly or you may be injured or become a target for the enemy.

c. *Radiation Injuries.* The third effect results from penetrating rays. Recent tests indicate that most radiation injuries are caused by rays shot off at the moment the bomb goes off. Rays from radioactive material after the explosion are not as great a hazard as people feared they would be. However, the amount of danger from lingering radioactivity depends upon where the atomic bomb goes off. This subject will be covered in detail in paragraphs 68 through 73. Radiation did not kill many people in Japan. About 10 percent of the deaths were caused mainly by radiation. Even this percentage would have been lower if they had had our present-day knowledge. Many of these deaths were due to secondary effects like pneumonia. Prompt medical attention would have reduced deaths from illness caused by radiation.

65. Why Radiation Is Dangerous

a. You have already had contacts with radiation. In the form of cosmic rays from outer space, you have been bombarded by radiation every hour of your life. You know that too much exposure to the sun will result in severe sunburn. The effects of atomic radioactivity may be compared to severe sunburn. You have also had X-rays taken of your chest. This was done by sending invisible, but powerful, rays into your body. You have heard of doctors using radium in the treatment of cancer. In receiving this treatment, the patient was exposed to powerful radiations. If you are an athlete, you may have taken infrared lamp treatments for a Charley horse. Like sun rays, X-rays, and infrared rays, atomic radiation

is not a mysterious occurrence, but is easily understood by comparison with the above examples (figure 61).

b. Rays, like BW agents, cannot be heard, seen, tasted, smelled, or felt. For example, when an X-ray is taken of your hand, you feel nothing. However X-rays have gone through hand to the photographic plate. The light-shaded outline of your bones on the film means that some X-rays have been stopped or absorbed by your bones. Too many X-rays will cause injury. They tend to tear down the body cells, especially the blood-forming cells. That is why a safety limit is set up. X-ray machine operators are allowed to be exposed to only a certain amount of radiation in a week. Likewise, airmen working in a radioactive or "hot" area will not be allowed to absorb radiation beyond a safe limit, which will be determined by their commander.

c. To understand why radiation is dangerous, you must review a few facts of science. There are three general types of radiation called *alpha*, *beta*, and *gamma*. Alpha and beta are really tiny particles traveling at high speeds. Gamma radiation differs from alpha and beta in that it is actually a *ray of energy* similar to a radio wave or X-ray.

d. Any agent or material that gives off radiation like alpha, beta, or gamma rays is said to be radioactive. The rays are expelled with great force. Their ability to penetrate objects varies. Alpha particles can be stopped by a thick piece of paper, clothing, or by skin. Most beta particles can be stopped by a $\frac{1}{8}$ -inch thickness of metal. But gamma radiation is another story. High-energy

