

7432 d. [US].

GROUND SELF DEFENSE FORCE INSTRUCTION MANUAL #21-101

PROTECTION AGAINST SPECIAL WEAPONS

GROUND SELF DEFENSE FORCE

GROUND STAFF OFFICE

August 1967

GROUND SELF DEFENSE FORCE INSTRUCTION MANUAL #21-101

August 14, 1967

The following is hereby declared the official version of the instruction manual, "Protection against Special Weapons."

Draft #32-119, "Chemical Protection." shall be abolished.

Chief Ground Staff
Lieutenant General

Sei-ichi Yoshida

Distribution

Instructions will be given in a separate notification.

ACCESSION for		
NTJS	White Section	<input type="checkbox"/>
DDC	Buff Section	<input checked="" type="checkbox"/>
UNANNOUNCED		<input type="checkbox"/>
JUSTIFICATION _____		
BY _____		
DISTRIBUTION/AVAILABILITY CODES		
Dist.	AVAIL.	and/or SPECIAL
B		

PREFACE

1. This manual contains the fundamental materials for the education and training of the Ground Self Defense Force, particularly units below the regiment level or the like and their soldiers in the essential rudiments of protection against special weapons.
2. The effective use of this manual will necessitate reference to other related instruction manuals such as Field Orders or those instruction manuals which are classified by individual duties. Moreover, since the subject of this manual is the special weapons which are within the sphere of our present knowledge, it will be necessary to adapt promptly in response to the future technical progress of each country.
3. Any suggestion for revising this manual should be submitted to the Ground Self Defense Force Chief of Staff (care of 5th Division Chief) and at the same time to the Dean of the Ground Self Defense Force Academy of Chemistry.

TABLE OF CONTENTS

Preface	
I. General Remarks	2
1. Outline	2
2. Special weapons	4
(1) Nuclear weapons	4
(2) Chemical weapons	13
(3) Biological weapons	21
(4) Influence of weather and geographical features	25
3. Protection equipment, etc.	31
(1) Protection equipment, etc. for individuals	31
(2) Detectors and meters for units	32
(3) Decontaminating devices for units	39
(4) The other protection equipment and materials	40
II. Individual Protection	42
1. General Remarks	42
(1) Outline	42
(2) Directions for use of protection equipment, etc.	42
2. Protection against nuclear weapons	53
3. Protection against chemical weapons	58
4. Protection against biological weapons	67
III. Unit Protection	70
1. General Remarks	70
(1) Outline	70
(2) Information on special weapons	73
(3) Precautions against special weapons	83
(4) Protection facilities	86
(5) Decontamination and rescue	90
2. Protection against nuclear weapons	96
(1) Activities against nuclear weapons	96
(2) Activities for contaminated district	101
3. Protection against chemical weapons	112
(1) Outline	112
(2) Activities against each method of attack with chemical weapons	114
(3) Treatment of contaminated areas	117
(4) Decontamination methods	127
4. Protection against biological weapons	137
Appendix 1. An example of prescriptions on the operation of protection against special weapons	143

Appendix 2. A list of main protection equipment, etc.	144
Appendix 3. Decontaminating materials against radioactive substances.	145
Appendix 4. (1) Decontaminating agents against poisonous chemical agents	146
(2) Decontaminating materials against poisonous chemical agents	148
Appendix 5. Disinfectants	150
Appendix 6. Decontamination against poisonous chemical agents by using each material	152
Appendix 7. Incapacitative agents	156
Appendix 8. Herbicidal agents	158
Appendix 9. Terminology	159

Part I - General Remarks

Chapter 1 - Outline

Section 1. The Purpose of Protection against Special Weapons

The purpose of protection against special weapons is to minimize the damage caused by an enemy special weapon attack and to insure smooth and continuous operations. Special weapon is a general term applied to nuclear, chemical and biological weapons.

Section 2. Characteristics of Protection against Special Weapons

Special weapons can do massive physical damage to personnel, equipment and terrain and also do great psychological damage. The effects of special weapons vary with the kind of weapon, the method of use, etc. Therefore, there is a wide variety of countermeasures. Inadequate measures result in more severe damage in many cases. Adequate measures can remarkably reduce the damage.

Section 3. General Rules for Protection against Special Weapons

1. Meticulous Information - Gathering and Precautions

One should have thorough knowledge of the effects, methods of use and characteristics of each special weapon in order to prepare against an enemy special weapon attack. In particular, there should be an organized effort to gather information and also detect signs of preparation for an attack by the enemy. Continued precautions

must be taken in order to prevent any surprise attack, either from the front or the rear.

2. Appropriate Preparatory Measures

Proper preparatory measures are important in order to avoid or to minimize damage by an attack with enemy special weapons. Constant study of geographical features, the construction of fortifications, dispersion of personnel and supplies and secret and deliberately misleading operations is very important. Good protective equipment should be carefully prepared. It should be in good condition and in good supply.

3. Accurate and Fast Protection Measures

Since special weapons display their irrevocable effects in a very short period of time, protection activities must be carried out quickly and accurately. Proper decontaminating measures are important in minimizing the damage caused by contamination.

4. Strict Discipline and Martial Spirit

Carelessness or insufficiency of preparation for an enemy attack with special weapons may, in the case of an attack, rapidly result in a dreadful condition. The accompanying psychological shock may lead to panic. For these reasons, all ranks must engage in rigorous daily training so that, under any circumstances, without fear or overconfidence, strict discipline and high combat spirit can be maintained and each person's duty can be thoroughly and resolutely accomplished.

Chapter 2 - Special Weapons

(1) Nuclear Weapons

Section 4. Outline

1. Nuclear devices are shells, bombs, etc., which employ a nuclear reaction to produce casualties and destruction.

Following are the main characteristics of nuclear weapons:

(1) Nuclear weapons have three different effects - blast, heat and radioactivity. Generally they have these effects simultaneously.

(2) Explosive energy is so massive that protection requires a considerable amount of labor and materials.

(3) Nuclear weapons contaminate an area by spreading radioactive substances upon exploding.

(4) The abovementioned three effects differ according to the type of nuclear weapon.

Section 5. Types and Effects of Nuclear Weapons

1. Nuclear weapons are roughly classified according to three types of explosions. These are explosion in the air, on the ground and underground.

In explosion in the air, the blast center is in the air and the fireball does not reach the ground. In explosion on the ground, the fireball is on the ground. In underground explosion, the center of explosion is underground.

Explosion in the air is classified further into three types according to the altitude of the center of explosion. They are ultra-high altitude explosion, high altitude explosion and low altitude explosion.

2. Table 1 shows different types of nuclear weapons and their effects.

3. Tables 2 and 3 show the extent of damage to personnel, equipment and facilities.

Section 6. Characteristics of Each Explosive Effect

1. Blast

The blast compresses and destroys personnel, equipment and facilities.

The speed of the blast is initially very high and gradually drops to transonic speed. In certain regions, the effect of the blast continues for several seconds.

Personnel and equipment suffer secondary damage by collapsing and flying objects. Clouds of dust caused by the blast could interfere with observation.

2. Heat

Most of the heat is released in a very short period of time after the explosion. The heat travels at the velocity of light and burns persons, equipment and facilities, but it can be protected against by opaque materials.

The effects of heat cover the largest area of all the effects of nuclear weapons. However, preparing protection against heat is relatively easy.

3. Radioactivity

(1) Radiation can be classified into initial radiation and residual radiation. Radiation harms human bodies but is unperceptible.

(2) Initial radiation: initial radiation is released within one minute after the explosion. Most of the initial radiation is released within several seconds after the explosion. Initial radiation is classified into alpha particles, beta particles, gamma particles and neutrons. Gamma particles and neutrons are concern for protection. Small nuclear explosions produce mostly radiation while their blast and heat effects are slight.

(3) Residual radiation:

(a) The radiation released one minute after the explosion or later is referred to as residual radiation. This radiation is composed of alpha particles, beta particles and gamma particles.

Table 1 - Effects of 5 Different Types of Nuclear Explosion

Types	Blast	Heat	Initial Radiation	Residual Radiation	Notes
Atmospheric explosion	Ultra high altitude explosion	almost no effects	almost no effects	almost no effects	Used for destroying guided missiles and aircraft
	High altitude explosion	affects a large area	affects a large area	creates induced radiation region around ground zero; usually no fallout	Used for destroying exposed personnel
	Low altitude explosion	affects a large area	affects a large area	creates induced radiation region around ground zero; usually no fallout	Generally frequently used for field operations
Ground level explosion	affects comparatively small area, creates a crater	affects a smaller area	affects a slightly smaller area	creates induced radiation region and fallout; contaminates comparatively large area	Used for destroying sturdy ground structures and fortifications.
Underground explosion	affects only around ground zero; creates a crater	affects only around ground zero	affects only around ground zero	creates induced radiation region and fallout; contaminates the most strongly around ground zero	Used for destroying sturdy ground structures and fortifications

Table 2. An Example of Casualty Radii (Distance from Ground Zero in Meters).

Yield (kt)	Direct Exposure		In Foxholes or Tanks		In Shelters (1m Layer of Dirt on Top)		In Forests (Casualty due to Forest Blowdown)
	Immediate	Delayed	Immediate	Delayed	Immediate	Delayed	Immediate
0.5	400	700	300	500	200	400	200
1	500	800	400	600	300	500	300
2	600	900	500	700	400	500	400
10	900	1200	700	900	500	700	900
20	1200	1300	800	1000	600	900	1200
50	1700	1700	1000	1200	700	1000	1700
100	2200	2200	1100	1300	800	1100	2300
500	4200	4200	1400	1600	1100	1400	4200
1000	5500	5300	1800	1800	1200	1500	5200

Note. (1) Above is a table of effects of a low altitude burst.

(2) "Immediate" means soldiers are immediately combat incapacitated and "delayed" means soldiers will be combat incapacitated after several hours.

(3) For direct exposure, assume that soldiers are wearing combat attire.

Table 3. An Example of Damage Extent (Distance from Ground Zero in Meters) of Equipment, Facilities and Others

Yield (kt)	Regular vehicles (Moderate)	Tanks and guns (Moderate)	Light aircraft on the ground (Moderate)	Supply facilities (Severe)	Communication equipment (Severe)	Heavy Bridge (Severe)	Forest Blowdown (Damage to Tracked Vehicles)	Forest fire (75 % humidity)
0.5	200	100	1300	100	200	200	300	700
1	300	200	1500	100	300	200	400	1000
2	400	200	1900	200	300	300	600	1300
10	700	400	3200	400	600	600	1100	2400
20	900	500	4000	500	900	700	1500	3200
50	1300	700	5500	700	1200	1100	2500	4500
100	1700	1000	6900	900	1600	1400	3100	5900
500	3200	1800	11800	1700	3000	2500	6000	11000
1000	4200	2400	14800	2200	4000	3100	7700	14200

Note. (1) Above is a table of exposure effects of a low altitude burst.

(2) "Moderate" requires major repair and "severe" means nonrepairable.

They are released from induced radioactive substances or from radioactive fallout. All of these particles are objects of protection but they gradually become ineffective.

(b) Soil around the center of an explosion becomes contaminated with radiation and forms an area of induced radiation; its extent is limited and usually round in shape.

(c) Two to three minutes after an explosion radioactive fallout starts falling around the center of explosion. It gradually spreads leeward with the high altitude wind and forms a wide fallout-contaminated area. In certain areas, the radioactive fallout declines very rapidly during the first 5 to 6 hours after explosion and declines slowly afterward.

Radioactive fallout caused by an atmospheric explosion usually does not appear. However, it may occur locally with heavy rain at the same time or immediately after the explosion.

4. Table 4 shows the penetrability of radiation.

Table 4 - Penetrability of Radiation

Radiation	Penetrability
alpha	It can be stopped by skin or clothes
beta	It penetrates skin but it can be stopped by thin metal sheets.
gamma	It penetrates human body. The higher the density of the blocking material, the more effectively it is blocked.
neutrons	It penetrates human body. It can be easily stopped and absorbed by water.

Section 7. Effects on Human Bodies

1. Injuries caused by blast are classified as primary and secondary. Primary injury results directly from the blast of an explosion. Secondary injury is caused

Table 5 - Effects of Initial Radioactivity on Human Bodies

Dosage (Roentgen)		Prodromes	Effects on Combat Capability
Under 50		None	None
100		Nausea and vomiting - within several hours after explosion	50% (slightly wounded within a short period, but can maintain full combat capability. Wounded need not be sent to the rear.
150		Nausea and vomiting within several hours after explosion	Within several hours 20 % injured. 50% of those injured must be sent to the rear
200	50 % injurious	Nausea, languor, uneasiness within 2 to 5 hours after explosion	50 % injured: all the injured must be sent to the rear. 50% loss of entire combat capabilities.
300		Nausea, headache, dullness, drowsiness, and asthenia within 2 hours after explosion	All soldiers must be sent to the rear. After 2-6 weeks 20% of the injured die. Survivors need 3 months to recover their combat capability.
400	50 % fatal	Asthenia, dullness, headache, nausea and incapability within 1 hour after explosion	Within 1 month 50 % of the injured die. Survivors need 6 months to recover combat capability.
600		Entire incapability of immediately after explosion	Within 2 weeks 90 % of the injured die.
More than 700	Fatal	Same as above	100 % of the soldiers die.

Note. - The dosage causing damage varies widely according to the individual.

by foxhole cave-in, building collapse, flying objects, etc. It is important to pay particular attention to prevention of secondary injury.

2. Injury caused by the heat of an explosion is classified as: burn, which is directly caused by the heat of an explosion, burn, which is caused by secondary fire following an explosion and temporary blindness and permanent blindness caused by the flash of an explosion or suffocation. Temporary blindness may heal by itself within 3-20 minutes, although it depends on whether it is night or day. Permanent blindness is caused by directly looking at the fireball of an explosion.

3. Bodily Damage Caused by Radiation

1. Bodily Damage Caused by Initial Radiation

General premonitory symptoms of radiation diseases start with headache and nausea several hours after exposure to radiation. After these symptoms appear, there is an incubation period of several days to several weeks. After this incubation period, acute symptoms appear such as fever, nausea, diarrhea, hemorrhage and depilation.

2. Table 5 shows the initial radioactive effects on the human body.

3. Bodily Damage Caused by Residual Radiation. Bodily damage caused by residual radiation is classified as damage caused by external exposure to residual radiation and damage caused by internal radiation. The former occurs when the human body is exposed to ambient radiation in a contaminated area or when radioactive materials are attached to the human body. The latter occurs when a person breathes and eats radioactive substances or when radioactive substances enter the body through a wound.

The symptoms appearing after a large dosage in a short period resemble the symptoms due to initial radiation. However, a small dosage over a long period may cause slowly developing symptoms.

Section 8. Expected Usage of Nuclear Weapons

1. Usually, a nuclear weapon used by an enemy utilizes the atmospheric explosion to destroy our front line as well as major units, command posts and facilities in the rear, aiming at large scale casualties and destruction. Ground level or underground explosions of nuclear weapons are used to destroy sturdy ground structures or to disable combat units over a large area by creating a fallout-contaminated area.

The use of a ground level or underground explosion of a nuclear weapon is determined by circumstances, especially by the expected effects, the condition of targets, the number of usable bombs available at the time, the projection methods available, and the locations of our combat units and theirs. This kind of attack is used in combination with fighting by close combat units and other artillery.

2. Nuclear weapons with various yields are launched with different projection methods from ground level, the atmosphere or the sea. A relatively long time is generally required between spotting the target and launching a nuclear weapon. Therefore nuclear weapons are used for stationary targets or targets which appear in determined areas. Firearms and rockets can be relatively easily used to launch a nuclear explosive.

(1) Projection by Guns. Guns used for projection of nuclear weapons are limited in yield and shooting distance; however, they are easily transported and have high accuracy. They are used to provide direct aid to "close combat" units.

(2) Project by Free Rockets. Free rockets are used in a manner generally similar to guns. Free rockets can launch weapons of higher yield than guns. However, the accuracy of free rockets is less than that of guns. There are some free rockets by which nuclear weapons can be easily projected by front line units.

(3) Projection by Guided Missiles. A nuclear weapon attached to a missile can be used for long distance and can have high yield yet preserve high accuracy.

(4) Projection from Aircraft. Aircraft can carry bombs, missiles and free rockets to which nuclear weapons are attached but the preparation and flight to the target takes time.

(5) Nuclear Mine. A nuclear mine is put at a planned spot and set to explode at a certain time. It is used to create casualties, destruction, obstruction and a fallout-contaminated area.

(2) Chemical Weapons

Section 9. Outline

1. Chemical weapons are poisonous chemical agents and bombs, etc. which are filled with poisonous chemical agents.

2. Poisonous chemical agents are materials used to poison and kill personnel and animals. Following are the characteristics of poisonous chemical agents:

(1) Poisonous chemical agents spread, hover around, stay and flow over a large area. They penetrate even tanks and buildings. However, they have no destructive power.

(2) It is hard to estimate the effect of poisonous chemical agents. They can easily cause bodily damage before the affected person is aware of their presence.

(3) Most bodily damage can be avoided by adequate protection against poisonous chemical agents. However, even with such protection, activities are interfered with and command and communication become difficult.

(4) Some poisons have an immediate effect, while others have a delayed effect. Effects accumulate with certain kinds of poisonous chemical agents.

(5) The period of time for which chemical agents remain effective varies with the kind of poison, the weather, geographical features and the method of spraying the poison. Some poisonous chemical agents remain effective for a long period of time and others last only a short period of time.

Section 10. The Kinds and Characteristics of Poisonous Chemical Agents

The following is the classification of poisonous chemical agents:

- (1) Inflammatory chemical agents cause damage to eyes, redness of skin, blisters and skin inflammation. When the inflammatory chemical agents are inhaled, the respiratory organs are damaged.
- (2) Neurolytic chemical agents rapidly affect the nervous system, causing respiratory paralysis and convulsions.
- (3) Suffocative chemical agents act on the respiratory system. They stimulate the throat, windpipe, etc. and damage the lungs, causing suffocation.
- (4) Hemal chemical agents absorbed by the human body affect the blood components and the tissues of the entire human body and thus cause respiratory difficulties which result in convulsions and a comatose state.

2. Table 6 shows the representative kinds of poisonous chemical agents and their properties.

Section 11. Effects on the Human Body

The effects on the human body of chemical agents varies with the type of chemical agent, the concentration, the quantity, the exposure time, the physical constitution of the body, the exposed area of the body, etc. Figure 7 summarizes the effects on human bodies.

Section 12. Expected Usage of Chemical Weapons

1. Chemical weapons are used for killing people, causing disturbances and for devastating the land and are combined closely with other battle acts as follows.

(1) Use of chemical weapons for killing and wounding people: chemical weapons can cause large casualties with one attack. This is made possible by large amounts of chemical agents of high concentration. Generally, for this type of attack,

Table 6. Representative Poisonous Chemical Agents and Their Properties

Type	Name	Sign	Condition at 20°C	Odor	Speed of Its Effects	Effective period	50 % Fatal Dosage (mg min/m ²)
Inflam- matory chemical agents	Refined mustard	HD	Colorless or slight yellowish liquid	Garlic	Slow (Several hours to several days)	Highly concentrated liquid is effective 1-2 days. A week or longer at an extremely low temperature.	1500 (inhaled) 10000 (through the skin)
	Mustard nitrogen	HN	Dark col- ored liq- uid	Fish or mildew	Slow (12 hours or longer)	Slightly shorter than HD	1500 (inhaled) chemical) 20000 (through the skin)
	Lewisite	L	Dark colored oily liquid	Indefinite	Rapid	Shorter than HD Extremely short in high humidity	1200 to 1500 (Inhaled) 100000 (through the skin)
Neuro- lytic chemical agents	Phosgene oxime	CX	Colorless solid or liquid	Extremely stimula- tive	Rapid		
	Tabun	GA	Colorless or brown liquid	Slight odor similar to fruit. No odor when it is pure	Extremely rapid	Varies according to the method of ammu- nition and weather. 1-2 days with highly concentrated liquid spray	100
	Sarin	GB	Colorless liquid	Pure agent, almost odorless	Extremely rapid	Varies according to the method of ammu- nition and weather. Evaporates with the same speed as water	70 to 100

Table 6 - Continued

Type	Name	Sign	Condition at 20°C	Odor	Speed of Its Effects	Period It Remains Effective	50 % Fatal Dose (mg min/m ³)
	Soman	GD	Colorless liquid	Fruit	Extremely rapid	Same as GA	Same as GA or GB approximately
	V agent	VX	Colorless liquid	Odorless	Rapid	Long	Less amount than G
Suffocative chemical agents	Phosgene	CG	Colorless gas	Hay or green corn	Rapid (immediately - 1 hours)	Only temporary	3200
	Diphosgene	DP	Colorless gas	Same as above	Same as above	Same as above	Same as above
Hemal chemical agents	Hydrocyanic acid	AC	Colorless gas or liquid	Peach core	Extremely rapid	Same as above	About 2600 Varies to its concentration
	Cyanogen chloride	CK	Colorless gas	Same as above	Rapid	Same as above	11000

Note - G agent is a general term for neurolytic chemical agents such as tabun, sarin and soman.