INVISIBLE, BUT POWERFUL

ULTRAVIOLET RAYS
IN SUNLIGHT

X-RAYS

SUN LAMPS

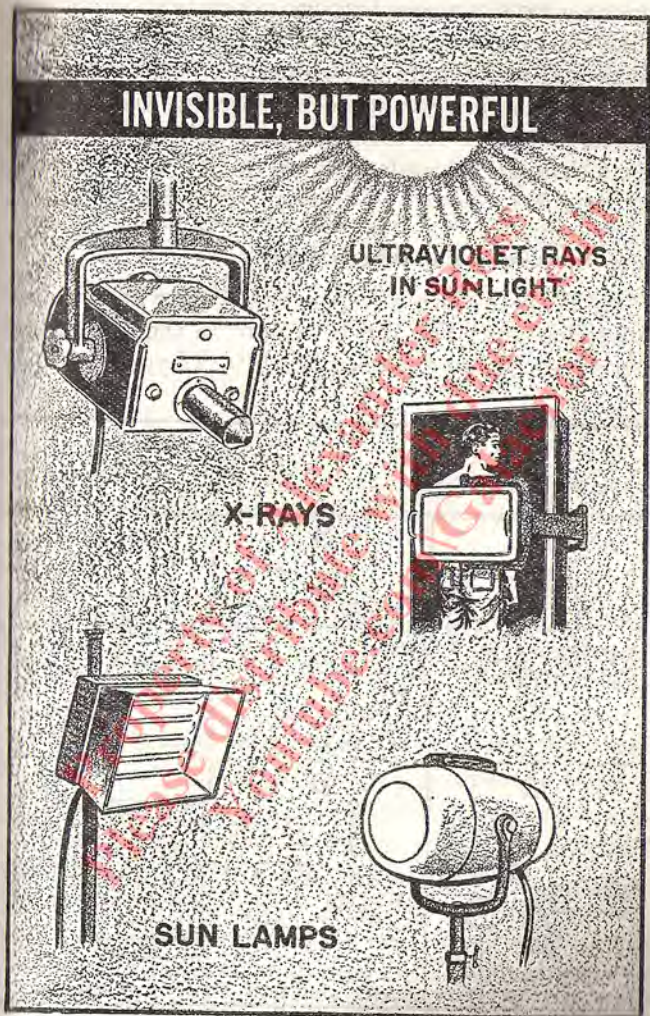


Figure 61. Common types of radiation.

gamma rays can pass through concrete or earth just like radio waves can penetrate the walls of buildings and make your radio operate. Of course, the gamma rays are weakened by passing through concrete, but part of them get through. How much gets through depends on how thick the concrete is (figure 62).

66. How Radiation Affects You

a. There are two ways you can acquire an overdose of radiation. You can be caught in the open when an atomic bomb explodes nearby. If your distance

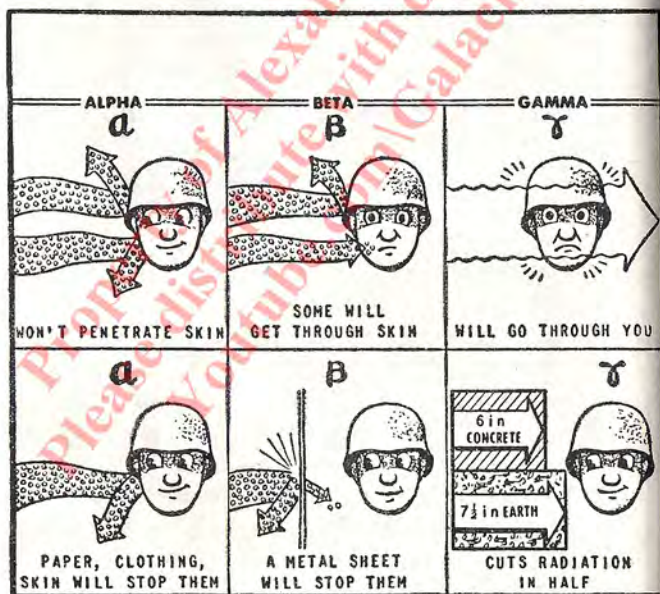


Figure 62. Three types of radiation.

from the point of explosion is great enough to protect you from blast and heat, gamma rays cannot reach you. However, if you are in the open within 800 to 1,000 yards of the burst, you will receive an overexposure to radiation because your clothes, which protect you from heat rays, will not stop gamma rays. Overexposure occurs if you remain too long in an area which is radioactive. Your commander will tell you how long to stay in a radioactive area.

b. The first indication of an overdose of radiation probably will not show up for several hours. Then you most likely will get sick and begin to vomit. The time it takes you to get sick depends on how large a dose you get. The larger the dose, the quicker you get sick. For a few days you might continue to feel below par. But in spite of it all, you would still stand a better than even chance of complete recovery (figure 63).

67. How Radiation Is Detected

a. Since radiations are invisible and cannot be detected by your five senses, detection instruments are used to detect them (figure 64). This is not hard to do. It is easier to detect radiation than it is to detect most chemical or biological agents. Special instruments have been developed to detect radiation. The passive defense personnel in your unit are trained to use this detection equipment.

b. One mission of passive defense personnel is to detect radioactive contamination. They will find out how big the contaminated area is and enforce the safety rules for airmen working there. Follow these safety rules.

LEARNING THE HARD WAY

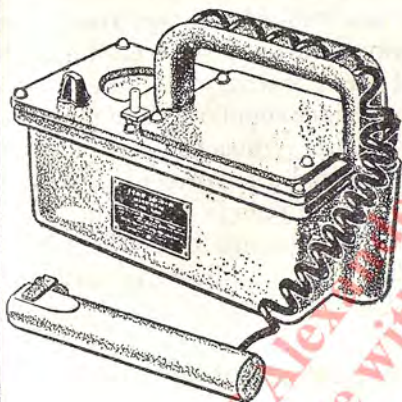


A FEW HOURS LATER—
NAUSEA AND VOMITING



Figure 63. Overexposure causes radiation sickness.

SURVEY INSTRUMENTS



GEIGER COUNTER

MEASURES
LOW INTENSITY

ION CHAMBER

MEASURES
HIGH INTENSITY

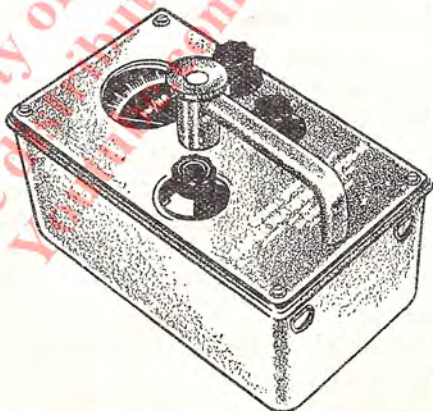


Figure 64. Radiation detectors.

c. You can count on passive defense men to do their job. They will see to it that firefighters, rescue workers, and defense personnel who enter "hot" areas do not remain there long enough to be injured. Remember, there is a lot of difference between *detectable* and *dangerous* amounts of radioactivity. For example, even the rays and particles from an ordinary luminous dial wrist watch will cause a roar in the earphones of a Geiger counter. You must not lose your head just because radioactivity is reported present. The amount of radiation present will determine how long it is safe to remain in a "hot" area. Atomic tests in which thousands of soldiers have taken part prove that not all radioactive areas are a big danger to combat personnel.

Section II. PROTECTION

68. Atomic Explosions

a. In order to protect yourself against RW, you must know about the different kinds of atomic explosions. An air burst is an atomic explosion high in the air. This type of explosion does the greatest damage by blast and heat. The radiation from an air burst disappears fast and is called prompt radiation. A ground or water burst is one which is low or on the surface. It produces less damage from blast and heat. It produces radiation which lasts for quite a long time and is called lingering radiation (figure 65).

b. Since an air burst does the greatest damage, that is the kind you can expect most often. With air

Types of bursts	Prompt radiation	Lingering radiation	Blast	Heat
Air	Extensive	None	Extensive	Extensive.
Ground	Less	Great	Concentrated in smaller area.	Concentrated in small area.
Underground and underwater.	Almost none	Very great	Concentrated in small area.	Almost none.

Figure 65. Effects of atomic bursts.

bursts, the violent, upward surge of superhot gases and air sweeps radioactive ashes into the sky. Most of them are carried harmlessly on in the drifting bomb clouds. Air explosions do not create "hot" areas. In fact, they leave almost no radiation on the ground. After a few minutes your unit can move across the center of destruction with no danger from harmful rays.

c. Ground, underground, or water bursts leave a limited area "hot." Such bursts will limit the time that troops can stay there.

69. Self-Protection

a. Air Bursts. The important point to remember is that in an atomic explosion, you do the same thing you would do in an ordinary bomb explosion. Speed in taking cover is vital. If you can protect yourself from heat and blast, you also will be protected from the dangerous prompt gamma rays. Remember that lingering radiation after an air burst is a very small danger. But prompt gamma rays at the time of explosion are very dangerous. Fortunately, these prompt rays are gone 10 seconds after the bomb explodes. If you take cover for a minute or two, you should escape harm unless the explosion occurs very close to you. The type of cover you should take will depend upon your mission, location, whether or not you are warned, and many unforeseen factors. As with any explosion, the more material or distance between you and the burst the safer you are. Falling flat on the ground and covering your face is better than standing. A foxhole with 3 feet of earth above your head is better than a slit trench. A concrete

shelter is better than a wood shelter. As is true with protection from all the dangers of war, you, as an airman, must make the most of what you have. Your training on protection against small arms or artillery fire is also good training for protection against atomic bombs.