Table 7 - Poisonous Chemical Agents' Effects on the Human Body

Kind	Effects on the Human Body
<p>Inflammatory chemical agents.</p>	<p>Mustard</p> <ol style="list-style-type: none"> (1) Liquid or its vapor causes eye congestion, pain, and tears. Eyes become very sensitive to light, and eyelids swell. These symptoms do not appear immediately. (2) Causes coughing, inflames the throat and trachea and interferes with breathing. Sometimes it also causes sneezing and nausea. (3) Within 30 minutes the contaminated skin reddens. Afterward, blisters and red swelling appear on the skin. (4) Generally mustard is a weak irritant, but harmful without being perceived.
	<p>Lewisite</p> <ol style="list-style-type: none"> (1) Liquid or its vapor instantly causes eye congestion, pain, and swollen eyelids. (2) It causes coughing, sneezing, and nausea. (3) When the skin is contaminated, pain occurs instantly. Within 5 minutes the skin becomes gray and blistered. The skin around the contaminated area becomes red and swelled. (4) Lewisite is a strong irritant and its symptoms appear instantly.
	<p>Phosgeneoxim</p> <ol style="list-style-type: none"> (1) Liquid of low concentration and its vapor can stimulate the mucous membrane of eyes and nose even when its concentration is low. (2) When the skin is contaminated, pain occurs instantly. The pain varies, from slight to extremely severe. (3) The contaminated skin instantly becomes white and blistered. The skin around the contaminated area

	<p>becomes red and swollen. 24 hours after contamination the area turns brown. 1 hour later scabs appear over the area. Recovery is very slow.</p> <p>(4) This agent is as strong an irritant as lewisite and its symptoms appear instantly.</p>
Neurolytic chemical agents	<p>(1) This causes myosis. Vision becomes impaired and eye pain occurs.</p> <p>(2) Causes a feeling of pressure on the chest.</p> <p>(3) Causes respiratory difficulties</p> <p>(4) Causes excessive salivation</p> <p>(5) Excessive perspiration</p> <p>(6) Nausea, vomiting, abdominal pain, diarrhea, involuntary urination and bowel movements.</p> <p>Cramps or convulsions.</p> <p>(7) Vertigo, distraction and unconsciousness. Eventual death.</p>
Suffocative chemical agents	<p>During exposure to the suffocative chemical agents or immediately afterward.</p> <p>(1) Causes coughing</p> <p>(2) Fast breathing and a feeling of pressure on the chest.</p> <p>(3) Sometimes, nausea and vomiting.</p> <p>(4) Headache and tears</p> <p>(5) Temporarily the symptoms mentioned above disappear.</p>
	<p>2 to 24 hours after exposure to the suffocative chemical agents</p> <p>(1) Breathing becomes fast and painful. Heavy coughing.</p> <p>(2) Causes nausea, vomiting and respiratory difficulties. Lips and skin turn bluish-purple.</p> <p>(3) Causes discomfort, uneasiness, fatigue.</p> <p>(4) Bubbly phlegm.</p> <p>(5) Causes death in a state of shock.</p>
Hemal chemical agents	<p>(1) Causes irritating pain in the nose and throat.</p> <p>(2) Fast breathing or a feeling of pressure on the chest.</p> <p>(3) Eye pain and tears.</p> <p>(4) Headache, vertigo, nausea and sneezing.</p> <p>(5) Respiratory difficulties.</p> <p>(6) Convulsions; the person falls into a comatose state and dies.</p>

short-lasting poisonous chemical agents, especially instantly effective chemical agents, are used. However, long-lasting chemical agents are also used.

(2) Use of Chemical Weapon for Causing Disturbances.

The purpose of this use of chemical weapons is to interfere with combat activities by compelling members to wear protective masks and clothes and by compelling them to take other protective measures. For this use of chemical weapons, the poisonous agents are spread by intermittently shooting them onto the planned area over a long period of time. Either short-lasting chemical agents or long-lasting chemical agents are used.

(3) Use of Chemical Weapons for Devasting Land.

For this use of chemical weapons, poisonous chemical agents are spread to create a contaminated area and to contaminate equipment and facilities in order to interfere with their use. Long-lasting chemical agents are used but, to prolong the effects, repeated distribution of the chemical agents is required. In many cases, either the artillery is directed to the contaminated area in front of the enemy's position or the contaminated area is created in striped or splashed patterns in order to combine with other obstructions.

2. Poisonous chemical agents are spread with artillery shells, bombs, hand grenades and mines. (Hereafter, we will refer to these weapons as chemical shells, chemical bombs, chemical grenades and chemical mines.) They can also be spread with rain bombs, cylinders, spray and others. One of the above methods or a combination of several methods may be used, possibly in combination with other common ammunition.

(1) Aerial Attack

An aerial attack with poisonous chemical weapons can spread a large amount of

the poisonous chemical over a large area with chemical bombs or with chemical rain bombs at any desired time and at any desired location. Marching units, assembly areas, technical positions, command stations, quartering areas and storage areas are common targets.

a. Bombs, or containers which break open when they reach the ground, are used to spread chemicals from aircraft. Dropping containers of poisonous chemical agents more effectively creates highly contaminated areas.

b. Chemical rain bombs are dropped from aircraft, spreading poisonous chemical liquid over a large area in a quick surprise attack from very low altitude. This is especially effective on personnel. Other methods, such as smoke screen tactics, anti-ground artillery and bombing are used together with this method. These kind of attacks are usually made in waves.

(2) Chemical Guns and Chemical Rockets

In this method of using chemical weapons, the shooting distance is limited, but the attack can be concentrated on a planned area. Either long-lasting or short-lasting chemical agents are used according to the purpose. Sometimes, a splinter effect is also combined. Rocket bombs or trench mortars are used largely for a fast attack. Advancing units, assembly areas, heavy weapons, technical positions, observatories, command stations, important transportation routes, etc., are common general targets of this kind of attack.

(3) Chemical Cylinders

Short-lasting poisonous chemical agents are emitted from large size cylinders and drift with the wind. It is possible to contaminate a large area with this method; however, usage is very limited because preparation requires a large number of personnel, material and time. Also it is difficult to keep plans secret with this method. Weather conditions further limit this use of chemical agents.

(4) Chemical Mines.

A chemical mine is filled with either long-lasting chemical agents or short-lasting chemical agents. It is set at important positions, possibly with obstructions which explode automatically when the enemy approaches or by remote control when the enemy approach is sighted. A chemical mine is often used at the same time as a regular mine.

(5) Chemical Spray Guns

Chemical spray guns are either vehicular or portable. Attack by chemical spray guns will create contaminated areas and interfere with enemy activities and use of strategically important positions. It is difficult to keep the plan secret and a large number of personnel and material are required with this method. Chemical spray attacks are usually used in combination with obstructions and in front, on the sides or even inside the enemy's position or in such a location as high land, forest, village, small path, etc.

(6) Others

Chemical hand grenades and small chemical cylinders have only localized effects although they can be easily and spontaneously used in close combat. In another use, poisonous chemical agents are directly ejected into loopholes, etc. by a spray gun or the like.

(3) Biological Weapons

Section 13. Outline

1. Biological weapons are biological agents and their disease mediums or artillery filled with them.
2. Biological agents are microbes or toxins which cause disease in personnel, animals or vegetation and are often fatal to them.

The characteristics of biological agents are as follows:

(1) Biological agents a highly undetectable and confirmation of their existence takes a long time.

(2) Each biological agent has an incubation period and generally its effects are very slow and nondestructive.

(3) Many microbes cause contagious diseases. A disease in one individual can cause a mass outbreak of the disease.

(4) Microbes proliferate very rapidly under the right conditions of humidity, nutrition and temperature; however, under unfavorable conditions they do not proliferate or they may die out.

(5) Biological weapons may be manufactured and used without difficulty and may easily be kept in secret.

(6) Biological agents which reached the ground after their release, form a secondary aerosol by means of the vehicular traffic, etc. over the area. This enlarges the contaminated area.

Section 14. Kinds and Properties of Biological Agents

1. Biological agents are generally classified into microbes and toxins.

According to their objects, they are also classified into agents which affect humans, agents which affect animals and agents which affect vegetation.

(1) The microbe is a general term referring to bacteria, virus, rickettsia, Eumycetes, protozoa, etc. There are many kinds of them; however, comparatively few of them can cause disease and can be used for weapons.

(2) A toxin is a product of various microbes in their biological process and neither proliferates nor propagates, unlike microbes. A small amount of a various toxin can be fatally effective.

2. Table 8 shows typical kinds of biological agents and their properties.

3. Disease mediums are mice, fleas, ticks, etc. which carry and spread the disease.

Section 15. Effects of Biological Agents on Human Bodies

The degree of damage to the human body by biological agents varies according to the physical strength and immunity of the individual and to the kind of biological agent. Each biological agent has its peculiar effects. Very distinctive effects on animals are athenia, languor and loss of appetite. Effects of vegetation include discoloration, defoliation and withering. Table 8 shows the main effects of each biological agent.

Section 16. Expected Usage of Biological Weapons

1. The general targets of attack by biological weapons are assembly areas, riverheads, supply facilities, residential areas, isolated islands, etc. An operation using biological weapons must be efficiently planned and surrounded by strict secrecy. It is used in combination with other combat methods for a concentrated or strategic attack.

(1) Attacks by Shells and Rockets.

Biological agents are conveyed by explosive shells or rockets by the same method as chemical weapons. However, biological explosive shells and rockets are filled with a less explosive agent or sometimes equipped with aerosol emitting equipment.

(2) Dropped Bombs, Etc.

Biological agents are dropped with bombs which carry little explosive agent and aerosol-emitting parachute equipment or with bombs which carry other emitting equipment. Also, breakable containers such as ceramic ones, are used. They break open when they hit the ground.

(3) Spray Guns

a. Biological agents are sprayed from aircraft or from spray methods on the ground (or water).

Table 6. Representative Kinds of Biological Agents and Their Properties

Use	Disease	Classification	Infection Routes Oral Skin Resp. Organ	Media	Infectious Period (Days)	Incubation Period (Days)	Mortality (%)	Symptoms
	Bacillary dysentery	Bacillus	0	Contaminated drinking water	1-7	1-7	Low	High fever, abdominal pain, diarrhea, blood/excrement
	Typhoid fever	"	0	"	6-21	6-21	7-14	Headache, rigor, high fever, roseola slow pulse
	Paratyphoid	"	0	"	1-10	1-10	1-2	Symptoms of typhoid type: high fever, shivering. Symptoms of acute gastroenteritis: high fever, diarrhea, vomiting
	Cholera	"	0	"	1-5	1-5	15-90	Vomiting, violent purging, physical collapse
	Plague	"	0 0 0	Fleas	2-19	Subonic plague	2-50	High fever, lymphadenoma, ulcer
	Glanders	"	0 0 0	Infected animals, contaminated feed, water	3-4	Pneumonic plague	90-100	Ulcers, pneumonia, hemorrhagic pneumonia
	Splenic fever	"	0 0 0	"	2-5	2-5	50 - 100 (Chronic)(Acute)	Skin: Rubefaction, pain, necrosis Nose: Ulcer, pneumonia, septicemia
	Purpura	"	0 0 0	"	1-7	1 (Pneumonic)	25 - 100 (Skin)	Skin type: papule, ulcer, blister Pneumonic type: Dyspnea, exudative, pleurisy Intestinal type: Hemorrhagic diarrhea.
	Tularaemia	"	0 0 0	Milk of infected animals	10 - 30	10 - 30	2 - 6	Navy high fever, systemic pain, lymphadenoma
	Psittacosis	Virus	0	Ticks, contaminated water, skin of infected animals	1 - 10	1 - 10	5	High fever, systemic pain, lymphadenoma, skin ulcer, pneumonia, enteritis
	Yellow fever	"	0	Aerosol	6 - 15	6 - 15	5 - 20	Rigor, high fever, severe headache, dyspnea
	Influenza	"	0	Mosquitos	3 - 6	3 - 6	30 - 40	High fever, bleeding jaundice, brain fever
	League fever	"	0	Aerosol	0.5-2	0.5-2	less than 1	Rigor, high fever, headache, bronchitis
	Typhus	Rickettsia	0	Mosquitos	4 - 10	4 - 10	Low	High fever, hectic cheeks, erythema, pain
	Rocky Mountain spotted fever	"	0	Lice	10 - 12	10 - 12	10 - 40	High fever, headache, eruption
	Q fever	"	0 0	Ticks	3 - 10	3 - 10	20	Headache, rigor, high fever, ecchymosis papule, arthritis
	Botulin	Toxin	0 0 0	Milk of infected animals	14 - 21	14 - 21	1	Headache, rigor, high fever, perspiration, chest pain, eyeball pain
	Epidemic typhus	Bacillus	0 0 0	Water and food	Within 18 hrs.	Within 18 hrs.	65	Vomiting, constipation, paralysis of muscle and respiration
Against Animals	Anthrax	Bacillus	0	Contaminated water and feed	1 - 3	1 - 3	49 - 88	High fever, dyspnea, hemorrhagic enteritis
	Cattle plague	"	0	"	1 - 4	1 - 4	3 - 50 (epidemic)	High fever, vesicles around legs, mouth and breast
	Plague	"	0	"	3 - 9	3 - 9	15 - 95	High fever, hemorrhagic diarrhea, inflammation on the oral cavity
	Spine cholera	"	0 0 0	"	2 - 7	2 - 7	100	Loss of appetite, bleeding, septicemia
Against Rice Blast Vegetation Disease	Rice Blast	true fungi	Spores spread by winds	Contaminated straw and seeds	5 - 7	5 - 7	90	High fever, diarrhea, bleeding
					4 - 6	4 - 6		Discoloration, withering

b. Spraying from aircraft is done in the same way as the poisonous chemical rain bombs. Biological agents will drift in the form of aerosol over a large area.

c. Some ground spraying equipment is fixed while others are movable. Aerosol biological agents can effectively cover a large area under good weather conditions.

(4) Weather and Geographical Features

Section 17. Outline

The effects of special weapons are influenced by weather and geographical features, especially local conditions. Drift of fallout is mainly influenced by high altitude weather.

Influential factors of the weather are winds, temperature, sunlight, atmospheric stability, humidity, rain, fog, etc. These factors constantly change according to time of day and the season.

Geographical features, such as mountains, water areas, forests and residential areas influence the effects of the special weapons and also influence the weather locally. The more complicated the geographical features are, the more changes in weather they can cause.

Section 18. Local Wind Flow

Air drift can be changed by geographical factors as follows:

1. In valleys or hollow ground, drifts move following concave lines.
2. On isolated high ground, forests and residential areas, drifts move following the contour lines.
3. Above narrow rivers with high shores on both sides, drifts move in the direction of the water flow.

4. On high ground, in jungles and urban districts, turbulent flows occur in the rear. Inside wind flow, different from outside flow, may exist within an isthmus.

5. In mountainous regions during fine and calm weather, the wind blows from the foothills to the summit in the daytime and, at night-time, it blows from the summit to the foothills.

6. Around the beach during fine and calm weather, the wind blows from the sea to the land in the daytime and at night, it blows from the land to the sea.

7. The speed of the wind such as mountain/valley wind or sea/land wind constantly changes. During the transition period in the morning or evening, the wind stops completely (called morning calm and evening calm).

Section 19. Atmospheric Stability

1. Inversion

The condition in which the air temperature at low altitudes is lower than that at high altitude is called temperature inversion. During a temperature inversion, the weather is very stable.

Generally a temperature inversion occurs at night during fine, windless or calm weather or within one hour after sunrise in the morning. A mild inversion condition is often induced in daytime on open water.

2. Neutrality

The condition in which the air temperature is almost the same at low altitudes and high altitudes is called temperature neutrality; in this condition the atmosphere is fairly stable.

Generally this happens when it is cloudy or during the transition period from late morning to noon or from afternoon to evening. A neutrality condition is common when it is raining.

3. Eversion

The condition in which the air temperature at low altitude is higher than that at high altitude is called temperature eversion; in this condition the atmosphere is very unstable and disturbed. An eversion condition usually occurs during the daytime in fine weather.

Section 20. Effects of Weather upon Nuclear Weapons

1. The high altitude wind spreads and moves the fallout over a large area. It influences the direction of falling, the time when the fallout starts falling, the scale of the contaminated area and the degree of contamination.

Since the high altitude winds over our country generally blow westward throughout the four seasons, the fallout-contaminated area spreads toward the east from the center of explosion.

2. Rain washes away the radioactive substances but it may contaminate river-heads and intensive local fallout may result.

3. During dry seasons, the heat of the nuclear explosion easily causes fires. Anything which interferes with visibility such as fog, rain, mist, smoke or city smog, reduces the heat effects of the explosion.

4. The complicated geographical features of mountainous areas provide many dead angles which constitute natural protection against the heat, blast and radiation of a nuclear explosion. In areas of steep mountains, the contaminated area formed by fallout drops is generally irregular.

5. When a nuclear weapon explodes on or under water near the land, the surrounding water area and the shore are often highly contaminated by fallout drops. High waves are formed at the same time.

6. When a forest or a residential area is far from the center of explosion, people can protect to some extent against the heat and the blast of the explosion.

However, if they are close to the center, the secondary damage becomes heavier.

The effects on a forest of a nuclear explosion vary according to the kind, the size and the density of the vegetation.

7. Induced radiation caused by the explosion changes according to soil components in the area.

Section 21. Effects of Weather upon Chemical Weapons

1. Gaseous poisonous chemical agents spread in the direction of the wind. Their diffusion and flow are greater as the wind speed increases.

They can maintain high density even with a wind velocity of 2 to 5 m/s in temperature inversion of neutrality conditions and spread and move along the ground surface. However, with a wind velocity over 7 m/s, gaseous poisonous chemical agents diffuse very rapidly and lose their effectiveness rapidly.

Liquid poisonous chemical agents evaporate quickly with high wind speed and lose their effectiveness.

2. When the atmospheric temperature or the ground surface temperature is high or extremely hot, liquid poisonous chemical agents vaporize fast and increase their vapor density. Thus, their penetrability is enhanced but their effectiveness is lowered.

When the atmospheric temperature and the ground surface temperature is low or extremely cold, opposite conditions will be observed. Some kinds of liquid agents may hang low and maintain their effectiveness for a long period of time while other kinds of liquid agents freeze and decrease significantly in effectiveness.

3. In temperature inversion conditions, poisonous chemical agents usually spread and hover along the ground surface especially in forests, villages and shelters.

In temperature neutrality conditions with a moderate wind velocity, poisonous chemical agents hover along the ground surface. In temperature eversion conditions, however, they spread and disperse quickly.

4. In high humidity liquid poisonous chemical agents vaporize slowly but high humidity causes more perspiration and skin humidity thereby increasing damage.

5. Fine rain scarcely alters the effectiveness of poisonous chemical agents. While heavy rain can absorb vaporous chemical agents and wash away liquid chemical agents. Heavy rain may also hydrolyze the agents, thereby considerably decreasing their effectiveness. Mustard does not lose its effectiveness by mixing with water and therefore, it may remain effective in craters for several days. Snow can cover poisonous chemical agents and decrease its vaporizing speed. It may also freeze some kinds of chemical agents and decreases their effectiveness. However, the snow makes the agents stay for a long period of time and heavy damage may result when the snow melts.

6. Liquid poisonous chemical agents sprayed on the open ground remain effective for 5 hours to one day in summer at high temperature with strong winds. For several days in winter they vaporize faster in the daytime than at night.

7. In mountainous areas or flat areas adjacent to mountains, vaporous chemical agents spread and move with the mountain wind or valley wind. In valleys or gorges they travel along the contours and sometimes remain for a long period of time. On mountain ridges or slopes, the agents do not stay along the surface and cannot maintain high density.

8. In the coastal areas, vaporous poisonous chemical agents travel with the geographical winds (sea/land winds). Ascending currents of air are generally weak over rivers, swamps and ponds and hence, vaporous agents tend to stay for a long period of time.

9. In residential or forest areas, vaporous chemical agents generally stay and maintain their effectiveness for a long period of time.

10. In bushes or on grassland, the higher the vegetation, the more easily the poisonous chemical agents adhere to the human body, thereby causing more damage.

On bare ground, poisonous chemical agents are absorbed into the soil, which decreases the agent's effectiveness while prolonging the duration of its effectiveness.

Section 22. Effects of Weather on Biological Weapons

1. The effects of weather on biological weapons are very similar to those on chemical weapons when biological agents float in aerosol.

2. Microbes generally need appropriate temperatures for their existence. Extremely low or high temperatures can interfere with their proliferation. Microbes of many kinds are weakened when exposed to the direct sunlight which can even kill some microbes.

3. The proliferation of microbes may increase with high humidity and high temperature.

4. Rain absorbs some biological agents or washes them away but may even contaminate adjacent areas, water sources or a very large region.

5. The humidity is high around rivers, lakes, swamps, residential and forest areas, etc., thereby increasing the proliferation of microbes.

Chapter 3. Protection Equipment, Etc.

(1) Protection Equipment, Etc. for Individuals

Section 23. Outline

Individual protection equipment against special weapons includes protective mask, light protective garments, glass dosimeter and protective ointment. Individuals must always carry them.

Section 24. Protective Mask

A protective mask covers the face and shields radioactive substances, poisonous chemical agents and biological agents from the eyes and the respiratory organs thereby preventing such agents from entering the human body.

Protective masks include type 1 and type 2, masks and the observational mask. Special masks are required to protect against carbon monoxide, ammonia, carbon monoxide gas, petrochemical gas, etc.

Section 25. Light Protective Garments

Light protective garments are made of thin sheets of synthetic fiber and provide entire body cover. They are worn with protective masks to protect against body contamination. Usually light protective garments can protect for 5 to 6 hours against adhesion of radioactive substances and biological agents.

Section 26. Glass Dosimeter

A glass dosimeter is an instrument for determining the dosage of radiation that an individual has received. It is a transparent fluorescent glass sheet. An individual carries this meter around his neck in a holder.

A glass dosimeter is put into a glass-dosimeter measuring instrument to measure the amount of radiation received by an individual. It can measure up to 1000 R of radiation dosage.

Section 27. Protective Ointment, Equipment, etc.

Protective ointment equipment (Figure 2) is used for first aid to an injury caused by poisonous chemical agents. It must be carried by individuals in the same case as the protective mask. The first aid kit consists of 4 protective ointments, 4 units of eye ointment, one unit of Bal eye-ointment and one injector (atropine, etc. for neurolysis).