b. *Cover and Distance.* Study figures 66 through 71 to learn the protection afforded by familiar objects. The explosive force of the bomb dropped on Japan was equal to about 20,000 tons of TNT. In all the pictures it is assumed that the bomb is burst at a height of 2,500 feet above the ground. The men taking the cover shown probably would not receive injuries that would put them out of action. With no cover the man flat on the ground in the open is much more protected than the man standing in the open. If there is no good cover immediately available—*hit the ground!*

c. *Ground Bursts.* Blast, heat, and prompt radiation from a ground or water burst are present as in an air burst, but the area of damage is much smaller. A large crater is blasted out. People very close to the explosion would probably be killed. If an ordinary artillery shell bursts in or on the edge of a slit trench, anyone in the trench is killed. An atomic shell causes the same thing on a larger scale. Because a ground burst affects a smaller area, the number of casualties probably would be less than from an air burst. The same cover described in air-burst protection is needed for a ground burst. Protect yourself from heat, blast, and flash radiation for a minute or two after a ground burst. A ground explosion results in a heavy concentration of lingering radia-

tion. The ground in the bomb crater and the dirt and dust falling after the explosion have become highly radioactive. The radiation from this material is as dangerous as the prompt radiation. Since you have no way of knowing how "hot" the area is, your unit passive defense personnel will find out. They will tell your commander the amount of radiation present, and he will decide how long it is safe to remain there.

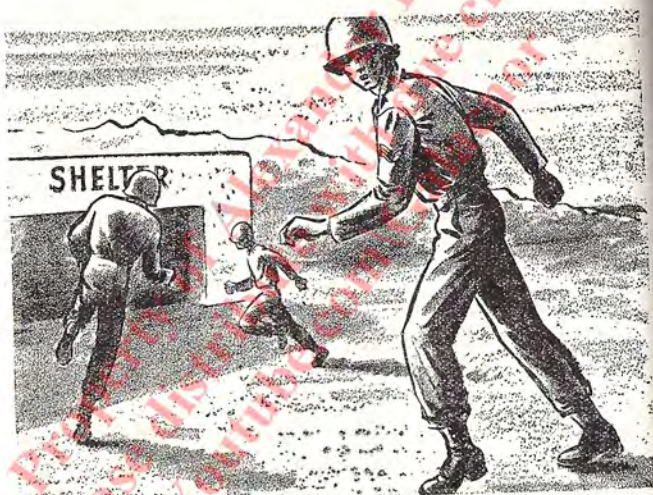


Figure 66. If you have warning, take shelter.

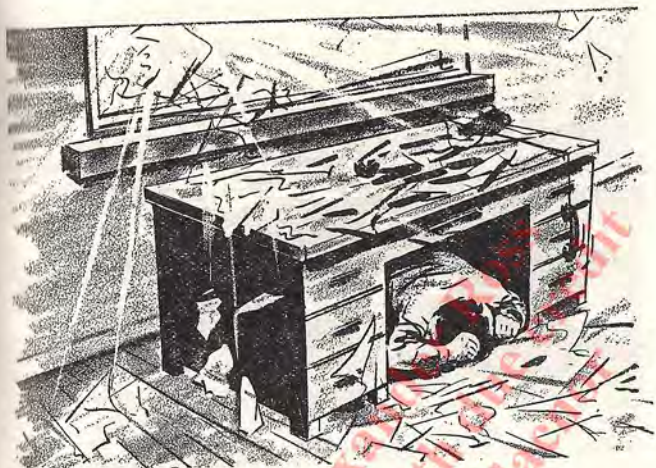


Figure 67. A desk affords some protection.



Figure 68. A blinding flash of light—hit the dirt!



Figure 69. Ditches are fair protection.



Figure 70. Deep foxholes are excellent protection.

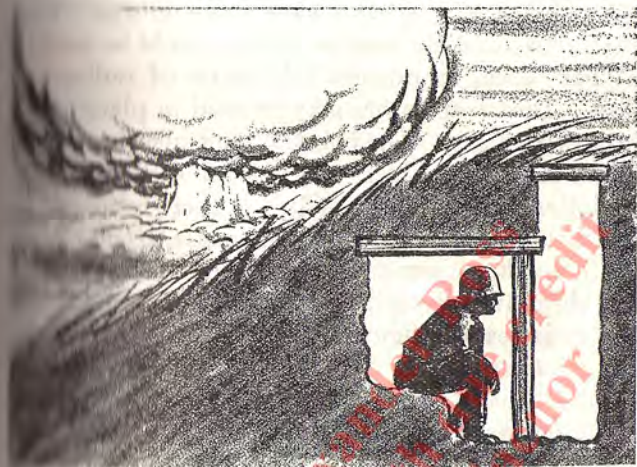


Figure 71. Deep, covered foxholes are excellent protection.

70. Protective Equipment

a. *Clothing.* Any type of clothing that covers you gives some protection against RW. In order to protect the clothes you are wearing from radioactive materials, extra covering is desirable. For example, if you are caught outdoors, try to grab something to cover yourself when you fall to the ground. A board or some sheets of newspaper will help, but your raincoat is better. The object is, of course, to keep radioactive dust off your body and regular clothing.

b. *Gloves and Mask.* When you enter a "hot" area, you must wear gloves to protect your hands. Touching radioactive material with bare hands may result in serious burns. Any kind of gloves will protect your hands. Later when you wash your hands, it will be easier to decontaminate them, especially

your fingernails, if you have worn gloves. Your protective mask or dust respirator should be worn in a "hot" area, to prevent inhalation of radioactive dust. Dust respirators may be used in place of the protective mask. The point to remember is never to inhale radioactive dust. Serious internal injury and radiation sickness may result. If there is no dust in the "hot" areas, it probably will be safe to enter without a mask. Your unit passive defense personnel will check and advise the person in command whether a mask is needed (figure 72).

c. Protecting Your Skin. Beta particles, like blister gases, may have a delayed action. Beta particles won't penetrate very far into your body, but they will damage your skin. The effect is a reddening and blistering of the skin. Such damage, as with blister gas, may not appear until some time after exposure. You may not know you have received skin burns until it is too late. Play it safe by wearing any protective clothing you are issued in the manner that you are instructed to wear it.

71. Decontamination

a. If you suspect that you are contaminated or detection equipment shows that you are, report to a personnel decontamination station as directed. Outer clothing will serve as a trap for most radioactive contamination. By taking off your clothes you may remove most of the contamination.

b. Upon reporting to the personnel decontamination station, follow the directions of the men operating the station. If no men are posted at the station,



Figure 72. Instruments show amount of radioactive contamination.

necessary instructions will be posted on signs. Obey them to the letter.

c. The usual procedure at the personnel decontamination station is as follows: Discard clothing and equipment as directed. Enter shower and take a good bath, using plenty of soap and warm water. In washing, pay close attention to the hairy parts of your body and to your body creases. It is at these points that dirt, probably contaminated dirt, tends to gather. Do not forget your fingernails. After you have finished your shower, you will be directed to a monitor who will check you with a counter. If you are still contaminated, you will be sent back to take another shower (figure 73). If you are free from contamination, you will go to the dressing room for a new issue of clothing and equipment.

d. Remember that bathing is the best way to remove radioactive contamination from your body. No special cleaning compound is necessary. GI soap, brushes, and warm water will do the job if you cooperate.

e. Food and water can become contaminated. Avoid using uncovered food or water if they are in a radioactive area. Canned food and covered water may be used with safety. Rely on Air Force medical personnel to declare harmless anything you take into your mouth.

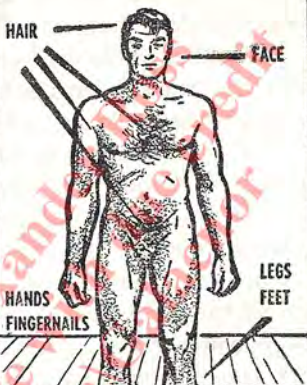
f. *Decontamination Expedients.* Since a shooting war will be going on, the situation may not permit you to go to a decontamination station. You must be able to remove most of the radioactive material with what you have on hand. Lingering radiation dies out quickly during the first few hours after an

HOW TO REMOVE RW AGENTS

AFTER EXPOSURE....



....WASH THESE PARTS WITH PARTICULAR CARE:



AFTER SHOWER, MONITOR WILL CHECK FOR POSSIBLE RADIOACTIVE PARTICLES



IF HE FINDS IT NECESSARY, WASH AGAIN THOROUGHLY—



Figure 73. Personal decontamination.

atomic explosion, hence the little you may leave on after your "quickie" decontamination job probably will not harm you. If you become heavily contaminated—

(1) Remove your outer garments. Shake them violently in the wind. This will remove most of the radioactive material, unless it is wet and muddy.