1. The protective ointments are effective antidotes against inflammatory chemical agents and V agents in the human body. The protective ointment can be applied to individual equipment for decontamination. Because the amount of ointment that an individual can carry is limited, it must be used efficiently.

2. The Bal eye-ointment is used as an antidote for eyes poisoned by lewisite.

(2) Detecting and Measuring Means for Units

Section 28. Outline

Detective means are used to determine the degree of danger caused by radiation, poisonous chemical agents or biological agents. By detection is meant determination of the existence and the kind of contamination. By measurement is meant determination of the amount and density of contamination.

To ensure such operations accurately and quickly, a good knowledge of the equipment and its operation is important. Also, these detecting and measuring means must always be kept in good condition and in sufficient supply.

Section 29. Detecting and Measuring Means for Radioactivity

There are two kinds of radiation measuring means: one is to measure the intensity of radiation and the other is to measure the dosage of radiation.

The following are the kinds of equipment which are usually used in the field:

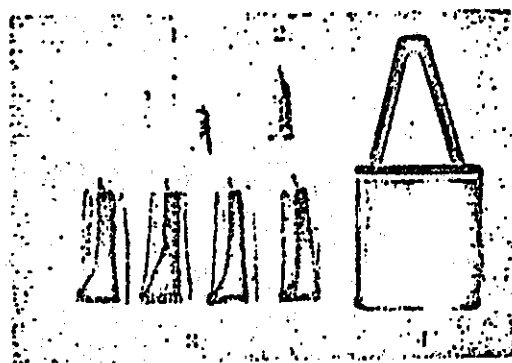
- (1) For measuring the intensity of radiation

Detective radiometers

Radiometers for companies (alarm or I.C. type)



Figure 1 - A Glass Dosimeter



- Key: 1. Injector (Atropine)
2. Bal eye ointment
3. Protective ointment
4. Case

Figure 2 - Protective Ointment Equipment

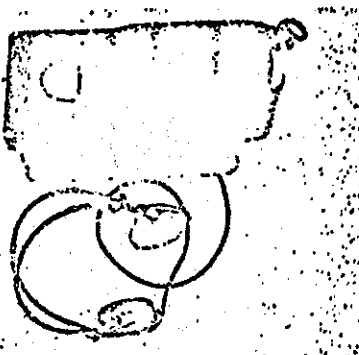


Figure 3 - Detective Radiometer

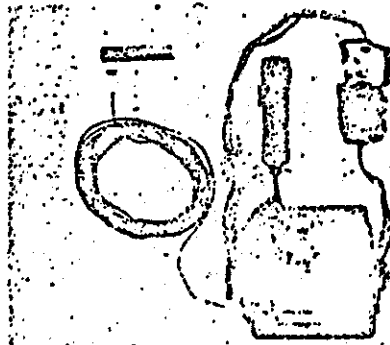


Figure 4 - Radiometer for Companies (Alarm attached)

Radiometers for terrain contamination

Radiometers for food contamination

(2) Meters for measuring the dosage of radiation

Portable Dosimeter Set

Glass Dosimeter (probe/meter)

2. Detective Radiometer

Detective radiation meters are used to measure the rate of radiation which personnel and equipment have received. This meter can detect the existence of beta particles and measure up to 500 mR/h of gamma particles.

3. Radiation Meters for Companies

(1) Radiation meters for companies with alarm (see Figure 4) are used to measure radiation of contaminated areas and to detect radiation that personnel and equipment have received. This meter can detect the existence of beta particles and measure up to 500 R/h of gamma particles. When the amount of radiation exceeds predetermined intensity level, an alarm buzzer and a signal light are turned on.

(2) Radiation meters for companies (I.C. type, see Figure 5) are mainly used to measure radiation of contaminated areas. This meter can measure up to 50 R/h of gamma particles.

4. Radiometer for Terrain Contamination

This meter is carried by aircraft to measure radiation of a large contaminated region and it can measure up to 600 R/h of gamma particles.

5. Radiometer for Food Contamination

This meter is used by supply units or others to measure radiation of contaminated foods and water and it can measure up to 100,000 counts of alpha, beta and gamma particles.

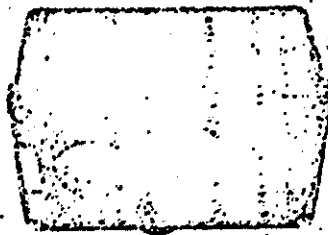


Figure 5 - Radiation Meter for Companies (I.C.-type)

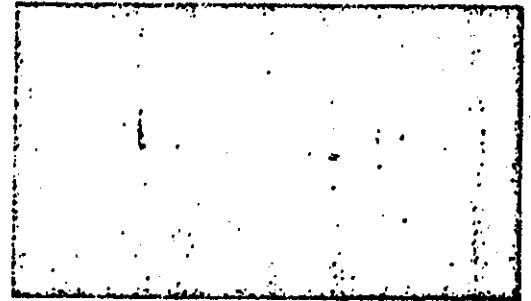


Figure 6 - Portable Dosimeter (300 mR)

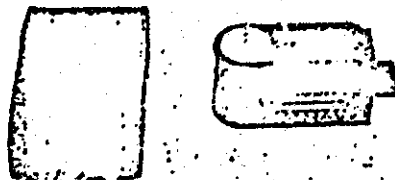


Figure 7 - Electric Charger

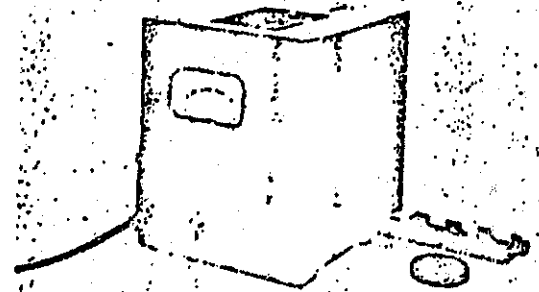


Figure 8 - Glass Dosimeter (Probe and Meter)

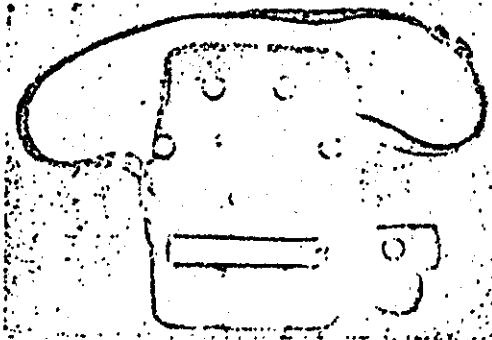


Figure 9 - Gass Detector

- Key:
1. Detection crayon container
 2. Reagent container
 3. Reagent bottle
 4. Detection tube
 5. Pump

6. Portable Dosimeter Sets

A portable dosimeter set consists of three different dosimeters which are used to measure up to 300 mR (Figure 6), 50 R and 600 R of gamma particles and another dosimeter to measure neutrons.

Each portable meter is designed to be carried in a pocket or the like of an individual to measure the amount of radiation that the person has received. An electric charger (Figure 7) is attached to this set.

7. Glass Dosimeter

A glass dosimeter (Figure 8) is a meter for reading the amount of radiation which an individual has received. The dosimeter is carried by an individual. (Cf. Section 26.)

8. Measurement Distance

Meters must be held a distance of one meter above the ground to measure radiation of contaminated terrain. Insofar as possible, the area where the meter is used must be cleared 10 meters around it. The meter must be aimed in all directions and the maximum intensity must be measured. Aircraft which carry such meters must fly at a predetermined altitude.

Meters to measure personal dosage must be held a distance of 2 to 3 centimeters away from the skin or clothes. The same standard is applied to other similar equipment.

Section 30. Detection Devices for Poisonous Chemical Agents

1. Detection devices for poisonous chemical agents include the following: gas detectors, detection paint, detection paper, detection crayon and automatic detection alarm.

2. Gas Detectors

When the human body has been contaminated by poisonous chemical agents or is believed to have been contaminated, a gas detector (shown in Figure 9) is used to detect the existence, the kind and to measure the concentration.

A gas detector has a glass tube which contains chemical agents for detecting poisonous chemical agents. When the detector absorbs vaporized poisonous gas into the glass tube, colors appear in the tube to show the existence of the poisonous gas.

There are other kinds of glass tubes which contain different kinds of chemical agents to detect the existence of carbon monoxide, ammonia, etc.

3. Detection Paint

When liquid inflammatory chemical agents or liquid neurolytic chemical agents adhere to protective paint, the paint color changes to red but vaporous poisonous chemical agents do not affect the paint at all.

When the detection paint touches dark solution or protective ointment or when the temperature is over 65 degrees C, the detection paint also changes its color. Therefore it cannot be kept under such conditions. Detection paint is applied to the surface of equipment, ground structures, etc. It should be applied so as to be clearly visible.

5. Detection Crayon

Detection crayon changes its color from pink to blue when it touches liquid or vapor of highly concentrated inflammatory chemical agents (excluding nitrogen mustard), highly concentrated phosgene, diphosgene or cyanogen chloride.

Detection crayon cannot be used where nonpoisonous chlorous chemical agents of high concentration exist, because detection crayon changes to blue when it touches these nonpoisonous agents as well.

Detection crayon should be painted on the surface of equipment and ground

structures or shavings of detection crayon should be scattered over areas suspected of being contaminated.

6. Chemical Agent Automatic Detection Alarm

An automatic detection alarm is designed to detect mainly highly concentrated neurolytic chemical agents. It gives off an alarm by emitting sound or light.

Section 31. Collecting Equipment for Contaminated Materials

Collecting equipment (Figure 10) is used to collect radioactive materials, poisonous chemical agents, biological agents or objects contaminated by them in order to determine and pinpoint the type and the strength of special weapons used by the enemy.

In collecting a sample, the time of day, the date, the place, the name of the collecting person and the method of collection must be clearly recorded.

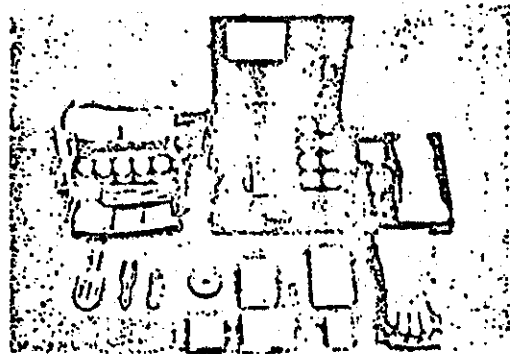


Figure 10 - Collecting Equipment

- Key:
1. case
 2. sample container
 3. extracting equipment
 4. detection paper
 5. record report notebook

(3) Decontaminating Devices for Units

Section 32. Outline

Decontaminating agents, materials and equipment are used for decontamination. Individuals doing the decontamination must wear protective masks and garments. Detectors and meters must be used for this operation also.

Before a decontaminating operation begins, the kind and the amount of contamination must be known in order to select the right equipment and material.

Section 33. Decontamination against Radioactive Materials

For decontamination against radioactive materials, water (soap solution), alkalis, acids, organic soluble agents, resolvers, etc., are used to wash and dissolve radioactive substances. Major decontaminating materials are listed in Appendix 3.

Section 34. Decontamination of Poisonous Chemical Agents

Decontaminating materials of poisonous chemical agents include: bleach, such as bleaching powder and daunk, which makes the poisonous chemical agents become nonpoisonous or less poisonous; water (soap solution) which washes, vaporizes and dissolves poisonous chemical agents; organic soluble agents and explosives. The common decontaminating materials are listed in Appendices 1 and 2.

Section 35. Disinfectants of Biological Agents

The common disinfectants are listed in Appendix 5.

Section 36. Portable Decontaminating Equipment

Portable decontaminating equipment is used to spray liquid decontamination agents on the surface of contaminated equipment or others. It can be operated by one person. Fifty cubic meters of equipment or one truck of 2½ tons can be decontaminated at one time.

Section 37. Decontamination Vehicles

A decontamination vehicle is used to sprinkle either water or a solution of decontamination agents over a large area.

A hose is used to wash the ground, buildings and equipment. A shower is used to wash individuals. When bleaching powder emulsion is used, about 650 square meters of grassland, or 1300 square meters of flatland for decontamination can be covered in one round.

Section 38. Chemical Heater

A chemical heater is used to either warm or boil water which will be used to wash persons or dissolve decontamination agents. This heater can heat 2000 liters of water to raise its temperature at the rate of 45°C per hour.

Section 39. Chemical Protective Garments

Chemical protective garments include rubber coated protection clothes, rubber gloves, rubber boots and light blankets. A protective mask must be worn with these garments to cover the entire body when a person is involved in decontaminating activities or scouting contaminated areas in order to protect the body from being contaminated.

(4) Other Protection Equipment and Materials

Section 40. Air Purifiers

An air purifier is used to purify contaminated air within a shelter by continuously feeding fresh air into it.

Section 41. First Aid Medication against Poisonous Gas

First aid medication is applied to persons injured by poisonous chemical agents. This medication is generally carried and used by either sanitary units or chemical clerks of each unit. Common medications are listed on Table 9.

Table 9. Medications for Poisonous Gases

Names	Methods
Calamine lotion	This relieves the pain and itching of burnt skin or inflamed skin. Cloth soaked with this lotion must be repeatedly applied to the affected area.
Chloroform	Inhale to relieve sneezing. ve sneezing.
Copper sulfate solution	Cloth soaked with this solution is used for removal of yellow phosphor fragments which persistently adhere to the skin or wounds.
Eye drop Nasal drop	This relieves eye and nasal pain and congestion.
Bal eye drop	2 or 3 drops to the eyes are used to decontaminate against lewisite. It must not be repeated.
Bal ointment	This is used to decontaminate against lewisite which has adhered to the skin. It must be applied after liquid lewisite is wiped off from the skin.
Amyl nitrite	This is used for injuries caused by hemal chemical agents which stimulate the respiration. Two broken ampoules must be placed under the protective mask, so the person can breath its vapor. A person cannot take more than 8 ampoules at a time.

Part II. Individual Protection

Chapter 1. General Remarks

(1) Outline

Section 42. Outline

Individual protection is a general term for measures which an individual must take to protect himself and for equipment to protect himself against an attack with special weapons. Individual protection is the most basic of all the protective measures. Every rank, including officers, must practice daily in order to master sure and fast protection measures, especially the use and the appropriate operation of protection equipment.

(2) Directions for Use of Protection Equipment, Etc.

Section 43. Outline

It is very important to practice how to use protective materials and equipment quickly and accurately. Protective masks and garments interfere with activities. Hence, wearing them for a long period of time creates fatigue. However, practice and training can reduce this problem.

Correct use of decontaminating or protective materials and equipment considerably influences its effectiveness. Therefore individuals must have sound knowledge of their usage.

Section 44. Directions for Use of Protective Masks

This section mainly describes protective mask, Model 2. Model 1 will be described only to illustrate its special features.

1. Methods of Carrying the Protective Mask.

(1) The protective mask must be carried in a position where an individual can

immediately reach and use it. The adjustable shoulder strap goes over the right shoulder from which the equipment hangs. The mask hangs under the left shoulder. The waist strap must be put around the waist. Under some circumstances, the shoulder strap is placed around the hips to let the mask hang from either the right or left hip. The carrying positions are shown in Figure 11.

(2) The helmet strap must be tied so it can be easily untied.

(3) Protective mask, Model 1, has a carrying position and an alert position. When an attack by special weapons is anticipated, the alert position must be taken. In the carrying position, the shoulder strap must be adjusted so that a person can immediately change it to the alert position, the strap carried on the shoulder must be shortened to move the case up to the chest and the waist strap must be placed around the waist in order to be able to put the mask on at any time. The lower portion of the strap must be fixed around the bullet belt on the waist so that the case may not interfere when putting the mask on.

(4) Precautions When Carrying the Protective Mask

a. Usually the water stopping plug for the case must be taken off. (With Model 1, the bottom cover must be taken off.) In cold weather, a moisture proof agent must be applied to the glasses.

In crossing a river, the absorbing can must be removed and a water proof agent must be applied. (With Model 1, the bottom cover of the absorbing can must be put back on and its connecting pipe must be closed with a pin.

b. When lying face down, one must be careful not to break the glasses.

c. Unnecessary knocking and shaking must be avoided, especially of the absorbing can.

d. All other mask attachments must be in the prescribed places.

2. Inspection and Handling of Protective Masks

(1) In order to maintain the mask in good working condition and be able to put it on quickly and accurately, inspection must be carried out periodically. Refer to "Protective Mask and Protective Garment, Instructional Manual 3-202," for the details of the inspection.

(2) Malfunctioning parts must be immediately repaired or replaced.

(3) The protective mask must regularly be cleaned with cloth and it must be regularly disinfected. It must be kept in a dry place. When it is not in use, the water stopping cap and the cover (bottom cover in Model 1) must be put on so that the absorbing can may be kept dry also.

(4) Only the protective mask, its attachments and prescribed items must be kept in the case. No other items should be put in the case.

(5) The absorbing can must not be unnecessarily removed from the mask in order to avoid breaking its screws.

(6) When the mask is used in cold weather, moisture proofing must be applied to the inside of the glasses.

3. Directions for Putting on the Protective Mask

(1) One must hold his breath until he finishes putting the protective mask on.

Figure 12 shows the protective masks when they are worn correctly.

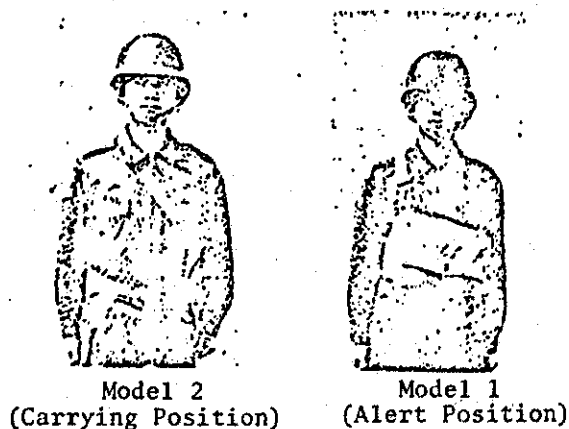


Figure 11. Methods of Carrying Protective Masks

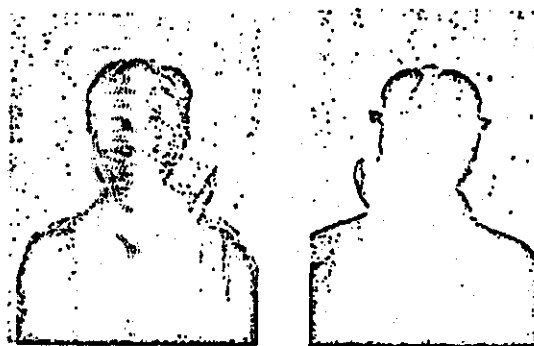


Figure 12. Protective Masks When They Are Worn Correctly

(a) Close the eyes and hold the breath.

(b) Take off the cap and hold it between the thighs. If a helmet is worn, loosen the strap so that the helmet hangs behind the head.

(c) Open the case cover and take out the mask. Open the cover with the left hand and grip the expiratory part to take the mask out.

(d) Hold the strap with both hands. Spread the mask and put it on from the chin.

(e) Press the expiratory part with the palm and remove the air inside the mask by strong and fast expiration. The expiration must be done thoroughly because it is dangerous if the contaminated air is left in the mask.

(f) Then inhale while pressing the outside mouth of the respirator with the palm and check the air tightness of the mask. With Model 1, inhalation must be done after the connecting pipe is tightly closed by a hand. Start respiration after checking the air tightness.

(g) Unfasten neck strap from the left snap and fasten it to the right snap. Be careful not to twist the strap. (This motion does not apply to Model 1.)

(h) The strap, the head support, the mask portion and the respirator (with Model 1, the connecting pipe instead of the respirator) must be checked and corrected in this order, fast and thoroughly. During these actions, the mask portion must be securely fastened to the face.

(2) If a gun is being held at the same time, in a standing position, the gun is put between the thighs. In a crouched position, the gun is rested against the thighs. In the prone position, the gun is put around to one side of the body and the body rolled to one side so that the other side of the body touches the ground. Or, alternatively, if lying on the back, the gun is rested on the abdomen. In a position bearing the gun on the shoulder, put the mask on either in that position or after putting the gun down. When driving a vehicle, stop the vehicle and put

the mask on. With

(3) With Model 1, after the mask is put on with the same method as Model 2, the case must be moved back to the alert position.

4. Precautions in the Use of Protective Masks

(1) When the mask is used, its air tightness must be checked once in awhile.

(2) When a person must communicate on a radio or telephone, he must be careful not to put moisture on the transmitter. This is done by either covering the transmitter with a piece of thin cloth or by holding the transmitter slightly away from the expiratory part but the person must talk clearly, loudly and slowly. Also the person must tell the other person that he is wearing the protective mask.

5. Directions for Taking Off the Protective Mask

(1) Follow the correct sequence described below:

(a) Open the case cover and take the hat off.

(b) Unfasten the neck strap from the right snap and put it into the left snap.

(c) Holding the expiratory part with the right hand, remove the mask from the chin.

(d) Put on the hat again.

(e) Push the neck strap into the mask. The mask is placed into the case so that the respirator faces front and the glasses face upward. Close the case cover. (With Model 1, the mask is placed on the bottom and the respirator on top of it, covering the mask.)

(2) Precautions after Using the Mask

(a) In putting the mask back into the case, be careful not to deform the mask. When the mask is wet, it must be dried naturally or it must be wiped dry, especially the expiratory parts. In cold weather, the parts easily collect moisture.

(b) The expiratory parts must be wiped carefully to prevent breaking the

valve.

(c) Wind drying may be done by any convenient means. In the case of Model 1, this can be achieved by leaving the absorbing can in the case and hanging the mask on the back with the connecting pipe over the shoulder.

(d) After the mask is used, all the parts must be put back correctly so that the mask may be put on quickly.