(2) If it is too cold or wet to remove your outer clothing, brush or scrape them carefully with a broom made of twigs and branches.

(3) This same procedure should be used to decontaminate your equipment.

(4) To prevent recontamination from radioactive materials which have collected in your foxhole or bunker, and to give you additional shielding against radiation from the ground around your position, clean out a half-inch all the way around your hole, spreading the soil over the ground around your position.

(5) Considerable contamination can be kept out of your hole by use of overhead cover or by digging undercut foxholes.

72. Kill the Rumors

a. ATOMIC WEAPONS WILL NOT DESTROY THE EARTH. Atomic bombs hold more death and destruction than man ever before has wrapped up in a single package, yet their overall power has definite limits. Not even hydrogen bombs will blow the earth apart or kill all of us by radioactivity.

b. DOUBLING BOMB POWER DOES NOT DOUBLE DESTRUCTION. Modern A-bombs

can cause heavy damage 2 miles away, but doubling their power extends that range to only $2\frac{1}{2}$ miles. To stretch the damage range from 2 to 4 miles requires a bomb 8 times the rated power of present models.

c. **RADIOACTIVITY IS NOT THE BOMB'S GREATEST THREAT.** In most atomic raids blast and heat are by far the greatest dangers that you must face. Radioactivity alone will account for only a small percent of deaths or injuries except in underground or underwater explosions.

d. **RADIATION SICKNESS IS RARELY FATAL.** In small amounts radioactivity is not harmful. Radiation sickness from moderate dosages rarely are fatal.

e. **RADIOACTIVITY DOES NOT HARM MEN.** The story has been widespread that radiation causes sterility, making it impossible to have children. Radioactivity does not harm sexual activity. Men exposed to radiation can have the same normal children they would have without being exposed (figure 75).

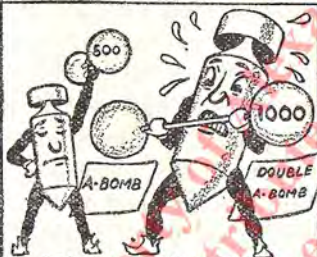
73. Conclusion

Radiological warfare, whether used by spreading radioactive agents without an atomic explosion or by use of the atomic bomb, is not mysterious. You have been exposed to various radiations many times. Protection against RW is basically the same as protection against ordinary HE attack. An air burst produces damage on a larger scale than any other type of atomic burst. Study figure 76; this information will give you a firm foundation for defense against RW.

KILL THE RUMORS



ATOMIC WEAPONS WILL NOT DESTROY THE EARTH!



**DOUBLING BOMB POWER
DOES NOT DOUBLE DESTRUCTION**



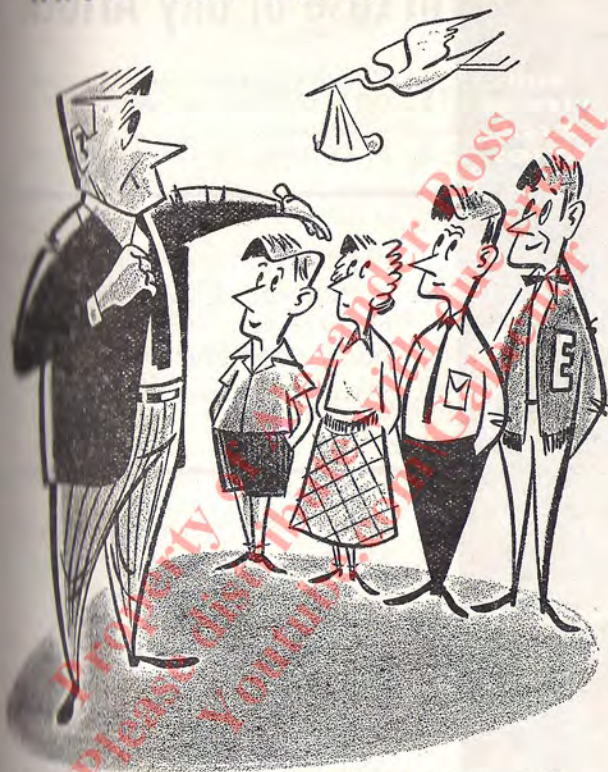
**RADIOACTIVITY
IS NOT GREATEST THREAT**



RADIATION SICKNESS IS RARELY FATAL

Figure 74. Don't spread rumors.

KNOW THE FACTS



exposure to radiation does not
cause sterility or impotency

Figure 75. Kill the rumors.

in case of any Attack

WITH WARNING ALARM SOUNDS

1. PUT ON your defense equipment.
2. GO to your defense post or shelter.
3. STAY there, wait for instructions.

WITHOUT WARNING

1. TAKE SHELTER or hit the dirt!
2. COVER MOUTH and NOSE with handkerchief.
3. DON'T LOOK UP!
4. STAY PUT at least 90 seconds.

IMMEDIATELY AFTER ATTACK

1. Put on MASK! Don't take chances.
2. AVOID clouds of mist and smoke.
3. APPLY self aid, or report to aid station if injured -- if able give first aid to others.
4. REPORT to decontamination center when directed.
5. REPORT to unit or defense post.
6. DON'T EAT, DRINK OR SMOK! Everything may be contaminated.

Figure 76. Self-protection in any attack.

Chapter 6

THE PROTECTIVE MASK

74. Your Lifesaver

a. This Manual was written to help you perform your mission and live to tell about it. While defense against CBR warfare is not the result of any single act, one idea should be as clear as crystal by now. Your protective mask is the number one item of equipment in protection against CBR agents. Known in World Wars I and II as simply a gas mask, its value has now tripled. Today it is called a protective mask. It gives you protection against BW and RW as well as CW.

b. As you now know, the big secret of survival in CBR warfare is preventing toxic agents from entering your body. While the protective mask does not do the trick all alone, it does play the major role. It prevents all known war gases, germs, and radioactive particles from being inhaled or getting into your eyes. To say that your protective mask is a lifesaver is to state a true and simple fact.

75. How It Works

The protective mask is a cover or shelter against harmful substances in the air just as a roof and walls are a shelter against wind and rain. To protect you

from toxic substances your mask contains an air filter. This filter prevents war gases and toxic solids or liquid particles from reaching your face, eyes, and lungs. When you wear your mask, you draw air into it by inhaling. This air first must pass through a canister containing a purifying system which consists of a mechanical filter and a chemical filling. The mechanical filter clears the air by stopping tiny solids and liquid particles (in the form of aerosols). Then the chemical filling receives the air and adsorbs (condenses and holds) the gases and vapors. Charcoal is used in the chemical filter because it is a powerful adsorbent. After it is purified, the air passes into your facepiece where it is inhaled. Exhaled air is expelled from the facepiece through an outlet valve, which opens only to let exhaled air escape. Your protective mask has three major parts—facepiece assembly, canister, and carrier (figure 77).

76. A Correct Fit Is Important

a. You know that chemical agents like the nerve gases, blood gases, blister gases, and choking gases are very deadly. BW agents may be equally bad. They must be kept out of your body. To stop breathing and put on your mask upon detection of gas is not enough. *The mask must be airtight.* Be sure that your facepiece does not leak around the edges.

b. Protective masks come in three sizes—large, medium, and small. Most airmen will find the medium size gives a correct fit. If your face is very small or very large, you will not use the medium size.