Section 45. Exercise of Putting On and Taking Off the Protective Mask

1. Important Note on Exercise

(1) First of all, correct breathing must be practiced.

(2) Putting on the mask must be practiced so that it is done quickly with eyes being shut and the breath being held. The whole procedure before checking air tightness must be done in 8 seconds.

(3) After accuracy and speed are mastered in a stationary position, carrying out the procedure under various conditions must be practiced. These include different positions, different garments, marching in combat, in combat, in operations, at night, etc.

(4) Wearing the mask must also be practiced for a long period of time during other operational activities.

(5) It is sometimes dangerous to do hard exercise with the protective mask on, especially in summer time. Exercise must be stopped when one's pulse rate is over 140. Rests or light exercise are necessary between hard exercises to recover from fatigue.

2. Breathing Exercise

(1) The exercise of stopping one's breath immediately at request and holding it for a long period of time is very helpful to prevent inhaling air contaminated by poisonous chemical agents and also to prevent the glasses from collecting

moisture when the mask is being put on.

(2) The breathing exercise must start with holding one's breath for a long period of time in various positions without the mask on. Next, with the mask on, maintaining calm breathing must be practiced during various exercising activities. Slowing down rapid breathing after hard exercise must also be practiced.

(3) Exercises for holding one's breath for a long period of time in the middle of rapid breathing or right after speaking loudly should be done.

3. Exercise of Putting On and Taking Off the Protective Mask under the Gas Tent

This exercise makes one aware of the protection capability of the mask and gives confidence in how well one has mastered the procedure for its use. Tear gas is used in this exercise which follows four steps:

(1) Step 1: Adjusting to the protective mask.

Strong inhalation and various positions must be practiced with the mask on under the tent. The strap and other parts must be adjusted during this exercise so that airtightness is maintained and the mask may be kept on for a long period of time.

(2) Step 2: Confirmation of the protective capability of the mask.

After putting the mask on, the person goes into the tent and takes off the mask. By doing this, one can realize protective capability of the mask.

(3) Step 3: Getting rid of the contaminated air.

After going into the tent with the mask on, the mask must be a little open to let the tear gas come into the mask. The exercise must be performed to master the method for removing the contaminated air by exhalation.

(4) Step 4: Taking off the protective mask.

The exercise of putting on and taking off the mask in the tent while holding one's breath must be practiced repeatedly.

(5) The person coming out of the tent must stand against the wind, beat the chemicals from his clothes and then take off the mask. These exercises can be done in gas chambers, shelters, concave places or forests where there is very little air flow.

Section 46. The Use of Light Protective Garments

Light protective garments are put on in the same way as chemical protective garments, after they are thoroughly inspected. They must be prepared so that they may be put on quickly in response to any request.

Section 47. The Method of Putting On and Taking Off the Chemical Protective Garment

1. The chemical protective garment is mainly used by chemical technicians, but sometimes it is also used by other personnel. Any little holes, cracks, loose thread and stiff or sticky parts must be thoroughly inspected.

2. Chemical protective garments must be put on in the following order: Figure 13 shows a chemical protective garment when it is worn correctly.



Figure 13

(1) Put on underwear and stockings. The bottom of the shirt must be tucked into the trousers. Long trousers must be used. Stockings must cover the bottom

of the long underwear.

(2) Put on the chemical protective garment.

(a) The trousers must be worn with the suspenders on the back.

(b) The length of the suspenders is adjustable with the ring. The ends of the suspenders should be put under the trousers.

(c) Fasten the waist belt.

(d) Put on the boots so that the trousers can cover the higher parts of the boots.

(e) Pull the bottom cords of the trousers and tie them over the boots, leaving some slack.

(f) Tie the top cord of the trousers around the waist.

(g) Put on the jacket.

(h) Pull and tie the waist cord of the jacket.

(3) Put on the protective mask and the hood.

(a) The protective mask must be put on first and then the hood must be put on.

(b) Two snaps on the hood must be fastened and the cord must be pulled and tied.

(4) Wear rubber gloves.

(a) The gloves must cover the inside sleeves.

(b) The outside sleeves must cover the gloves and snaps must be fastened to the gloves.

3. The order of taking off the garments is the reverse of the order of putting on the garments. Before taking off the garments, they must be well decontaminated. In taking them off, one must be careful not to contaminate his body.

4. When the chemical protective garments are put on, one easily becomes tired after physical activities. The fatigue is augmented as the temperature goes higher. Especially as time goes on, the heat and moisture from the body accumulate inside the garment, rapidly increasing fatigue.

Therefore the weather conditions such as humidity and temperature must be considered in deciding an exercise schedule. However, it is necessary to exercise in hot weather to get used to the discomfort of the heat.

To avoid heat stroke and excessive fatigue, sufficient water and salt must be taken. When a person's pulse rate is over 140, he must rest for a while.

In summer, sometimes the exercise must be stopped after only 30 minutes. In winter, one must be careful not to catch cold after perspiring greatly.

Section 48. Directions for Handling Protective Ointment

1. Protective Ointment

(1) Protective ointment must be applied in the following order:

(a) The liquid drop of the poisonous chemical agent must be carefully removed with a piece of cloth so as to not spread the contamination.

(b) The ointment must be applied well with a poultice by rubbing into the skin.

(c) The ointment must be wiped off and the poultice must be applied again and left on the skin.

(d) The ointment must never be applied to the eyes. Also, one must be careful so that the ointment does not get into the eyes accidentally.

(2) When contamination is expected beforehand, application to exposed skin and other bodily parts is an effective preventive measure.

2. Bal Eye Ointment

When the eyes are contaminated with lewisite, they must be immediately washed with water from a canteen for at least 30 seconds. Then Bal ointment must be rubbed into the eyes. Bal ointment must not be applied to other parts of the body.

3. Atropine (Injection)

When a person is contaminated by neurolytic chemical agents and the symptoms described in Table 7 of Section 11 appear, an injection of atropine must be given in the following order:

(1) The cap of the needle must be removed. When the injection liquid is frozen, it must be thawed by body heat or other means. This must be carefully done so that the fingers do not touch the needle.

(2) It must be injected at a 90 degree angle into the muscle of either the thigh or the upper arm as deeply as possible. If the skin cannot be exposed, it must be injected through the clothes.

(3) The liquid medication must be firmly injected at once.

(4) While it is being injected, the needle must be held steady. When finished, it must be pulled out immediately.

(5) The injected area must be massaged for several minutes.

(6) When the symptoms are severe, one can receive two injections. For more than three injections, a doctor's instructions should be followed.

(7) Atropine must not be injected when the symptoms caused by neurolytic chemical agents do not appear.

Chapter 2. Protection Against Nuclear Weapons

Section 49. Outline

Protection against the early effects of nuclear weapons is of the utmost importance. Protection against residual radiation must also be considered.

The preparatory protection before the explosion is especially important since this makes later protection activities considerably easier. Immediately after an explosion, protection activities must be carried out quickly and reflexively. Secondary damage must be avoided as much as possible. If necessary, protection against fallout and decontamination will be necessary.

Section 50. Preparatory Protection Activities

1. More than two sets of clothes, a protection gown and a pair of gloves must be worn. The body must be least exposed by turning up the collar, tightly fastening the cuffs and using mufflers, etc. The helmet strap must be fastened so that the strap will not cause choking with the blast wind. The glass dosimeter, the protective mask and light protection garments must be inspected beforehand. Raincoats and sheets of vinyl must be prepared for protection against contamination if required.

2. Use trenches, ditches and concave areas when one must stay at one location whenever possible. Trenches must be deep and side holes must be dug to the wall.

When there is enough time, covered trenches must be made. When lumber and iron sheets are available, the cover for a trench must be built one meter thick, at least, so that the cover may endure the strong blast. The ground must be moistened for protection against neutrons.

When trench cover cannot be built, cover the trench with tents, blankets, wood camouflage materials, etc. When branches are used for camouflage, branches with many thick leaves such as those of broad-leaf trees and needle-leaf trees

which contain much moisture are preferable. These branches must be piled thickly and moistened with water. When cloth is used, one white blanket and another camouflaging colored blanket on top of it should be used, if available.

In order to protect against the fallout, anything open such as entrances and loopholes must always be ready to be closed with tents or blankets when an alarm is given.

Section 51. Movements During the Explosion

When the flash is perceived, the following movements must be done quickly and reflexively:

1. When one is in a trench, he should hide in a side hole and crouch down in order to be as little exposed as possible.
2. One in a tank or an armored car must take a low and stable position to avoid injuries caused by blowdown or shake.
3. One on flat ground must immediately lie down in a concave area or behind raised ground and cover his face and ears with his hands. When gloves are not worn, the hands must be hidden under the abdomen. The gun should be kept under the body. If there is nothing at all behind which to hide the body, one must immediately lie face down at that spot.
4. During an explosion, one must never look at the fireball.

Section 52. Activities Immediately Following the Explosion

The following activities must be done immediately after the explosion:

1. A person must remain still until the blast wind and flying objects subside. Then he must observe the conditions around and avoid injury from collapsing structures, fires and other hazards.
2. First aid treatment must be done to burns and external wounds if such are found.

3. Inspect and arrange the equipment, clothes and other items before continuing the duty.

4. If one is close to the center of the explosion, he must prepare protection against fallout.

5. In any protection activities, never neglect the enemy watch.

Section 53. First Aid Treatment

First aid treatment must be carried out with a strong spirit by oneself or to each other.

1. The treatment for burns and wounds caused by the blast and heat includes stopping the bleeding, protecting wounds and preventing shock. For a broken bone, a piece of wood must be used for a splint.

2. When the symptoms caused by radiation appear, fast movements must be avoided. Rest and nutritious food must be taken to increase energy. If also externally wounded, treatment must be done to the wound first.

3. If possible, it is best to receive treatment from medical units immediately.

Section 54. Protection Activities Against Fallout

The following protection activities against fallout are carried out:

1. Fast protective preparation must be done when fallout is anticipated after an explosion.

2. When a fallout warning is received, one must hide in a trench, cover any exposed body areas and put on the protective mask and light protection garment also is necessary.

3. If one cannot find a safe shelter, use any ground structure or trees to hide behind. A protective mask and protective garments, a raincoat, etc., must be worn.

4. When the fallout starts coming down, one must be in the lowest position possible.

Section 55. Activities in a Contaminated Area

The following are precautions on activities in a contaminated area:

1. Always inspect and update the precautionary measures. High posture and excessive movement must be avoided.
2. After fallout has stopped, a person must shake the dust from his body and garments. If possible, a thin layer of the ground surface around should be scraped off and the soil must be thrown away where it is safe to do so.
3. In rain, a person must try not to get wet and rain water must be prevented from flowing into trenches.
4. If one must pass the contaminated area, he must wear the protective mask and lith protection garments, avoid dust and move quickly.
5. Emergency contaminating activities must be repeated, if necessary. Contaminated foods and contaminated drink must never be taken.

Section 56. Decontamination for Individuals

1. Radioactive substances must be immediately removed from the body whenever such substances are found. With the protective mask on, the garment should be either brushed with a brush or a branch or shaken to remove radioactive substances. The exposed skin must be wiped with wet cloth or washed with clean water. Contaminated objects must not be touched.
2. If one leaves the contaminated area to use the decontaminating unit's equipment, he must use the following procedure:
 - (1) Contaminated garments or clothes must be taken off.
 - (2) The body must be washed.
 - (a) Hands must be washed first and then the body washed by repeatedly pouring clean water over it. Especially the hair, fingernails, ears, wrinkles, thighs, etc. must be carefully washed.
 - (b) When a shower is used, a person must be careful not to get contaminated

water into his eyes, mouth, ears or nose.

(c) Use hot water, soap and a brush to clean the body effectively. If the contamination is very persistent, use synthetic detergent or solvent.

(d) Sewage must be disposed of so that it may not spread the contamination.

(3) After washing, the body must be inspected with radio meters. If the decontamination was not performed completely, washing must be repeated.

(4) Clean clothes must be worn afterward.

Section 57. Decontamination of Individual Equipment

1. Guns, light protective garments, masks and other items must be brushed with a brush or a branch. If possible, it is better to wash them with water. In washing, one must be careful not to wet the inside of the respirator.

2. Dishes and cooking equipment must be washed with soap solution.

3. Contaminated foods and water must be disposed of under instruction of the commander. However, some foods which have not been contaminated on the inside, such as canned foods and foods packed in polyethylene, can be saved by washing the outside.

4. Other materials must be treated by similar methods, taking into account each material's characteristics. When a large quantity of clean water is available, anything washable should be washed. Precautions should be taken to avoid secondary contamination during or after decontaminating activities.

Chapter 3. Protection Against Chemical Weapons

Section 58. Outline

Adequacy, accuracy and promptness of usage of protective equipment are very important for protection against chemical weapons. Facing an attack by chemical weapons, one must use adequate protection equipment and protect himself. If one is contaminated, he must give himself first aid treatment and decontaminate himself.

Section 59. Preparatory Protective Activities

1. When an attack by chemical weapons is anticipated, the protective mask and light protective garment must be ready for immediate use. Also, decontamination and first aid materials must be prepared.

2. In order to protect from poisonous chemical agents, the skin must be exposed as little as possible, as described in Section 50. If necessary, light protective garments must be worn. In order to protect from inflammatory chemical agents or V agents, protective ointments applied to the exposed area ahead of time will be an effective preventive measure.

3. In order to protect from liquid poisonous chemical agents, any equipment which comes in contact with the skin, such as a gun, must be immediately covered with vinyl, or, if possible, protective ointment should be applied to it. Install a means of protection in shelters and other positions.

- (1) When rain bomb is forecast, a person sometimes must wear the protective mask ahead of time when an alarm is sounded. This is important when firing at aircraft.

Section 60. Perception by the Five Senses

In order to minimize the damage caused by chemical weapons, a person should always take note of symptoms in their early stages by using his five senses.

1. Sight

Colored agents or agents which change the colors of vegetation can be detected by sight. Even if chemical agents are colorless, they can be discovered by taking note of unusually large amounts of liquid on the surface of ground objects. Use of chemical weapons can be predicted by noticing unusual shapes of bomb shells or unusual enemy movements.

2. Smell

When there is a peculiar smell, the use of poisonous chemical agents can be suspected. Most of the agents have a peculiar smell and even agents of low concentration can be detected by smell. Sometimes a person, by his experience, can distinguish by smell the particular agent.

However, one's sense of smell can be confused by other smells. Also, after the poisonous chemical agents are inhaled, sometimes they temporarily numb the sense of smell. Neurolytic chemical agents are odorless and cannot be smelled.

3. Taste

A peculiar taste in foods and water, stimulation to the eyes, nose, throat and skin, headache and nausea are the signs of contamination.

Myosis is a very definite and convincing symptom indicating contamination by neurolytic chemical agents. Since the sound of an explosion of chemical bombs is usually smaller than that of other bombs, it can be recognized from experience.

4. To be able to perceive the existence of chemical agents, knowledge of the characteristics and usage of each chemical is essential, together with training and experience. Sample agents and imitations are used for eye-recognition practice, while a smell testing set is used for odor-recognition practice.

Section 61. Individual Protection during Attack

1. Vaporous poisonous chemical agents usually can be blocked by protective masks alone but, against liquid agents, both a protective mask and protective garments must be worn.

2. Protective movements during the attack are as follows:

- (1) The protective mask must immediately be put on.
- (2) In an attack by rain bombs, both a protective mask and protective garments must be worn. If possible, the person must hide in a covered trench and stay there until the liquid drops stop.

3. Neurolytic chemical agents are very powerful and are absorbed into the skin. One must therefore cover his skin completely. As soon as the symptoms appear, atropine must be injected as described in Section 48.

4. Decontamination must be done to the body, clothes, individual equipment and to the trench, in that order, when contaminated by poisonous chemical agents.

5. The protective mas should not be taken off until the commander gives permission to do so.

6. One must take precautions against other battie movements which go along with an attack by chemical weapons.

Section 62. Use of the Protective Mask Against Anticipated Chemical Weapon Attack

On the following occasions, the protection mask shouls be worn without waiting for the permission or the alarm:

1. After an attack with poisonous chemical agents or after the alarm for preparation of such an attack, put the mask on if one of the following occurs:

- (1) When concentrated firing is received.
- (2) When bombs are dropped or chemicals are sprayed from aircraft.

- (3) When suspicious smoke is seen.
2. When there is a peculiar smell or liquid drops are found.
3. When entering an area which is suspected to be contaminated.
4. When symptoms such as respiratory difficulties, a feeling of pressure on the chest, impaired vision, stimulation, etc., occur.
5. Whenever an attack by chemical weapons is anticipated.

Section 63. Measures When the Protective Mask is Damaged.

When the face of the mask and the connecting tube are damaged and when they cannot be immediately repaired, one must put his mouth directly to the absorbing can or to the connecting tube to inhale. Exhalation must be through the nose. Holes in the respirator can be stopped with adhesive tape, paper, cloth, or by putting a finger over the hole. When the damage is so severe that the mask cannot be repaired with these methods, one must cover his nose and mouth with a wet towel or gloves and breathe calmly.

Section 64. Activities for Contaminated Areas

1. It is preferable to stay away from a contaminated area. However, if one must work in a contaminated area, both protective mask and light protective garments must be worn. If necessary, protective shoe cream should be applied. If conditions allow wearing only the protective mask, protective ointment must be applied to the exposed skin in advance. After the activities, one must immediately and thoroughly decontaminate himself. The following are precautions for a contaminated area:

- (1) One should not lie down, sit down, kneel or touch ground objects unless necessary.
- (2) One should avoid places where the poisonous chemical agents may remain such as puddles, artillery shell craters and grassland.

(3) One should avoid putting down his equipment on the ground or letting them touch contaminated ground objects.

(4) One must not touch contaminated materials, especially the fragments of chemical bombs.

(5) One must not relieve himself.

Section 65. Decontamination of the Body and First Aid Treatment

1. When the body is contaminated with poisonous chemical agents, accurate and immediate decontamination and first aid treatment must be done. Refer to Table 10 concerning decontamination methods and first aid treatment methods against various kinds of poisonous chemical agents.

2. The following first aid treatment should be used when the body is contaminated with unrecognizable chemical agents:

(1) If the liquid adheres to the skin, it must be pinched off with a piece of cloth.

(2) Protective ointments must be applied.

(3) The protective ointment must be wiped off; after applying it again with a poultice, it should be left on.

3. When one is contaminated with fallout at the same time, treatment must be done against the contamination with poisonous chemical agents first.

4. For more thorough decontamination, as has been described in Section 56, a large quantity of water and soap must be used for washing a contaminated person's body.

Section 66. Decontamination of Individual Equipment

Contaminated equipment must immediately and thoroughly be decontaminated since it is directly harmful to human bodies. The areas which hands and face touch must be decontaminated first. If the time allows, it is better to receive

Table 10. Methods of Decontamination and First Aid Treatment

<p>Inflammatory chemical agents</p>	<ol style="list-style-type: none"> (1) When eyes are contaminated, they must be immediately washed with water from a canteen for at least 30 seconds. When they are contaminated with lewisite, Bal eye ointment must be rubbed into the eyes. (2) When the liquid adheres to the skin, protection ointment must be applied. (Refer to Section 48.) Mustard nitrogen and phosgeneoxim must be washed off with a soap solution without applying protection ointment. (3) Contaminated clothes must be decontaminated or the contaminated part must be cut off. If the contamination is severe, the clothes must be taken off. Treat the skin underneath the cloth as described in (2) above. (4) If the symptoms are severe, the person must lie quietly and keep warm. He should be given a non-alcoholic, stimulating drink and treated against shock.
<p>Neurolytic chemical agents</p>	<ol style="list-style-type: none"> (1) When symptoms such as myosis, a feeling of pressure on the chest, respiratory difficulties or excessive salivary appear, atropine must be immediately injected. (Refer to Section 48.) (2) When eyes are contaminated, they must be washed with water. (3) When the agents adhere to the face, neck or ears, they must be washed with sufficient soap solution. (4) For contamination with a V agent, protective ointment must be applied as in the case of inflammatory agents. (5) The decontaminating methods for clothes are the same as those used against inflammatory chemical agents. (6) Artificial respiration must be practiced when respiration is difficult or stopped.
<p>Suffocative chemical agents</p>	<ol style="list-style-type: none"> (1) One should stay warm and still and loosen his clothes. (2) Non-alcoholic, stimulating drinks should be taken. (3) Mouth-to-mouth resuscitation should be used if necessary.
<p>Hemal chemical agents</p>	<ol style="list-style-type: none"> (1) One should stay calm and move to where the air is clean. (2) If necessary, artificial respiration should be used. (3) When it is available, two broken ampoules of aluminum nitrate should be placed under the protective mask so that the patient can breath its vapor when it is available. This must be repeated 4 times every 3 to 4 minutes. (4) Contaminated clothes must be bleached and exposed to the air.

instructions and inspection from a chemical technician. Decontamination must be properly done according to the kind of poisonous chemical agents, amount of contamination, the kind of available decontaminating equipment and available decontaminating agents.

Refer to Appendix 6 for decontamination of different materials. Refer also to Appendix 4 for usage of decontaminating chemical agents.

1. Decontamination of Clothes

Contaminated clothes must be washed with bleaching powder solution and then rinsed out with clean water. Bleaching powder damages the clothes, if it is not rinsed out. If water is not available, the contaminated fabric must be cut off. For a small area, protective ointment can be applied. It is preferable to change temporarily decontaminated clothes whenever possible.

When time allows, cotton material should be decontaminated by boiling it for one hour, washing and drying it in the wind. Wool material should be decontaminated by drying it in the wind, washing it and soaking it in lukewarm soap solution (one hour at 40°C) to avoid shrinkage. The seams of collar and sleeves should be particularly carefully washed.

2. Decontamination of Shoes

Poisonous chemical agents must be immediately removed before they penetrate materials. Protective shoe cream should be applied as an emergency measure. However, when the contamination is heavy or when inflammatory chemical agents are already penetrating the material, the shoes cannot be easily decontaminated and must therefore be changed. Contaminated shoes should be rubbed with bleaching powder paste and the powder should then be shaken off. If time allows, they can be wind-dried for one or two days. For complete decontamination, after the liquid and mud are removed, the shoes should be rubbed with a highly concentrated soap

solution, soaked in lukewarm water (50°C) for 4 hours and then washed with clean water. After they are dry, leather oil or protective shoe cream should be applied.

3. Decontamination of the Protective Mask

After any liquid has been wiped off the mask, protective ointment must be applied to the inside and outside of the mask in order to decontaminate it. After the glasses and their frames have been wiped with a dry cloth, they must be repeatedly washed and moisture proofing must be applied. Any liquid on the absorbing can should be removed and a poultice soaked with bleaching powder emulsion should be applied to it. Water or bleaching powder emulsion must never leak into the absorbing can. When decontaminating the case, follow the method for decontaminating clothes. If contamination is light and time allows, it should be wind-dried. For complete decontamination, after the absorbing can is removed, the mask should be boiled in soap solution for 3 hours (if contamination is heavy, about 6 to 8 hours), and then washed with clean water.

4. Decontamination of Light Protective Garments

When protective garments are still worn and must be decontaminated, poultices soaked with bleaching powder emulsion should be applied for several minutes and then rinsed with water. If there is no other method, contaminated areas must be cut off or the material which is heavily contaminated must be disposed of.

5. Decontamination of Antichemical Garments

When the garments are still worn and must be decontaminated, poultices soaked with bleaching powder emulsion should be applied for several minutes or its solution should be sprayed on the garment which should then be rinsed with water. If time allows, it should be soaked in a hot soap solution close to boiling temperature for one hour and then rinsed with water.

6. Decontamination of Individual Weapons

The areas which will touch hands and face in shooting positions must be decontaminated first. Apply protective ointment. Then remove liquid from other portions. Metal parts should then be wiped with a soap solution. Wooden parts should be wiped with bleaching powder emulsion. If time allows, they should be sun-dried or they should be taken apart for complete decontamination. Afterward, oil the weapon.

7. Decontamination of Food and Water

Usually contaminated food and water should not be handled by an individual.

8. Decontamination of Trenches

The areas which may touch the skin should be thoroughly decontaminated. Either bleaching powder should be scattered or the surface of the ground must be scraped off to a depth of 5 centimeters. Since camouflaging materials usually change color when exposed to poisonous chemical agents, they must be replaced quickly.

Chapter 4. Protection Against Biological Weapons

Section 67. Outline

Maintaining good health and immunization by prevention injection or by other means is important for individual protection against biological weapons. During or after an attack by biological weapons or when such an attack is anticipated, protection measures must be taken by using proper equipment and proper methods of decontamination.

Section 68. Preparatory Activities

1. To maintain good individual health, good individual hygiene and environmental sanitation must be maintained. One should regularly rinse his mouth, wash his hands, avoid excessive drinking and eating and develop his physical and spiritual strength. Garbage must be properly disposed of. Noxious insects must be exterminated to provide a good environment.

2. Every member must be vaccinated to reduce sensitivity to biological agents.

Section 69. Protection Activities During an Attack

1. It is difficult to detect an attack by biological weapons. However, it is possible by finding symptoms of early stages of an attack such as spray from aircraft, unusual shapes of bomb shells, existence of an extraordinarily large number of disease mediums and unidentified smoke formation.

2. When the enemy has attacked or when it is suspected that they have attacked with biological weapons, the protective mask must be worn to prevent inhaling the biological agents floating in the air and, if necessary, protective garments must be worn to cover exposed skin. When the situation allows, one should hide in a covered trench or a shelter.

Section 70. Activities After the Attack

1. When one is contaminated or suspected to have been contaminated with

biological agents, he should immediately disinfect the body and the equipment. Refer to Appendix 5 for information on disinfectants.

(1) Decontamination of the Body

The contaminated areas must be immediately washed with either water or a soap solution. Especially the face, hands and fingers must be carefully washed. If available, 3% cresol water or a 3% invert soap solution should be used for disinfection. The mouth must be repeatedly washed with 0.01% potassium permanganate solution if available. When time allows, taking a shower or bath is an efficient means of decontamination and it should be repeated. Clothes must be changed afterward.

(2) Decontamination of Individual Equipment

Contaminated areas of individual equipment and others must be immediately washed with either water or a soap solution. Disinfectants should be used if available. When time allows, they must be boiled and sun-dried. The methods for disinfection and sterilization of common individual equipment are as follows:

- a. Boiling and then sun-drying is the most efficient disinfecting method for cotton clothes. Usually boiling should be done for 30 minutes. Washing without boiling is also effective. If a 3% bleaching powder solution is available, clothes should be soaked in it at least 30 minutes, then rinsed well. Wool products should be washed with a lukewarm soap solution with the temperature under 50°C and wind-dried to avoid shrinkage. For exterminating lice, clothes must be boiled or a powder of 10% DDT or 1% BHC must be used.
- b. The protective mask and its case must be boiled at least 15 minutes, then well washed with a lukewarm soap solution, rinsed with clean water and wind-dried.
- c. Shoes must be washed by scrubbing them in a hot soap solution for 20 minutes.
- d. Helmets and metal utensils must be washed with a soap solution and then boiled for about 15 minutes.

(3) Decontamination of Food and Water

Usually food contaminated with biological agents must be disposed of. Canned food or other tightly sealed food can be eaten after the outside is disinfected. Use only supplied water.

1. First aid treatment against biological agents is the same as that for contagious diseases. Always be aware of symptoms such as high fever, eruption, diarrhea and fatigue as soon as they appear. The patient must be treated if any of these symptoms is found.

2. General precautions for protection against biological agents are as follows:

- (1) Never have food or water which is not approved.
- (2) Do not enter the contaminated area if so indicated.
- (3) Grass or leaves should never be put into the mouth.
- (4) Never eat raw foods.
- (5) Never bathe or wash the face in a river or lake which is suspected of being contaminated.
- (6) Exterminate disease media as much as possible.

Part 3. Unit Protection

Chapter 1. General Remarks

(1) Outline

Section 71. Outline

1. Unit protection means systematic protection measures which a unit takes to protect against special weapons. The units must try not to give the enemy a chance to attack with special weapons and they must make careful preparation against such an attack. They must carry out protective activities properly and rapidly to minimize damage.

2. Commanders must give their members complete training in the course of daily duties, build confidence in the ability to perform protective activities and establish strong cooperative spirit so that fear or depression may be overcome when facing attacks with special weapons.

Section 72. Protection During Battles

Special weapons are usually either used independently or with other kinds of weapons during a battle. Therefore, one must have combined sound knowledge of the methods of protection so he can choose with cool judgment the protective measures proper to various conditions. Too much involvement in protective activities should be avoided if it interferes with an individual's performance of his duties. Such may result in increased damage.

If one masters the principal methods of using special weapons and the protective measures against each method, his knowledge will be applicable to adequate protective measures against unexpected methods of attack by the enemy.

Section 73. Operation Prescriptions Concerning Protection

Protection measures must be included in operation prescriptions in order for

units to properly and immediately perform their duties against an attack. The contents may vary according to the circumstances of each unit. Some examples are listed in Appendix 1.

Section 74. Organizations for Protection Activities

Each unit has the responsibility of protecting itself against special weapons and each commander has the responsibility of coordinating his members and their equipment for efficient protection activities.

Each unit must organize fatigue parties to carry out protection activities under instructions from a chemical technician such as reconnaissance, measuring, weather observation, giving precautions, decontaminating, medical treatment, rescue and fire fighting. The organizing method and operating method of the fatigue party must be described in the operation prescriptions. The commander must provide the chemical technicians with adequate technical duties. If their knowledge is insufficient, he must ask for support of the chemical unit.

There are only a few technicians (sergeants) in each unit. Therefore an adequate number of members should be trained to the same level as technicians.

1. Chemical Chief, Etc.

(1) A chemical chief provides the superintendent general or the staff with the technical knowledge on protection against special weapons.

(2) The chemical staff of each division (the staff of chemical technicians of the third and fourth Sections of each Division) performs its duties similarly to those of a chemical chief within the division.

2. The Staff of Chemical Experts in a Regiment

(1) The staff of chemical experts of a regiment must study and plan the protection against special weapons. Under the commander's instruction, they must direct the units' chemical technicians and other members to perform protection activities.

(2) The following are the duties involving protection activities against special weapons:

(a) Obtaining information on special weapons, carry out reconnaissance of the contaminated areas and perform weather observation.

(b) Take precautions against special weapons.

(c) Investigate the damage done by special weapons.

(d) Decontamination

(e) Anti-incendiary activities and smoke-screening.

(f) Maintenance of supply of equipment.

(g) Protection activities against special weapons.

3. Chemical Expert Sergeants and Privates in a Regiment

Chemical experts in a regiment must always study and practice the technical expertise under the guidance of the chemical expert staff. Their duties include reconnaissance of special weapons, measurement of contamination, weather observation, precautions and decontamination activities.

4. C.B.R.C. (Protection Center)

One chemical information party of a chemical information unit usually is attached to one division. It opens C.B.R.C., and performs the following duties under the guidance of the chemical staff of the Third Division:

(1) Provides data of the effects of special weapons.

(2) Makes reports of the wind conditions.

(3) Makes reports of fallout.

(4) Makes maps of contaminated areas. Plans and organizes necessary reconnaissance activities.

5. Support Units

Those units which support the protection activities against special weapons

include a chemical unit, sanitary unit, facility unit and supply unit. However, other units must provide support in decontaminating activities, medical treatment, rescue work and fire-fighting if needed.

(1) Chemical Units

Chemical units are responsible for collecting information on special weapons, decontamination of large areas, technical activities of protection, sending alarms by smoke, anti-incendiary activities, supply and maintenance of chemical equipment, etc.

(2) Sanitary Units

Their duties include vaccination, treatment of the sick and wounded, transporting the wounded, identifying biological agents, inspection of contaminated food and water and performing necessary experiments.

(3) Facility Units

Their duties include building protective facilities which require special techniques and equipment and providing other units with technical advice and aids.

(4) Supply Units

Their duties include detecting and measuring the amount of radiation which food and water received, supplying showers/bath equipment for contaminated members, and exchanging clothes or decontaminating clothes by washing them.

(2) Information on Special Weapons

Section 73. Outline

Protective measures against special weapons are quite complicated and generally need a long period of time for planning. Therefore it is of the utmost importance to obtain information in early stages. It is very difficult to predict the use of special weapons since they are usually used in surprise attacks. Therefore all members, from commanders, must make efforts toward careful information-gathering activities.

Section 76. Important Directions for Information-Gathering Activities

1. Each unit must obtain information on enemy-possessed special weapons from higher ranking units and make use of it. Information includes types of weapons, effects, specific characteristics, organization of the units which use the special weapons, their equipment and their strategy.

2. On the battlefield each unit must carefully collect information and try to find any sign of the use of special weapons. Technical information must be collected by effectively making use of information organizations, by reconnoitering and by observing. The obtained information must be reported promptly through pre-determined channels or adjacent units.

3. The effects of special weapons are very easily overestimated or underestimated. Especially, such confusion is very likely when attacked by a combination of weapons. Detecting the use of poisonous chemical agents is especially difficult. Confusion can easily be caused when the enemy uses some imitation special weapons to be misleading.

4. The weather and geographical features have much influence on protection against special weapons. Each commander must study the conditions of weather and geographical features in which the use of special weapons by enemies is most likely. However, even if the conditions are unfavorable, they can still be used in a surprise attack.

5. We must interfere with the enemy's activity of determining the targets of an attack by special weapons. Plans and activities to interfere with the enemy's confirmation of the effects of their special weapons must be kept secret. Misleading operations or interfering reconnaissance are also combined to ensure secrecy of our plans and activities.

When there is a danger of protective equipment and materials being taken by the enemy or in other emergency situations, equipment must sometimes be destroyed

according to orders.

Section 77. Information Collecting Organizations

1. Unit's Members - General

(1) Each member is responsible for collecting information to help protect against special weapons. He must always try to be aware of signs of the use of special weapons.

(2) A general scout or reconnoitering party always collects information on special weapons as well as other information. According to the circumstance, however, a special-purpose reconnoitering party is organized.

(3) Each unit is responsible for utilizing its specific ability in collecting information on special weapons. Aviation corps can reconnoiter over a large area and find signs of the use of special weapons. Also, special technical corps and aviation corps can collect data on high altitude weather.

2. Chemical expert units, especially chemical expert parties, chemical information parties and other parties responsible for chemical technical information, should fulfill their information-collecting duties making full use of their technical knowledge and techniques.

3. Sanitary units are responsible especially for collecting information on biological weapons.

Section 78. Sources of Information

1. Prisoners of War

When a prisoner is taken who was involved in operations with special weapons, very important information and materials can be collected. Interrogation must be carefully done with the attendance of chemical staff and sanitary staff.

2. Deserters, Residents and Refugees

They may provide very important sources of information on special weapons since they have witnessed various things about the weapons used. It is therefore very important to obtain a wide range of information by questioning them.

3. Weapons and Materials

Weapons and materials which were used by the enemy can be important in discovering specific characteristics of special weapons. If any peculiar item is found among the captured or picked up items, such as land mines, shells, cylinders and detectors, it must be immediately reported to higher ranking units.

4. Documents

Documents are very reliable information sources; however, it is usually very difficult to decode and determine whether they are associated with special weapons. The unit which obtained any document must check for missing pages and carefully handle them. It must be immediately sent to higher ranking units.

5. Contaminated Items

Analysis and experimentation of contaminated items are very reliable sources for discovering the kind, effects and special characteristics of special weapons. Under certain conditions they must also be sent to higher ranking units.

Biological agents are used secretly and it is difficult to find whether they were used. Therefore, things which are suspected of being contaminated such as soil, water and plants, must be collected. Also disease media such as insects and animals must be examined.

6. Movements

Before the special weapons were used, peculiar movements and activities of the enemy can usually be seen such as the wearing of protective masks and garments,

unusual smoke, unusual construction, transporting, accumulating or unusual retrogression. Attention must be concentrated on such movements.

7. Other Sources

The weather/geographical reports, maps, aerial photographs and ground photographs can be important information sources by themselves. They may also provide valuable information when combined with other sources.

Section 79. Preparation and Use of Information

1. The following are the main subjects of information on special weapons:
 - (1) Basic information which can be used for protective measures.
 - (a) Kind of enemy's special weapons, methods of use, and their characteristics.
 - (b) Organization of the units which use special weapons and their equipment and identification.
 - (c) Enemy's strategies in using special weapons.
 - (2) Information and materials to detect or predict an attack in advance.
 - (a) Existence of enemy's units (means) which use special weapons and kinds of such units, power, positions and their activities.
 - (b) Peculiar changes in the enemy's psychological-strategy of unit activities.
 - (c) Suitable weather and geographical features for the use of special weapons.
 - (3) Information for predicting whether the enemy will use special weapons and any unusual signs and their descriptions in one's territory and in the enemy's territory.
 - (4) Information on conditions of the area after an attack with special weapons.
 - (a) The time, place, method, scale, kind, effects and characteristics of the weapons that the enemy used.
 - (b) The weather and geographical features where the weapons were used.

2. Collection of Pieces of Information

(1) Collecting information and materials on special weapons must be systematically done in conjunction with other reconnoitering activities.

(2) When some information on enemy's special weapons is obtained, particularly when the enemy attacks with special weapons for the first time or when a peculiar kind or peculiar method of using special weapons is found, a report must be made immediately to the commander and to predetermined units.

3. Treatment of Information

(1) The method of interpreting information on special weapons is the same as that for general information. However, particular care must be taken to avoid overestimating or underestimating the information. Precise evaluation and judgment are of vital importance. The information must be totally analyzed, based on recorded documents.

(2) Information on the use of special weapons must be immediately recorded in detail and necessary statistics must be made in time. In making a map of contaminated areas, the same reduced scale as a regular map must be used. The kind of the weapon, the rate of contamination, the time, the unit which found the attack, locations of important facilities and other important notes must be recorded on the map.

4. Use of Information

The effects of special weapons are long lasting and spread over a large area thus causing a considerable amount of damage without being perceived. Information must be immediately distributed to units over a large area under certain conditions of weather. Under some circumstances, an alarm must be sent immediately after receiving the information.

Section 80. Reconnaissance of Special Weapons

1. The main purpose of reconnaissance of special weapons is to accurately understand the contaminating effect so that commanders can make the right decisions on overall activities and measures. Therefore, the right method of reconnaissance must be chosen according to the purpose and particularly to weather conditions and to geographical features.

2. The main duties of chemical technicians in reconnaissance are collecting materials, detecting contamination, measuring the extent of a contaminated area, measuring the degree of contamination, putting up contamination signs and other technical duties.

3. Contaminated materials are collected only when high-ranking commanders so order, when the kind of contamination cannot be confirmed or when the weapon was used for the first time. All the collected materials must be sent to higher-ranking units. They must be handled carefully so as to avoid unnecessary contamination.

Section 81. Signs of an Attack by Special Weapons

1. The following are main signs of nuclear attack:

- (1) Appearance of weapons with nuclear warheads.
- (2) Launching guided weapons.
- (3) Attack by nuclear weapons in other fronts
- (4) Constructing many trenches, wearing special protective garments or using unusual equipment in the enemy's front line.
- (5) Sudden entire retrogression to trenches or use of smoke signs in the enemy's front line.
- (6) Retrogression of the enemy's front units to increase distance from our front.
- (7) Assembly of armored troops and airborne troops which may be assigned to

confirm the effects of nuclear attacks.

(8) Abandoning the land too early, opening roads and putting up obstacles.

(9) Increase in the enemy's aircraft in a localized area.

(10) A high altitude solo flight.

(11) Increase in the enemy's reconnaissance flight.

(12) Sudden retrogression of the enemy's aircraft in a localized area.

2. The main signs of an attack by chemical weapons are the appearance of chemical weapons and attacks with chemical weapons in other fronts. They can be classified according to the following methods of the attack:

(1) Bombs.

(a) Generally the sound of an explosion is small; some are soundless.

(b) Usually smoke is formed and sometimes a peculiar smell accompanies it.

(c) The impact mark is small. The fragments are comparatively large and, in most cases, have liquid drops on them.

(2) Rainbomb

(a) Generally the aircraft fly at an extremely low altitude. The liquid comes down like fog.

(b) Rainbombs explode at an extremely low altitude and the sound of their explosion is small.

(3) Cylinders

(a) Transportation and assembly of materials around the front line, arrangement of gas cylinders, chemical agent cylinders, digging trenches, unusual activities, wearing protective garments and the sounds that accompany all of these activities are signs of the use of chemical cylinders.

(b) The cylinder emits drifting fog. Ignition flashes may be observed when chemical agent cylinders are ignited. Emission sounds from gas cylinders may also be heard.

(4) Land Mine

(a) The location of enemy land mines is generally far away from the enemy.

(b) Persons installing land mines wear protective garments.

(5) Spray

(a) Fatigue members wear protective garments and take part in peculiar activities.

(b) Vehicles which do the spraying travel parallel to the front of their position.

(6) Other Methods

(a) The sound of the explosion, the smoke, the condition of the fragments and the color and shape of the container of a hand grenade with poisonous chemical agents are different from those of a regular hand grenade.

(b) After an area is contaminated, there will be changes in the color of vegetation, withering, a peculiar smell or the existence of an extraordinary amount of liquid drops.

3. The following are signs of an attack with biological weapons:

(1) Spraying or dropping unidentified objects from aircraft.

(2) Unusual shapes of bombs, especially those with a small or no explosion sound.

(3) Unidentified smoke.

(4) Abnormal existence of disease media.

(5) A large number of residents, animals and plants which fall sick or die.

(6) A scattering of fragil containers such as ampoules and jellified substances.

(7) Something employed by the enemy which does not immediately show its effects.

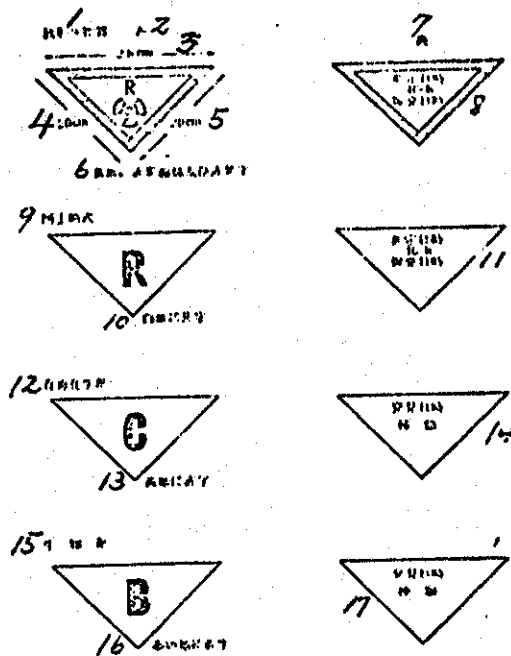


Figure 14 - Standard Contamination Signs

- Key:
- | | |
|---------------------------------------------------------------------------|----------------------------------------------------------------|
| 1. Radioactive substances | 10. Black letter with white back background |
| 2. Front view | 11. Date and time of measurement
Date and time of explosion |
| 3. 28 centimeters | 12. Poisonous chemical agents |
| 4. 20 centimeters | 13. Red letter with yellow background |
| 5. 20 centimeters | 14. Date and time of discovery
Type of contamination |
| 6. Reddish purple pattern on yellow background.
Reddish purple letter. | 15. Biological agents |
| 7. Rear view | 16. Red letter with navy blue back background |
| 8. Date and time of measurement
Date and time of explosion | 17. Date and time of discovery
Type of contamination |
| 9. Simplified sign of #1 | |

- Note - (1) Wood or metal must be used for signs.
 (2) The front side must face outwards from the contaminated area.
 (3) The letters on the back may have a different color.