THIS IS HOW YOUR MASK WORKS

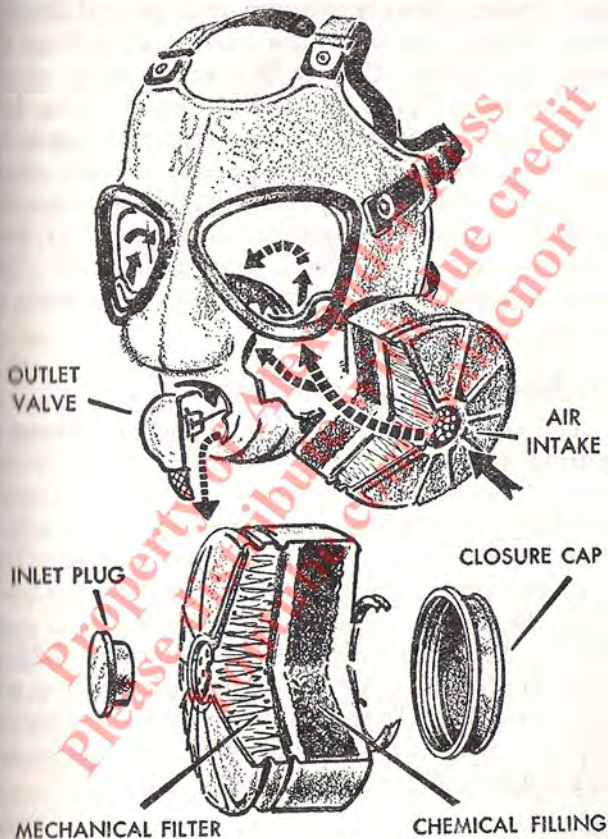


Figure 77. Airflow and sectional view of protective mask canister.

Your unit passive defense officer will inspect the fit and help you decide upon the best size for you. He also will inspect your head harness straps to make certain they are properly adjusted. This will prevent leakage, temple pressure, and general discomfort. Many men make the mistake of pulling the straps too tight. Correct fit does not mean an extremely tight fit, but a close fit. Since it is the duty of your unit commander to see that your mask fits properly, he or your unit passive defense officer will check the fit very carefully. This inspection is done during basic and unit training. Pay close attention to how they check your mask for fit. The time may come when correct fit will be squarely up to you.

77. Speed and Proper Adjustment

You may ask which is more important: Speed in getting the mask on or getting it properly adjusted? Both are absolutely necessary. During training you will find that learning how to adjust your mask correctly will be stressed at first. This is correct procedure since speed in getting the mask on at the expense of bad adjustment results in casualties. After you have been drilled in proper adjustment so often that you do it automatically, you will work on speed. To be well trained, you must become expert in properly adjusting your mask and in getting it adjusted in a few seconds.

78. Practice Makes Perfect

You may never be completely comfortable in your protective mask. This is not your big problem. Much more important are two other factors—that your life is safeguarded and that you are able to carry on with your job throughout a CBR attack. This means shoot, march, crawl, drive, fly, or any other task to which you are assigned. You won't be able to do that in battle unless you practice. You must learn to work in your mask by exercising and playing in it. You should wear it for increasing periods of time on maneuvers. You should be able to do your work, whatever it is, in a mask with minimum loss of efficiency. In spite of CBR warfare the war will go on.

Your mission and the mission of your unit must be accomplished. Planes must fly. Bases must be defended. Messages must be sent. Trucks must move. Practice today will make you perfect tomorrow.

79. It's Your Baby

You are responsible for the care of your protective mask. In view of what you have learned about the great dangers of CBR warfare, it hardly seems necessary to preach to you or to explain in detail why you must take excellent care of your mask. Remember that items such as candy, cigarettes, and matches should not be kept in the carrying case with your mask. This would damage your mask and hinder you from putting it on quickly when it is needed. No good infantryman would abuse his rifle. No good

mechanic would let his aircraft be in any condition but the best. Regardless of your duty in the Air Force, your protective mask is vital to your safety when CBR warfare is being used. Treat your mask with the same respect you have for your most treasured possession. When you need it, you'll need it badly.

80. The Purpose of Protective Mask Drill

a. Drill in adjustment of the protective mask is done to insure perfection. You cannot take the chance of having a sloppy mask adjustment in a CBR attack. The steps that make up the drill have been carefully tested. These steps, when followed exactly, result in correct adjustment in a matter of seconds. Drill also will result in your being able to put on your mask automatically. You should do this as a reflex action without hesitating, just as a good driver slams on the brakes in an emergency.

b. This Manual has not covered the tactics of CBR warfare. Surprise, however, is a big factor in the success of any CBR attack. The enemy will be constantly trying to "catch you with your pants down!" Your surest counterpunch against this surprise element is being able to mask correctly in a matter of seconds. Drill enables you to do this. Protective mask drill may not be the most interesting or the most exciting part of your training, but it may easily be one of the training exercises that you will never regret. Protective mask drill may result in your living to tell your grandchildren about your Air Force experiences.

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