Section 82. Signs of Contamination

When a contaminated area is found, signs must be posted in order to keep out or restrict the traffic of units. The signs must be posted on the outer fringe of the contaminated area or at other important places. Standard contamination signs, flags, lights, luminous paint, pieces of cloth, rope and lime must be used for indicating contamination. In severe cases, sentinels must be assigned outside those area. Figure 14 shows standard contamination signs.

(3) Precautions Against Special Weapons

Section 83. Outline

Although the precautions against special weapons are similar to general precautionary activities, they must be carried out more carefully and strictly. Each unit must perform strict direct precautionary activities such as establishing a complete alarm network, trenches and shelters and keeping a good supply of protective materials.

Section 84. Information Which Commanders Must Provide to Their Members

Officers of a higher rank than company commander must provide the following information:

1. The kind of special weapons which the enemy might use.
2. The extent of preparatory activities necessary for protection.
3. The duties of positions of scouts and sentries who are specially assigned for precaution against special weapons.
4. The observation of a nuclear explosion.
5. Activities of decontamination groups.
6. Protective facilities and protective measures against contamination.
7. Delivery of equipment and the zone where it must be carried.

8. Weather observation, especially wind direction.

9. Signals, alarms, etc.

Section 85. Precautions for Units

1. Each unit must take precautionary actions by itself and establish its own protective measures. Technicians must join members of sentries and fulfill the duties involving techniques in detecting and measuring. They must carry alarm equipment, individual protective equipment, detectors and communication equipment as well as decontaminating materials.

In arranging a unit, the condition of the enemy, the weather and geographical features must be considered.

2. When an attack by special weapons is predicted or when contamination over a large area is anticipated, each unit must keep in close contact with each other. Particularly, the units in that area must warn other units when the wind is blowing contamination toward them, through available means of communication.

Section 86. Special Rules

The following are the subjects of special rules concerning precautions against special weapons and must be provided to each member:

1. The kind and methods of use of special weapons, their signs of being used, and important positions to monitor. The newest information must be referred to always.

2. The extent of the activity area of sentries to find and detect contamination and to collect contaminated materials. Wind direction, the scale of the weapon and its influence on our units must be considered to estimate the extent of contamination.

3. The methods of warning and communication.

4. Carrying and putting on protective garments and equipment.

5. The weather.

6. Other necessary subjects on protecting against contamination.

Section 87. Carrying and Putting on Protective Garments and Equipment

1. Every member, including commanders, must always carry his own protective equipment. The method of carrying must be decided by officers of a higher rank than company commanders or by a commander whose unit acts independently. The method of carrying a unit's equipment must be decided by each commander according to the circumstances.

2. When the enemy attacks with special weapons or when the alarm is given, protective masks and protective garments must be put on immediately.

3. Before going into a contaminated area, commanders must give their members necessary instructions on the use of protective equipment.

4. Officers of higher rank than company commander or a commander whose unit acts independently must give the order to take off these pieces of equipment.

Section 88. Alarm for Special Weapons

1. When the enemy attacks with special weapons, each commander must immediately give an attack alarm to his members so that all the necessary protective measures will be immediately taken. When an attack is predicted or suspected, each commander must give an early warning alarm so that there will be time to elaborate upon the protective measures.

2. In giving an alarm, the area to be attacked must be predicted and the alarm must be sent to all the units which may be affected.

Particular attention must be paid in order to avoid the confusion caused by the contamination of other areas.

3. Proper alarm equipment must be chosen to assure quick and reliable transmission and to avoid misleading. Equipment such as sirens, electronic communication equipment and smoke signals are used. The members who noticed the alarm must tell

other members by calling signal words such as "Gas!". Under some circumstances sound alarms must be prohibited or restricted and other warning methods must be used to keep our signals and activities secret. In such cases, information on warning methods must be provided to every member in advance.

4. The organization, the means, the sender of alarms, etc., are defined in the operation provisions according to the kinds of duties and circumstances of each unit.

(4) Protection Facilities

Section 89. Outline

Constructing protective facilities and installing equipment are very important to protect personnel and equipment against special weapons. Such activities include installing equipment for decontamination, building covered trenches and preparing decontaminating sites for units. The extent of facilities and equipment which must be constructed or installed depends on the information on special weapons, the purpose for use of the facilities, available supply of materials and time. Buildings and structures which have already been built must be utilized as much as possible.

Section 90. Protection Equipment

Protection materials and equipment include blankets, tents, vinyl, camouflage materials which are used to cover people and equipment or protect them. Also rubber cloths and blankets are used to cover entrances thereby preventing the air flow into the buildings or covered trenches.

Section 91. Covered Shelters

1. Covered shelters are air tight and installed with air ventilation and decontamination equipment to protect against fallout, poisonous chemical agents and

biological agents. When a large area is contaminated for a long period of time, these covered shelters provide protection to the personnel, assure uninterrupted important activities such as command and communication and produce a safe and convenient area for recuperation or rescue activities.

2. Covered shelters are classified into those with ventilation equipment and those without such equipment. Those with ventilation equipment have an air purifier installed with the ventilation equipment and therefore can be used for a longer period of time. A shelter without ventilation equipment needs two cubic meters of space for one resting person for one hour and cannot be used for a long period of time.

3. The protection shelter must be constructed underground whenever possible and must be protected against explosions and blast. On the entrance and inside of the shelter, decontaminating materials, detecting equipment and supplies for repair must be prepared. At the entrance a sign must be placed to indicate its capacity. Sufficient chairs, light, water and sanitation equipment must be prepared for the number of people indicated on the sign.

4. The following are subjects which must be considered in choosing locations for constructing covered shelters:

- (1) The shelter must be close to those who will use it.
- (2) Camouflage and protection must be adequate.
- (3) Geographically it must be located where fallout and poisonous chemical agents will not stay for a long period of time.
- (4) The location must have good drainage and solid ground.
- (5) A sentry must be posted in front of the shelter to give instructions for decontamination to each person as he enters the shelter. During this procedure, inside and outside curtains should not be opened at the same time. The people who enter the shelter must always carry a protective mask or wear one if necessary.

Use of fire or smoking is prohibited in the shelter.

6. The following are the main duties of sentries for the shelters:

(1) When a sentry recognizes the signs of contamination or when he hears the attack alarm, he must report it immediately to members inside the shelter, draw the curtain and turn on the air purifier.

(2) He is responsible for reporting the conditions outside to the members inside. He must measure the contamination and report it to the members inside the trench as necessity dictates.

(3) He must monitor the prescribed conduct of the members entering and leaving. When poisonous chemical agents exist around the area, he must restrict the area.

(4) He must have contaminated members decontaminate themselves according to the prescribed methods.

(5) He must regularly check the safety of the air inside the shelter.

7. Additional duties to protect against fallout are as follows:

(1) Before he enters the shelter, he must decontaminate himself.

(2) Water should be sprinkled inside the trench if necessary and any movements which stir up dust should be prohibited.

8. Other facilities and structures must be used for protection when there is not enough time for preparation or in emergencies. Buildings which have shelters, tunnels, basements of concrete, underground passages or caves can be used as shelters.

Section 92. Temporary Decontamination Facility for Units

1. A temporary decontamination facility must be immediately set up by units which are contaminated with fallout, poisonous chemical agents or biological agents. This is used for decontamination of personnel and their equipment. This must be well planned in advance and set up, usually, by a battalion or larger units.

2. The points which must be considered in deciding the location of a temporary decontamination facility are as follows:

- (1) The facility must be close to the battalion camp.
- (2) The location must be where plenty of water is available.
- (3) The location must be where contaminated water can be easily disposed of.
- (4) Camouflage and protection from the air or ground must be adequate.
- (5) Away from units and equipment. No danger to others.
- (6) It must be easy to drive vehicles in and out of.

3. Equipment of Unit Decontamination Facility

(1) Equipment which should be installed at the temporary decontamination facility is classified as means for decontaminating personnel and means for decontaminating the equipment.

(2) The type of equipment which should be installed depends on the type of contamination, the object to be decontaminated, the decontaminating methods, the condition of the enemy and our units and available materials. This facility must be installed with equipment as completely as possible so that decontamination can be performed quickly and in an orderly manner. Conduct must be decided in advance.

(3) The facility for personnel decontamination must be installed at least with a depository for contaminated clothes, decontaminating equipment, medical equipment and materials and a supply of new clothes.

(4) The facility for equipment decontamination must have a waiting room and decontaminating equipment and materials. This facility must be set up where the decontaminating activities will not cause secondary damage from the used water or from the dust which contains radioactive substances.

(5) It is desirable to have chemical heaters as well as decontaminating vehicles, drainage pumps, etc. Figure 15 shows one example of a temporary decontaminating facility for units.

4. Management of Unit Decontamination Facility

(1) Generally the chemical staff operates the facility. Chemical technicians must be stationed in the facility. When necessary, other members should provide help. Coordination with other units must be established in advance insofar as possible, to ensure smooth management.

(2) Activities in a unit decontamination facility include: guidance of contaminated personnel and vehicles, operation, direction and inspection of decontamination activities, rescue of the injured, exchange of clothes, disposal of contaminated equipment. In addition to the above general activities, precaution against the enemy must always be maintained.

(5) Decontamination and Rescue

Section 93. Decontamination of Units

1. When contaminated by special weapons, every unit should decontaminate itself in principle. In such a case, the commander of each unit must quickly comprehend the condition of contamination and take the proper measures to minimize the damage. The commander must determine the necessity and the extent of decontamination so as not to interrupt the unit's duties. If necessary, he must give adequate instructions on the objects to be decontaminated, the time and the methods.

2. A battalion must prepare a temporary decontamination facility for unit and equipment decontamination when necessary. It also must organize fatigue parties to decontaminate the area and other facilities. Usually, decontamination of a company is carried out by emergency measures. A company must also organize fatigue parties for decontamination if necessary.

The fatigue party consists of several decontamination groups. The organizing method and the operation of the party must be in the operational provisions.

3. The chief of the fatigue party must confirm the type and extent of

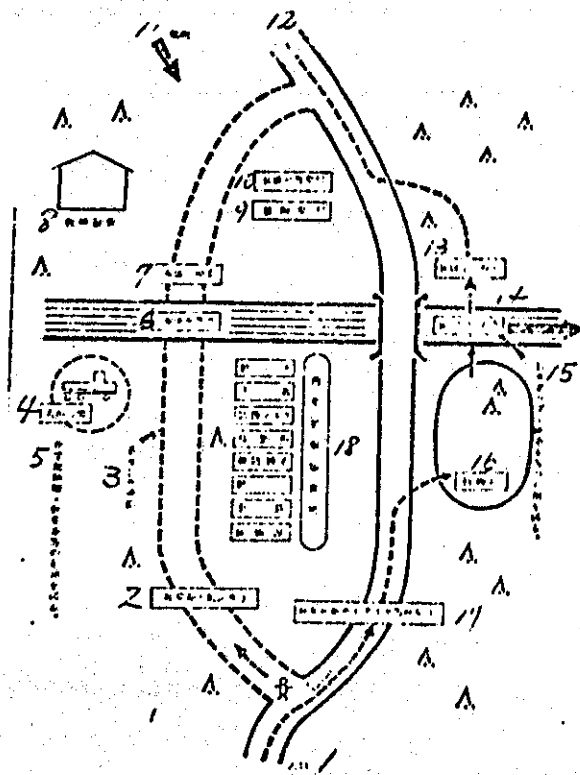


Figure 15 - One Example of a Temporary Decontaminating Facility for Use by Units

- | | |
|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Key: 1. Entrance | 11. Wind direction |
| 2. Decontamination of shoes (Wiping) | 12. Exit |
| 3. Directed route | 13. Location for checking thoroughness of the washing |
| 4. Shower/bath equipment | 14. Location for members to wash their equipment |
| 5. Chemical heater | 15. Water pump and decontaminating vehicles |
| 6. Location for members to wash themselves | 16. Location for waiting |
| 7. Location for checking thoroughness of the washing | 17. Decontamination of tires |
| 8. Medical treatment | 18. Decontamination of equipment, gloves, shoes, light protective garment, working uniform, protective mask, underwear, and socks. |
| 9. Delivery of clean clothes | |
| 10. Delivery of clean equipment | |

contamination in order to plan proper measures. During the parties' activities, they must keep close contact with units in shelters and other units who need their assistance.

Section 94. Preparation for Decontamination

1. A large quantity of materials and labor are usually needed for decontamination. Therefore a proper amount of decontamination materials, labor and time must be estimated in advance so as to assure orderly and smooth operations.

2. The condition of contamination, such as the kind of contamination, the rate, the extent, geographical features and source of water supply must be reconnoitered for preparation. If necessary, signs must be posted.

Section 95. Decontamination Plans

1. Decontamination activities may depend on the duties and the circumstances. In any case, the plans and preparations must be made carefully and thoroughly. Standby means must be also prepared to maintain flexibility of operations.

2. The usual subjects in a decontamination plan are:

(1) The condition of contamination and the situations of the enemy and our units.

(2) The purpose, objects, methods, priority, extent, etc., of decontamination activities.

(3) Detailed specification of the duty of each unit, the procedures and the extent of the activities, work schedule and disposition methods for contaminated materials.

(4) Supply and storage of decontaminating materials. Rescue activities.

(5) Specification of commands, communication and its methods.

Section 96. Decontamination Activities

1. Decontamination activities must be thoroughly and efficiently carried

out according to the plan and the commands which are given adequately in response to the actual situation. The work directions must be strictly followed, the operation provision must be fully utilized and every task must be performed quickly and efficiently.

2. Every decontamination activity must be performed steadily and in the right order. In particular, each member must obey the rules strictly and must cooperate with others.

With regard to decontaminating equipment, priority must be given to: the portions which will directly touch the body, the equipment which is frequently used, the portions which may be easily corroded by contamination and the objects whose absence may interfere with activities.

3. The chief of a decontamination fatigue party should change the personnel arrangement, etc., if necessary, maintain the overall smoothness of the entire works and report the progress of the works to higher ranking commanders with adequate timing.

4. In order to avoid any danger, necessary protection equipment such as protection masks, light protection garments and chemical protection clothes, must be used. Collecting, transporting and disposing of contaminated materials must be carried out carefully as well as the handling of decontaminating materials.

All the cloth, water, etc., which has been used for decontamination must be thoroughly disposed of.

Section 97. Treatment after Decontamination Activities

1. When the decontaminating works are done, the chief of the fatigue party must inspect the decontamination results. Signs must be posted if necessary and communication must be fully maintained with related units.

2. Decontaminated areas and facilities can be easily recognized by signs of

decontamination activities or by color changes of objects treated by decontaminating agents. Therefore these must be well camouflaged after decontamination activities.

3. After decontamination activities, all the members of the fatigue party must decontaminate themselves and their equipment in order to avoid any further damage.

Section 98. Disposal of Contaminated Materials

1. Contaminated materials which are extremely difficult to decontaminate or which cannot be used again must be disposed of according to the commander's instructions. Disposal methods generally are either burial or incineration. After the materials are disposed of, the location and the time of disposal must be indicated and signs must also be posted to indicate "No Admittance" areas. Cloths and water which were used for decontamination must be completely disposed of.

2. In burying contaminated materials, a deep hole must be dug. Contaminated materials should be thrown into the hole and covered with soil. The location must be chosen so that the personnel may not be affected. The depth of the hole must be properly estimated so that the contamination will be contained by the soil. For example, materials contaminated by radiation must be buried more than one meter deep. Materials contaminated by poisonous chemical agents and biological agents must be covered with soil which is mixed with a large quantity of decontaminating agents. The contaminated water should be disposed of in a similar manner. The soil should be put back after the water is well absorbed into the soil in the hole.

3. Incineration is an easy and sure method of disposing of materials contaminated with poisonous chemical agents and biological agents. However, wind direction must be considered when incinerating materials contaminated by poisonous chemical agents so that the smoke will not do damage to the leeward areas.

4. In circumstances where neither burial nor incineration methods can be used,

contaminated materials are accumulated and isolated in a safe location. Contaminated materials must be prevented from being scattered by wind. Signs must clearly identify areas from which people must be kept out in order to avoid accidental damage.

5. Contaminated food and water must be immediately segregated to prevent contamination by spreading. The condition of contamination must be inspected by either chemical staff or designated sanitary staff. The decision on whether food and water are usable is made by the designated sanitary staff.

Section 99. Rescue

1. A large number of people will be injured in an attack with special weapons in a short period of time or continuously over a long period of time. Each unit must organize a rescue party which has mobility and is in charge of supplying rescue materials and equipment and of maintaining good communication with sanitary units. Careful preparations must be made in advance.

2. The first treatment given to the injured must be stopping bleeding, protecting external wounds and preventing shock. The treatment must be performed adequately according to the kinds of wounds.

Before treatment, contaminated persons must be segregated from other wounded persons to prevent secondary damage. Persons who suffer injuries from multiple kinds of special weapons must quickly consult doctors even when their symptoms are not severe.

3. Every member must have a good knowledge of the symptoms caused by special weapons, their first aid treatment and how to use medical materials so that, in any difficult situation, he can treat himself or rescue other members with confidence. It is the commander's responsibility to instill such ability in every member of his unit through training.

Chapter 2. Protection Against Nuclear Weapons

(1) Activities Against Nuclear Weapons

Section 100. Outline

In order to minimize the damage caused by a nuclear attack, preparatory protection measures are important and therefore must be planned in advance as carefully as possible. During an explosion, commanders must keep a calm attitude, use judgment to control their members and instruct them clearly and properly so as to alleviate a difficult situation.

Section 101. Preparatory Activities

1. Reconnaissance and information-gathering activities are very important to protection against nuclear weapons. By these, adequate protection measures must be determined. Keeping movements secret, dispersing units and facilities, increasing mobility and constructing shelters must be done as preparation. Also, protection organizations must be established to prepare a supply of protective equipment, medical materials, transportation for sending the wounded to the rear and other necessary activities.

A chief of chemical experts must continuously study and analyze the damages to our personnel, equipment and facilities by expected nuclear weapons. Their technical studies and suggestions must be submitted to commanders or to the staff.

2. Sheltering and dispersion of units must be well arranged, based on duty and taking into consideration geographical features, the effects of expected enemy's special weapons, locations of forts and armored power of the units in order that two units will not suffer damages with one nuclear weapon.

Time the movement between actions and carry out deceptive and misleading actions in order to avoid being easily caught by the enemy. When the unit stops, the

members must immediately build trenches. When the units cannot be sufficiently dispersed, the forts must be reinforced.

Section 102. Preparation to Protect Equipment

The supply of equipment and amaterials must also be dispersed in order to minimize the damage by nuclear weapons. Existing structures and preferable geographical features such as concave areas or raised ares on the ground can be used for storage. As many shelters as possible must be prepared and their tops must be covered. Preparation for fire prevention and protection against contamination and destruction must be done. When forests are used to store equipment and materials, places which can easily catch fire of collapse must be avoided.

Methods of protecting each piece of equipment are as follows:

1. Vehicles

Check for gas or oil leaks, wipe the leak if necessary and take off the hood and doors. Lower the position as much as possible. When a shelter is used, the vehicle must be parked front-first. Cover the vehicle, especially engine portions, thoroughly with nonflammable camouflage materials and tie a rope from the bumper to a post. Portable fuel containers must be stored in the back of the shelter, all the flammable materials must be removed from around the containers and a fire extinguisher must be prepared.

2. Firearms

Firearms must be stored in one of the deepest trenches. In order to prevent them from falling down, wheels and base plates must be fixed to posts with ropes. Telescopic sights should be protected by attaching them to firearms only when needed. Ammunition must be removed from firearms and covered with nonflammable camouflage materials.

3. Communication Equipment

These are placed in cover trenches or, if there is no other way, they must be covered at least. The wire must be buried underground.

4. Aircraft

Since aircraft on the ground can be easily damaged by the blast of an explosion, they must be dispersed, stored and tied in shelters. Fuel leaks must be repaired and fire extinguishers must be prepared.

5. Supplies

Supplies in the rear area, especially explosives and inflammable materials, must be dispersed over as large an area as possible. Anything which is easily blown away must be securely fastened and, wherever possible, must be stored underground. Fire prevention measures must be taken. Packing and wrapping can be left as they are. Put on as many covers as possible. Fuel materials must not be piled up and leaks must be well wiped off. Ammunition and chemical explosives should be dispersed and stored in cover trenches to prevent them from induced explosions.

6. Food and Water

Food and water must be stored in tightly sealed containers, preferably made of metal, vinyl or wood, to prevent contamination. Food and water supplies piled on the ground must always be covered with sheets or tents. Wells and water tanks must be covered also and specially guarded.

Section 103. Activities When an Explosion Has Occurred

1. The C.B.R.C. (protection center) of each division and the head office of each unit determine the location of the center of an explosion and its yield, according to observational reports of the explosion, they estimate the damage and the extent of the contaminated area and decide countermeasures and activities.

2. Each company must have observers to observe the explosion with either their eyes or with equipment. Observers must report on the following subjects:

- (1) The location of the observation and the time and date of the explosion.
- (2) The location of the center of explosion and the type of explosion.
- (3) The method of projection
- (4) The location of the center of the initial atomic cloud and the direction of its stem.
- (5) The width of the initial atomic cloud.
- (6) The time between the flash and the sound of explosion.
- (7) The length of time of the flash.
- (8) Elevation of the base and the top of the stable atomic cloud.

The information on these subjects must be reported as the "first report" immediately after the explosion, except Number 8. The elevation of the cloud should be measured 10 minutes after the explosion and this will be in the "second report." The length of the time of the flash should be measured only at night or in poor visibility. Details concerning these observations must be defined in the operational provisions.

Section 104. Activities After an Explosion

1. After an explosion, each commander must immediately assess the conditions of our damage and that of the enemy to decide proper countermeasures for repairing the communication system, rescuing, treating the wounded, transporting the injured, fire fighting, removing obstacles, etc. In some circumstances, he must reorganize his unit. Adequate protective measures must be taken against residual radiation if necessitated by the type of explosion.
2. When the danger from the initial radiation is gone, each commander must report the type and extent of the damage, the number of casualties and the damage done to the equipment.
3. Higher ranking commanders than those of battalions must organize investigation parties and send them to the stricken units in order to investigate their

damage and to instruct them with emergency measures. The method of organizing the investigation parties is defined in the operational provisions. If necessary, the party should include personnel in charge of: command communication, construction, chemical works, supply, sanitation, transportation and others.

Section 105. Rescue

1. Individual spirit is the most important element in performing rescue work after a nuclear explosion. The injuries caused by the blast and the heat of the explosion are treated in the same way as other injuries. Injuries caused by radiation should be treated with the following methods:

(1) One who does not have any symptoms after being exposed to radiation should continue his duties.

(2) When one suffers prodromal symptoms within several hours after the explosion, his duty must be relieved according to the degree of his symptoms. If the prodromal symptoms are mild and he is in the incubation period, he can continue his duties. However, it is preferable to avoid hard labor and to keep quiet mentally and physically. When acute symptoms appear, he must be treated by a sanitary unit.

(3) When the prodromal symptoms appear immediately after the explosion and the symptoms are severe, he must be immediately treated by a sanitary unit.

(4) One who has radiation disease symptoms must be given sufficient nutrition and rest and his wounds must be treated to prevent bacterial infection.

2. After a person has received radiation, the amount of radiation he received must be measured and recorded in his health history. The record must be kept with the company records. This will be used as data in organizing rescue and other activities in the area contaminated by radiation.

(2) Activities for Contaminated Areas

Section 106. Outline

The effects of residual radiation accompanying a nuclear explosion vary largely according to the type of explosion. Immediately, each unit should know at least whether it was a ground level explosion or underground explosion and roughly estimate the extent of the contaminated area and the amount of radiation which the personnel will receive. Then they must immediately start their protection activities to prevent contamination as much as possible. Higher ranking units must organize activities to accurately discover the state of the entire area by measuring contamination and by reconnoitering the area in order to take adequate protective measures.

Section 107. Maximum Permissible Amount of Radiation

The maximum permissible amount of radiation that a person can receive is indicated in the operational prescriptions and other sources. However, each commander should decide and declare the limit according to specific situations when a unit must enter the contaminated area. Based on the limit thus decided, the maximum radiation of the area that his unit can work in, the entry time and the length of the stay in the area must be determined. Previously accumulated radiation must also be considered.

Section 108. Estimate of the Extent of a Contaminated Area

1. The extent of the area where contamination is anticipated with fallout or induced radiation must be estimated in advance for the following reasons:

- (1) Precaution to units.
- (2) Forming plans of investigating radiation.
- (3) Estimating activities of the units afterward.

2. Effects of fallout vary according to the yield and the condition of high

altitude wind. Generally it falls over an extensive area for a long period of time after an explosion. Units larger than a company must make a map of a fallout forecast based on reports of both the wind and of fallout sent from C.P.R.C. (protection center) for the division. The extent of a contaminated area can be estimated from this map. Generally a map of the fallout forecast shows fan-shaped lines which extend from the center of explosion. By these lines, the area is divided into the area which is going to receive damages by fallout and the area which is not, within a certain period of time.

3. The extent of the area which will be affected with induced radiation varies according to the yield of the explosion, the altitude of explosion and the chemical composition of the soil. However the area is generally limited and is only around the center of explosion. The area in which the radiation is more than 2 R/h one hour after an explosion is usually the object to be estimated.

Section 109. Activities for Protection Against Fallout

In response to fallout, each unit takes action as follows:

1. In the area where fallout is predicted, units must prepare protection against contamination or, under some conditions, the units must leave the area.
2. The unit must record the time when fallout starts falling and its strength of radiation and report them. They must also protect against contamination by using geographical features, structures and trenches.
3. After fallout stops falling, it should be decided whether the units should move out of the contaminated area or whether they should stay there to continue their protection activities. This should be decided according to the kind of duties they have and the amount of radiation the unit members received.
4. Immediately after they move out of the contaminated area, each member and piece of equipment must be decontaminated.

Section 110. Activities in the Area Contaminated by Fallout

After the fallout stops, each unit in the fallout-contaminated area takes action as follows:

1. When the amount of radiation which the members would receive in moving out of the area is the same or smaller than the amount of radiation which they would receive by remaining in the area, they must immediately move out of the area with the permission of a high ranking commander. In this procedure, the direction to which the fallout is moving must be roughly estimated, based on the observation made by the unit.

2. When the amount of radiation which members would receive by remaining in the contaminated area is smaller than the amount of radiation which they would receive by moving out of the area, they must remain in the area and reinforce their protective measures until radiation lessens. Generally, the strength of fallout drops rapidly within five to six hours after explosion. Therefore it is preferable to start activities after such a period.

3. If a helicopter or aircraft is available, it is better to immediately leave the contaminated area.

4. When the unit cannot leave the area because of its duties, it must reinforce the shelters and decontaminate the area to protect itself against radiation as much as the circumstances allow. Commanders must consider which units are to be exposed on duty and they should shift duty to other units as well.

When the members are expected to receive more than the maximum allowable amount of radiation, they must estimate the time when it reaches the maximum, immediately report it and prepare measures to handle the situation.

Section 111. Protective Activities Against Induced Radiation

Since the extent of induced radiation is limited to the center area of explosion,

this area should be avoided as much as the situation allows. When passing through the area with induced radiation, avoid the center of explosion. By doing so, one may pass through the area even a few hours after an explosion.

Generally the area contaminated by induced radiation may be occupied several days after an explosion. If units must stay in the area for their duty, the amount of radiation members will receive during the stay and their location must be considered. The length of the period of the stay must be shortened as much as possible. The location for the stay must be also carefully chosen.

Section 112. Measuring the Amount of Radiation

1. Each unit must measure the amount of contamination of its area, take protective measures and report the measurements according to the operational provisions. Groups larger than battalions must make maps of the contaminated area based on the reports from their units.

2. Each unit measures the amount of radiation in three different ways: periodical measurement, consecutive measurement and special measurement ordered by a commander. Details are given in the operational provisions.

(1) Periodical Measurement

Companies must periodically measure the amount of radiation in their area. This is also done by using aircraft.

(2) Consecutive Measurement

Companies must consecutively measure the amount of radiation on the following occasions:

- (a) When they received precautions against fallout.
- (b) When they observed a nuclear explosion or when they are notified of a nuclear explosion.
- (c) When they measured radiation which is higher than 1R/h during the periodical

measurement.

- (d) When they move to another location.
- (e) When they are ordered to measure consecutively.

Consecutive measurement is stopped when the amount of radiation drops to lower than 1 R/h, except when they are ordered to continue it by a higher ranking group or when they are moving to another location.

3. Measurement Methods

(1) Measuring radiation in the area can be done in two ways - direct and indirect methods.

(a) Direct method - with the direct method, the radiation of the area is measured without any obstruction between the field and the instrument.

(b) Indirect method - radiation of the area is measured in a cover trench to protect the person who is measuring. However, in this method, the readings must be adjusted by adding the protection coefficient which is determined in advance.

(2) Matters to be attended to in measuring radiation are as follows:

(a) The time, the location and the measurement of radiation must be clearly recorded.

(b) The measuring equipment must always be properly maintained and adjusted and used properly.

(c) The measuring conditions such as the distance and the functions of the equipment must always be the same to avoid measurement error.

(d) The person who measures radiation must be well protected.

Section 113. Reconnaissance of the Contaminated Area

1. When the condition of the contaminated area cannot be well understood, based upon the reports from each unit or in emergencies, observation parties must be organized according to the operation provisions to get more accurate information

on the situation.

2. General Directions for Reconnaissance of Radiation

(1) Observation of radiation is done on the ground and in the air in order to make a contour map of radiation by collecting readings of the amount of radiation at various locations. In these procedures, each unit must refer to the estimated extent of the contaminated area and they must make full use of their specific characteristics and ability of the units.

(2) First the direction of the fallout movement must be found. Then, after the extent of the contaminated area is determined by their own measurements and from aerial inspection, a more detailed inspection must be carried out. C.B.R.C. (protection center) of Divisions will control all observation activities or occasionally each regiment will work independently.

3. Aerial Observation

(1) Helicopters or light aircraft are used for aerial observation. This is advisable in order to immediately know the overall condition of the contaminated area.

(2) It is important to fly at the lowest altitude possible along the indicated course and to keep a constant altitude and a constant speed.

4. Ground Observation

(1) Observation of radiation on the ground provides more detailed information on the state of the contaminated area and the procedures will be decided according to the result of aerial observation. Occasionally, observation on the ground is done simultaneously with aerial observation. Both parties must communicate well.

(2) Generally a battalion must prepare to organize one observation party for radiation.

5. Radiation Reconnaissance Party

General methods of organizing a observation party and its duties and equipment.

are as follows:

(1) Members - the party consists of a chief who is concurrently a measurement engineer, (chemical expert sergeant, etc.), a pilot, a communication operator and guards (if necessary).

(2) Equipment.- 1/4 ton truck or armored car if available.

Radio activity measuring devices:

Radiometer for company: for measuring terrain contamination.

Portable dosimeters: for measuring the dosage of the personnel.

Contamination signs and materials for posting them.

Devices for collecting samples (if necessary).

Radio communication means.

Personal protection equipment: protection masks, protection garment against chemicals.

Glass Dosimeter

(3) Activity

(a) The instructions given to a radiation reconnaissance party are similar to those given to a general reconnaissance party. The following instructions are particularly essential:

(i) The course or the direction of the party's movement.

(ii) The location where the radiation should be measured, the predetermined radiation threshold and the measurement time.

(iii) The maximum allowable dosage in the action and the maximum allowable radioactivity of an area to enter.

(iv) The method for collecting samples.

(b) The party remains in a vehicle and measures the radiation from one meter above the ground. The reading must be adjusted with the predetermined protection coefficient. When the contamination is confirmed, signs must be posted at appropriate

locations indicating the time when the radiation was measured and the strength of contamination. During these activities, members must be careful not to accidentally receive too much radiation exposure.

6. Radiation Reconnaissance/Control Party

A radiation reconnaissance/control party of a regiment consists of a chief who is a member of the chemical staff, a communicator who is concurrently a recorder and a calculation person. This party sets up an office around a command post. They give detailed instructions to each observation party and control their activities. They also record the results reported from each observation party and make an equi-radiation contour map of radiation. This map must be presented to an information officer.

Section 114. Passage through Contaminated Areas

1. Before members pass through the contaminated area, the amount of radiation that members will receive must be estimated in order to select a safe course. Necessary reconnaissance and sign posting activities must be done first. The movement should be quickly done by utilizing tanks, armored cars or other vehicles as much as possible to minimize the damage.

When vehicles are used, sandbags must be laid on the floor to reinforce protection. Aircraft should also be used whenever possible.

2. In passing through the contaminated area, a protective mask, light protective garments and a dosimeter must be worn and the formation and method of proceeding must be carefully selected. When vehicles are used, they must be driven a wide distance apart to avoid stirring up dust and thereby incurring secondary contamination.

3. After passing through the contaminated area, members of a company must immediately remove the dust and select a location where water is available to temporarily decontaminate themselves and their equipment. A battalion opens a temporary

decontamination facility according to its duties, the condition of the battle and the condition of the contamination.

Section 115. Methods of Decontamination

Radioactive substances cannot be extinguished by means of chemical reactions, therefore they must be scraped off, washed away or removed. When conditions allow, one can simply leave the substances and wait for the natural decrease of radiation with time. Because removed radioactive substances remain radioactive, one must be careful not to be recontaminated.

1. Decontamination for Weapons

Weapons should be washed with water; however, if grease adheres to the weapons, they must be washed and brushed in a soap solution. If available, boiling water, hot soap solution, steam or a pressure hose should be used. The weapons must be decontaminated as thoroughly as time allows. Especially the areas which will directly touch the body must be well decontaminated. Decontamination during the operational duty is difficult; however it must be repeated as often as possible.

(1) Vehicles, firearms, heavy artillery, etc. must be washed with a soap solution, rinsed with water and then oiled.

(2) Observation, communication equipment and others which are hard to wash with water should be washed with solvents which easily evaporate such as gasoline, alcohol or turpentine. However, special care must be taken since these liquids occasionally cause deterioration of plastic or other materials.

(3) Aircraft should be washed by water as far as possible. The portions which cannot be washed by water must be washed by a selected decontaminating agent.

2. Decontamination of Clothes, Outfits, Equipment, Etc.

(1) When clothes, outfits, etc. are decontaminated in a unit, they are usually

washed by water. If the situation is not urgent, one may simply leave them and wait for the natural lessening of the radioactivity. If possible, they should be vacuum cleaned.

(2) Dishes and other tools made of metal, ceramics, plastic or wood should be washed with water. The portions which are stained with oil must be washed with boiling or lukewarm water and soap solution.

3. Decontamination of Food

It is preferable to dispose of foods contaminated with radiation. They must be decontaminated according to the condition of the food supply and the degree of contamination. Whether they should be used must be carefully decided.

(1) Packed Food

In the case of canned food, food packed in polyethylene bags and other completely sealed food, the outside should be thoroughly washed with water. Foods incompletely sealed with paper or cloth or foods in a box must be unwrapped first and the contents decontaminated. The contents must be accurately measured for contamination and the foods which are declared safe enough to use for decontaminated with the same method as exposed foods.

(2) Exposed Foods

Any cooked foods must be disposed of. Fresh vegetables and fresh fruits should be washed with a soap solution. Grain should be washed well with water before use or, if possible, it should be stored for a long period of time to wait for the natural decay of radiation.

4. Decontamination of Water

(1) It is preferable to dispose of contaminated water. However, if necessary, various kinds of filters are used for decontamination of water.

(2) Springwater or water in a sufficiently covered well is often not contaminated.

Even so, the circumference around the well or spring must be decontaminated first before the water is used.

5. Decontamination of Buildings

Buildings can be washed with water. If the inside cannot be washed with water, it should be wiped or vacuumed. This requires a large quantity of water supplied by using water pumps, decontamination vehicles or water supply systems. If the contamination is on a small scale, it should be brushed with detergent solution. Used water should be drained to ditches, rivers or areas where its radiation will not affect anything.

6. Decontamination of the Ground

(1) Places where the ground is flat and the drainage is good, such as paved roads and runways, are washed with water. If available, pressurized water supplied by a water pump or a water supply system is preferred. Drainage should be carried out with the same methods as described in the previous section.

(2) When the ground is not paved, it is preferable to scrape off the soil on the surface. If it cannot be scraped, it must be covered with clean soil to avoid stirring up the radioactive substances on the surface.

Chapter 3. Protection Against Chemical Weapons

(1) Outline

Section 116. Outline

Protective measures must be thoroughly planned in advance against chemical weapons so that members can calmly perform their duties and respond adequately to difficult conditions.

Section 117. Preparation Activities

1. When an attack by chemical weapons is anticipated, members must prepare individual protective equipment, decontaminating equipment and shelters to protect against contamination. Also, decontaminating materials must be distributed according to the condition of the war so that decontamination may be performed in a timely way. If necessary, members must prepare to set up a temporary decontamination facility and to organize a fatigue party for decontamination.

2. Firearms, vehicles and other equipment must be covered to protect against contamination in sheltered areas, taking advantage of geographical features and existing structures. Supply materials and equipment must always be covered. Occasionally detection paper and detection paint are applied in advance at units' locations, assembly areas, quarters, supply facilities, main traffic areas, vehicles and firearms in order to detect the contamination immediately.

3. When an attack by the enemy's chemical weapons is anticipated, try to destroy the weapons before they are used as much as possible or interfere with the enemy's timing for the attack by forestalling activities.

Section 118. Activities during an Attack by Chemical Weapons

A unit which has been attacked by chemical weapons should immediately send out a warning, put on protection masks and light protection garments and continue its

activities. If conditions allow, members must immediately hide themselves or leave the area, making full use of weather and geographical features and then first aid treatment must be given. A retreating unit must be well controlled, communication must be maintained and its moving direction must be maintained. It must immediately report in detail on the condition of the area, the kind of weapons used by the enemy and their method of delivery. Members must take precautions against other movements of the enemy following the attack.

Section 119. Activities After the Attack

1. Each commander should be aware of the degree of damage that units received, immediately take measures to rescue, decontaminate, reorganize units, etc. and report the progress of these activities.

2. Higher-ranking commanders must estimate the extent of the contaminated area. Considering the general situation, they must give necessary instructions to the units such as directions to advance, the areas which need retrogression and decontaminating measures.

3. Groups larger than a company must reconnoiter the areas and put up signs to indicate contamination if necessary. In some situations, they should also open passages and decontaminate the area. If required, a battalion should open a temporary decontamination facility.

4. When clothes and light protection garments are lightly contaminated, each member should decontaminate them and carry them. If contamination is severe, each item must be marked to indicate the amount of contamination it received. Then, under instructions of officers ranking higher than captain, these items must be piled up to be abandoned at an adequate place. Adequate means must be provided so that clean clothes may be delivered to members and may replace the contaminated clothes.

Section 120. Special Notes on Neurolytic Chemical Agents

Members must take full precautions against neurolytic chemical agents especially toward evening and at night during temperature inversion. As soon as the symptoms are recognized, the person must take protective measures and must move out of the area whenever his duty allows him to do so. Even when detecting methods do not indicate the existence of agents, taking off the protective mask should not be allowed until it is confirmed to be safe by observing wild animals or other methods.

(2) Activities Against Each Method of Attack with Chemical Weapons

Section 121. Activities Against Rain Bombs

1. Every unit from the front to the rear line must take strict precautions against aircraft. Protection measures such as establishment of warning measures, transferring network, contamination prevention means, etc., must be carefully prepared. Units should be inconspicuously dispersed in order to make it difficult for the enemy to focus on a target and to minimize damage. Unit members should make an effort to shoot the enemy's aircraft down. Rain bombs are usually used in the evening or at dawn and it is hard to perceive the attack.

2. When an air raid is anticipated, each member must prepare to wear a protective mask and a light protective garment. When such an attack is very likely, members should wear protective items in advance.

3. When the units are attacked by rain bombs, each commander must observe the number of aircraft, their altitude, their flying direction, the location where they started dropping rain bombs, the weather (especially the direction and speed of winds), and the geographical features in order to roughly estimate the extent of the contaminated area. He must also consider the situation of battle and of the units before he decides on countermeasures. An attack by rain bombs is generally

accompanied by regular bombing or anti-ground firing. When it is windy, units occasionally receive the effects of rain bombs at unexpected locations.

4. Each unit must reconnoiter the important positions of their area whenever possible after the attacks, thereby avoiding any delay in the activities.

Drops of poisonous chemical agents are extremely fine and difficult to see around the circumference of the contaminated area.

5. Immediately after the attack, units must leave the contaminated area to give first aid treatment and to decontaminate themselves. Even after the liquid drops stop falling, mists of highly concentrated poisonous chemical agents occasionally still float in the air for awhile. When units escape from the raining area, they must choose the shortest and the least contaminated route such as roads, bare ground or grassland. They must consider the condition of contamination and the direction of winds in choosing escape routes. During escape, they must protect themselves against contamination and take precautions against an aerial attack after confirming precipitation of the poisonous chemical agents. Commanders must decide on the time members can take off light protective garments, the scattering condition of the poisonous chemical agents and taking into consideration possible repetition of the enemy's attack. Protective masks must be worn until members escape from the contaminated area and finish emergency decontamination.

Section 122. Activities Against Chemical Shells

1. Chemical shells are often used in battle operations to concentrate an attack on important targets. Frequently various kinds of poisonous chemical agents are contained in a shell. Therefore members must take strict precautions and protective measures. If they are attacked by chemical shells, it is important that members immediately and quickly leave the area. The protection means must be adequately chosen according to battle conditions. Efforts must always be made to destroy the enemy's means of attack. Protection activities against chemical bombs are the same

as those against chemical shells.

2. When the units are attacked by chemical shells with temporary effects, members should continue their duties with protective masks on and take precautions against other attacks which are accompanied by chemical shells.

3. When an attack by chemical shells with long-lasting effects is anticipated, members should wear protective garments and prepare decontaminating materials, protective facilities and equipment in advance. When they are attacked, protection activities are the same as those against rain bombs. Those units which are close to the enemy or units in charge of firearms, technical equipment, command posts, observatories, etc. should continue their duties with protective masks and garments on. According to the situation of battle and contamination, units should quickly move to a reserved location for decontamination.

4. In the craters of chemical shells, especially one with long-lasting effects, highly concentrated poisonous chemical agents remain for a long period of time. Those places should be avoided until they are decontaminated. Also, around these craters, poisonous chemical agents are mixed into the soil and fragments to which highly concentrated agents have adhered are scattered around the area.

5. The reconnaissance activities for areas contaminated by chemical shells can be guided by these craters.

Section 123. Activities Against Chemical Cylinders

It is possible to predict an attack with chemical cylinders by observing enemy movements. When such an attack is predicted, every effort must be made to destroy the enemy's weapon. Units can then take preparatory measures, considering the location of sentries, how the warnings should be transmitted to other units and inspect protective equipment. After an attack, members should immediately put on protective masks and continue their duties. Especially, maintenance of control and orientation are important. Occasionally poisonous chemical agents are mixed into

the smoke signals.

Section 124. Activities Against Chemical Hand Grenades, Etc.

Chemical hand grenades and small chemical cylinders are used locally in an attack and combined in the volley or storming attacks. Members should immediately put on protective masks to continue their duties. Agent G and hydrocyanic acid are most likely used to attack tanks. Also, covered trenches and shelters are common targets. The occupation units must take necessary protection means and maintain strict watching and precautions. When protective facilities and equipment become contaminated, decontamination and ventilation treatments must be performed while continuing battle activities, thereby preparing for another attack by the enemy.

Section 125. Activities Against Chemical Land Mines

Chemical land mines are often used together with regular land mines. During reconnaissance activities or while passing over a mine field, members should wear protective garments and prepare detectors, meters and detection materials in advance. Other activities against chemical land mines are similar to those against regular land mines.

When members are contaminated, they should decontaminate themselves according to the situation of battle.

(3) Treatments of Contaminated Areas

Section 126. Outline

Activities in contaminated areas require a large quantity of materials, time and labor and are frequently complicated. Therefore it is preferable to avoid any action in such areas as much as the situation allows or to wait until the effects of chemical agents naturally lessen. When activities are unavoidable, locations

which are least contaminated should be chosen. Members should completely prepare to protect themselves and perform their duties properly and quickly. A contaminated area can be utilized as an effective side defense line which protects our units from enemy attack if our units are properly organized.

Section 127. Evasion

1. When units avoid a contaminated area while moving, they must choose a route in a direction toward which the wind is not carrying chemical agents. If a unit must go through a contaminated area, it must regularly measure contamination, put on protective masks in advance and quickly move through the area. Attraction of the enemy and the enemy's firing direction must be carefully taken into account.

2. In an area contaminated with neurolytic chemical agents, continuous measurement of contamination is required and members must wear both protective masks and garments unless safety is confirmed.

Section 128. Important Notes Concerning Passing Through Contaminated Areas

1. Routes must be cleared according to the duty of the unit, the condition of the enemy, the size of the contaminated area, degree of contamination and the protective capacity of the unit. Sometimes decontamination facilities should be set up. (Refer to Section 132.) Protective masks and light protective garments must be worn in any case. Armored cars and other vehicles must be made use of as much as possible. Decontaminating materials should be either carried by each member or placed at convenient places along the route.

2. Units which are going to travel along the route should obtain detailed information about the route in advance from decontamination and observation parties. If possible, guides should be stationed to make the procedures work quickly.

3. After passing through a contaminated area, each member must decontaminate his body and his equipment. He should exchange his clothes if necessary. For this

purpose, preparation for decontamination must be thoroughly planned, proper locations must be chosen for decontamination activities, decontamination methods and procedures must be properly regulated and activities such as taking precautions and building trenches must be continued if necessary.

Section 129. Occupation of a Contaminated Area

1. When occupation units cannot avoid staying in a contaminated area, they must choose the least contaminated locations and decontaminate the occupied area. Protective facilities should be used for members to rest in.

2. Commanders must watch that their members strictly follow the regulations on protective measures. As much as the situation allows, they must let their members rest by shifting the units and allowing them to decontaminate themselves. Sufficient precaution must be taken to avoid contamination when sleeping and excreting.

3. When constructing covered trenches in a contaminated area, the location must be carefully chosen. The soil at that location must be scraped off on the surface or must be covered with clean soil sufficiently while using decontaminating agents. The areas which are in direct contact with people must be carefully decontaminated.

Section 130. Observation of Contaminated Areas

1. Commanders must grasp the overall situation and organize reconnaissance parties to set up an evasive or detour route. Before organizing and dispatching reconnaissance parties, the commanders must estimate the extent of the contaminated area, considering the condition of the enemy, weather and geographical features.

2. Organization and Duty of Reconnaissance Party

(1) Kinds of members and the number in the party vary according to the duty, the purpose of observation, condition of the enemy, geographical features and how

much available light there is. A reconnaissance party consists of enough members for measuring, taking precautions, sign posting and communicating. They must carry enough detection material and equipment. Generally chemical technicians are assigned as a chief and as detection personnel in the party. In reconnoitering a contaminated area just in front of enemy territory, reconnaissance parties must be sent through main routes which connect the enemy's position to our units thereby enabling an overall judgment on the reconnaissance. When a passage is to be opened, the reconnaissance party is sent according to its planned location.

(2) The following are objectives for observation parties:

(If possible, only a single objective from the following list should be given to one party, especially at night.)

(a) Find the front line (our side), the back line (toward the enemy) and the width of the contaminated area.

(b) Find kinds and concentration of poisonous chemical agents.

(c) Find out whether there is an evasive route.

(d) Find an area convenient for decontamination.

(e) Find the condition of the surface of the contaminated area.

(f) If possible, find locations and kinds of enemy firearms aiming at contaminated area.

3. Action of Reconnaissance Party

(1) A reconnaissance party must set up an observation base at a proper location close to our position in a contaminated area. There, each member prepares for activities, putting on a protective mask and an anti-chemical garment.

(2) The party must move through an area, measuring the rate of contamination with measuring equipment. When contamination is confirmed, necessary signs must be posted. Figure 16 shows an example of a progressing formation of an observation party.

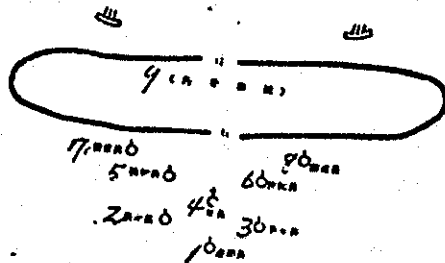


Figure 16. An Example of a Progressing Formation of a Reconnaissance Party

- | | |
|--------------------------------|-------------------------|
| Key: 1. communication operator | 6. measurement operator |
| 2. sign maker | 7. guard |
| 3. sign maker | 8. guard |
| 4. chief | 9. contaminated area |
| 5. measurement operator | |

(3) After observation activities, each member must decontaminate himself and his equipment.

(4) Reconnaissance of Front and Rear Edges

(a) The party smoothly progress until they come to what is roughly estimated to be a contaminated area. As soon as a detector finds the existence of poisonous agents, the member must report it to his chief. Then the chief must test it himself to confirm it.

(b) At the front line and back line of the contaminated area, the party must move along the perimeter of the area to get information in detail. On the back line of the area, positions of the enemy and wind direction must be considered.

(5) Reconnaissance of Both Wings

Reconnaissance activities in both wings of a contaminated area are similar to those at the front and back lines. The following objects must be particularly noted:

(a) Generally it is difficult to find the end of the contaminated area and

it requires , sometimes, movement in all directions over a large area.

(b) Occasionally there is a cliff or swamp on the wing of a contaminated area and land mines are buried there.

(6) Nighttime Reconnaissance

At night a chief must strictly control all his members and must be careful not to confuse their direction of movement. Each member must take strict precautions against the enemy. Lights which are used with a detector must not be noticed by the enemy.

4. Other General Notes

(1) Generally the contaminated area is under the enemy's artillery control. Therefore the position of the enemy must be considered to decide the progressing formation of the party and its duties. The whole purpose of observation activities is to correctly determine the condition of contamination. Therefore activities should not be limited only to local areas, especially at night.

(2) In contaminated areas, land mines and other obstructions are often combined. Members should avoid any confusion by grasping the relationship between the contaminated area and the enemy's position of general obstructions.

(3) To obtain an accurate measurement of contamination, a greater number of tests must be conducted if weather conditions so require. When the atmospheric temperature is lower than 10°C , the chemical agents evaporate slowly. Therefore the inhaling pump of a gas detector must be placed close to the object and the inhalation of the gas must be repeated several times in order to obtain enough amount of sample.

Section 131. Opening of Passage

1. There are two types of routes for passing through a contaminated area: One is for personnel and the other is for vehicles. A route for personnel requires

1.5 meters of width for one or two people abreast. A route for vehicles requires 7 meters of width. The locations and the number of routes are determined by the situation of the enemy, the difficulties in duties and passage and the supply of decontamination materials.

The method for decontamination should be selected based on the condition of the contaminated area, available time and resource, required secrecy, the degree of necessary protection of the activities, etc. Usually a decontaminating fatigue party is organized for this duty. Refer to Section 142 for a detailed description of the decontaminating method for the soil.

2. Organization of a Decontamination Fatigue Party

(1) How the party is organized depends on one's duty and the condition of the area. The party usually consists of several decontamination groups, an observation group, a watch group and a supply group.

(2) Generally, one decontamination fatigue party is in charge of opening one route. The composition and the equipment of the party vary according to the methods of decontamination. Table 11 and Figure 17 show the composition and activities of a party which uses bleaching powder.

3. Activities of a Decontamination Fatigue Party

(1) When a chief of the party gives duties to each group, he must cover the following subjects:

- (a) The situation of the enemy and condition of the contaminated area.
- (b) The condition of our units, particularly the method of protecting the activities.
- (c) Duties of the fatigue party and of each group.
- (d) Methods of decontamination and locations for the activities.
- (e) Schedule for activities, time of start and of finishing
- (f) Supply of decontaminating materials

Table 11 - An Example of Formation of a Fatigue Party for Decontamination

Member	Duty		Materials to Carry
	Bomb Method	Manual Method	
Chief	Supervision	Supervision	Bleaching powder, signs to indicate, decontaminating agents, tools for cutting grass, smoke cylinders
Sign maker	Indicating locations to set bombs	Posting signs indicating the route	
Decontamination/Explosion Operator	Preparing and setting bombs	Sprinkling bleaching powder	
Supply clerk	Delivering bleaching powder	Delivering bleaching powder	
Watch guard	Taking precautions against enemy movement		
Route clearer	(Not applicable)	Clearing a route	

- Notes - (1) The chief sign makers and decontamination operators must be chemical technicians.
- (2) In manual decontamination of a 3-meter or wider route, decontamination operators should work abreast of each other.
- (3) Only when it is required, route clearers should join the party.

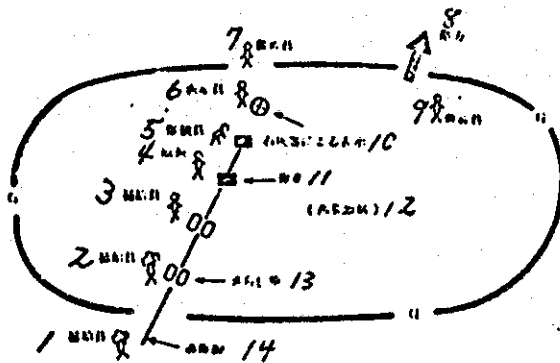


Figure 17. An Example of a Decontaminating Party's Organization (Bomb Method)

- | | | |
|------|-----------------------|-------------------------|
| Key: | 1. supply operator | 8. enemy |
| | 2. supply operator | 9. watch guard |
| | 3. supply operator | 10. lime for indication |
| | 4. chief | 11. explosive |
| | 5. explosive operator | 12. contaminated area |
| | 6. sign maker | 13. bleaching powder |
| | 7. watch guard | 14. fuse |

(2) Opening a route through the contaminated area, especially the one in front of an enemy position, should be done secretly a night. Under certain circumstances, forced decontamination is required to open a route.

(3) When decontamination must be done secretly, mixed or powdered bleaching agent must be manually spread at night. A fatigue party should start reconnaissance activities toward evening to open a route. Important locations along the route must be occupied to prepare decontamination activities. Then each decontamination group should progress and work separately. Due to changes in the situation of battle, secret decontamination activities occasionally change to offensive decontamination activities. Therefore firearms must always be prepared.

(4) When bombs and explosives are used to spread bleaching powder to open a route by forced decontamination, it is preferable to prepare them during the night and let them explode just before passing through that route. When forced decontamination activities take place with firearm support, cover fire and smoke screen, the fatigue party must maintain good communication with supporting units. Material

and equipment must be quickly delivered. Activities should be completed in a short period of time. Important notes for decontamination with bombs are the same as those for secret manual decontamination described in above (3). In particular, preparation must be done at night.

Section 132. Decontamination Positions

1. When passing through a contaminated area in some cases, decontamination of personnel must be done at several positions along the passing route. These positions are called decontamination positions. This method is used only when a passage cannot be opened due to a shortage of materials or time and also due to the situation of battle.

2. When deciding the locations of decontamination positions to pass through a contaminated area in front of the enemy, various situations must be considered such as the condition of the enemy, the condition of the battle and the purpose of activities. The distance between decontamination positions varies according to these different situations. For example, if the area is very close to the enemy position, the distance between decontamination positions should be very short and elaborately irregular.

3. The size of a decontamination position for the personnel needs at least two square meters of space. Bleaching powder is used manually or with an explosive.

Section 133. Decontamination of Terrain

1. Terrain decontamination usually requires a large number of members, materials and time. Therefore its necessity and the degree and the priority of decontamination must be considered determined according to the availability of the work force. A plan must be completely prepared.

The methods are similar to those of opening a passage; however, when decontamination is done on a large scale, it is preferable to use decontamination or incineration

vehicles for spreading bleaching powder solution or construction equipment to scrape or to cover the soil.

(4) Decontamination Methods

Section 134. Outline

1. Decontamination is mostly against liquid poisonous chemical agents. Usually decontaminating agents are used. Under some circumstances, other methods can be used such as wind drying, washing, incineration, explosion, covering, removal, etc. A combination of the above methods is also used.

2. Refer to Appendix 6 for decontamination methods for various materials. Refer to Appendix 4 for usage of main decontaminating agents and materials.

3. Usually clothes, protective masks and other individual equipment are decontaminated individually. However these items can be decontaminated in batches by a unit if enough members, time, decontaminating materials and equipment are available.

Section 135. Decontamination of Firearms and Ammunition

1. Firearms

(1) The areas which will directly touch the face and hands such as gun stocks and telescopic sights should be carefully decontaminated first in order to avoid any hinderance in firing operations.

(2) Drops of liquid poisonous chemical agents should be removed with a piece of dry cloth, soap solution or solvents. Then, poultice soaked with daunk solution or DS2 solution should be applied to metal portions. Poultice soaked with bleaching powder emulsion should be applied to wood. Afterward, they should be rinsed with water and oiled.

(3) When there is enough time, they can be sun-dried or disassembled and thoroughly decontaminated.

(4) When decontaminating agents are not available, the equipment should be rubbed with a piece of dry cloth, dirt or grass and washed with water. In combat, a contaminated gun barrel can be decontaminated by itself with the heat caused by firing.

2. Ammunition

(1) Ammunition can be washed with a cold soap solution but usually poultice soaked with daunk solution or DS2 solution is applied to decontaminate against inflammatory chemical agents. Then the item should be wiped well with gasoline and be wind-dried. When an item is lightly contaminated with G agent, it can be simply sun-dried or wind-dried.

Bleaching powder, except bleaching powder emulsion, must never be used for ammunition and should never even be handled around ammunition.

(2) The methods of decontamination of boxes of ammunition are the same as of ammunition discussed above.

(3) In emergencies, ammunition should be wiped with a dry cloth and then used for firing. Protective masks and gloves must be worn during firing. Contaminated ammunition should be quickly used.

Section 136. Decontamination of Vehicles, Etc.

1. Vehicles, including tanks, should be decontaminated in the following order, avoiding interference with battle activities:

- (1) The areas which members will touch when getting in and out.
- (2) The areas a driver will touch while driving.
- (3) The areas where passengers will touch when operating vehicles.
- (4) The areas used for observation or firing.
- (5) The areas used for loading personnel and materials.

2. Methods to decontaminate vehicles follow those for firearms. Methods vary according to the material of each portion. Light external contamination can be done

by simply wind-drying during driving the vehicle. In emergencies, the lower part of the frame should not be decontaminated unless it requires repairs.

3. When there is enough time, the hood, seats, weapons and ammunition should be taken apart for decontamination. After mud is washed off carefully from the lower part of the frame, bleaching powder, boiling water or steam is used for decontamination.

4. Occasionally seats cannot be decontaminated well. Therefore it is preferable to cover them with blankets, thick cloth, straw mats or boards.

Section 137. Decontamination of Aircraft

1. The entrance, exit, seats, the areas where passengers will touch and the areas where poisonous chemical agents possibly get into should be decontaminated first. The area where ground crews will touch for inspection and repair should be decontaminated, at least the area as high as a person can reach while standing on the ground.

2. Methods of decontamination for aircraft follow those for firearms and vehicles. Inflammable organic solvents cannot be used inside aircraft. However, daunk solution can be used within a cockpit. Bleaching powder should be spread on the ground underneath the aircraft. External areas of aircraft can be decontaminated by wind-drying during a two-hour flight.

3. Drops of poisonous chemical agents are occasionally found underneath wings or other unexpected areas. Because these chemical agents can be scattered around by a propeller or a rotor, crews and persons around the aircraft must be aware of them.

Section 138. Decontamination of Equipment and Tools

1. When observation and communication equipment must be quickly decontaminated, the areas which the face and hands will touch must be wiped with a dry cloth and

then wind-dried or wiped with alcohol. Generally wind-drying, sun-drying or using a hot air blower is preferable. When bleaching powder emulsion, daunk solution or DS2 solution is used, one should take sufficient care to dehumidify the equipment. Severely contaminated portions of equipment must be disassembled for decontamination and, in some situations, parts must be exchanged. The following precautions must be taken:

(1) Observation Equipment - Lenses should be wiped with soft cloth soaked with alcohol, avoiding causing scratches.

(2) Communication Equipment - Coated wires should be wiped with a dry cloth or, if necessary, bleaching powder emulsion can be used. Some electronic tubes can decontaminate themselves by the heat they generate when operated. A person must be cautious of the evaporation of the poisonous chemicals.

2. Dishes should be boiled with a soap solution for thirty minutes or soaked in lukewarm soap solution for ten minutes and then rinsed with water and wind-dried. They must be inspected to confirm complete decontamination before use.

3. Suitable decontamination methods must be chosen for each different material of other utensils and equipment.

Section 139. Decontamination of Food

Contaminated food should not be eaten. However, under unavoidable circumstances, it should be decontaminated with the following methods:

1. Canned food and other well sealed food contaminated with gaseous poisonous chemical agents should be simply wind-dried.

2. Canned or bottled food contaminated with liquid poisonous chemical agents should be washed with a soap solution, bleaching powder emulsion, daunk solution or DS2 solution.

3. When only packing is contaminated with liquid poisonous chemical agents, it must be carefully unwrapped to avoid contaminating its contents.

4. When the contaminated areas of food are obvious, the areas must be removed. The remainder should be washed with 2% sodium bicarbonate solution and boiled in clean water for thirty minutes.

5. The following are influences of contamination by poisonous chemical agents on food:

(1) Food contaminated with inflammatory chemical agents, excluding mustard nitrogen, has an unpleasant odor. Vegetables and meat change color. Oily foods are dangerous because they rapidly absorb the inflammatory agents. Even after chemical decontamination, lewisite still remains toxic.

(2) Oily foods are dangerous because they rapidly absorb neurolytic chemical agents.

(3) Foods contaminated with suffocative chemical agents taste bad. Foods, excluding oily foods, can be completely decontaminated by wind-drying.

(4) Oily foods contaminated with gaseous hemal poisonous chemical agents, excluding cyanogen chloride, are usually harmless.

Section 140. Decontamination of Water

1. Contaminated water should not be used. Under unavoidable circumstances, generally water supply units decontaminate water under technical instructions of chemical experts. When a unit by itself decontaminates water with filtering containers, the following procedures must be taken:

(1) Two filtering containers must be prepared.

(2) Contaminated water is poured into one of the filtering containers. Then 900 grams of activated charcoal and 60 grams of sodium carbonate are added. It must be stirred for about 20 minutes.

(3) Then 30 grams of alum should be added and stirred for 30 minutes.

(4) Upper water should be transferred to another container.

2. The following are influences of contamination on water by poisonous chemical agents:

(1) When water is contaminated with inflammatory chemical agents, mustard or mustard nitrogen, they gradually create acid in the water, an oily film on the surface and oily layers on the bottom. Lewisite rapidly creates arsenic compounds and the water gives a peculiar odor.

(2) Water contaminated with neurolytic chemical agents gradually creates organic phosphorous compounds and other decomposed elements.

(3) Water contaminated with suffocative chemical agents rapidly creates hydrochloric acid and chloric acid. The water has an unpleasant acid taste but using a small amount of water is harmless.

(4) Water contaminated with hemal chemical agents is harmful.

Section 141. Decontamination of Structures

1. Among the structures, important ones must be decontaminated first, such as command posts, communication centers and covered trenches where firearms are stored. The entrance, poopholes and areas where persons will touch should be thoroughly decontaminated. In decontaminating external portions of structures, the portion which may directly affect the inside should be decontaminated first.

2. Lumber, bricks and concrete should be thoroughly rubbed with bleaching powder emulsion and then poultice should be applied. While poultice is applied, the material should be regularly inspected. If it is still contaminated, new poultice should be applied.

Bleaching powder should be spread or the surface soil should be scraped off to decontaminate the ground. Ceramic tiles and glass can be washed with water or soap solution. Contaminated camouflage materials should be replaced. Scraped soil or used water must be safely disposed of.

3. In decontamination operations, precautions must be taken to dispose of

removed soil or contaminated water so that the contamination may not be spread out.

Section 142. Decontamination of Ground

1. Ground is either decontaminated or is left until contamination lessens naturally. When the ground is decontaminated, the purpose of the land, the condition of the ground and its amount of contamination should be considered before the operation. It can be decontaminated by spreading bleaching powder, incineration, covering or scraping soil, explosives or washing with water. One of these methods or a combination of these methods can be used to decontaminate ground.

(1) Bleaching Powder

(a) Spreading bleaching powder can be done manually, by explosion or by vehicles. The necessary amount of bleaching powder varies according to the concentration of poisonous chemical agents and to the condition of the ground. Usually 450 grams of bleaching powder cover one square meter of bare land and 900 grams may cover one square meter of grassland.

(b) Powdery bleaching powder, bleaching powder paste or bleaching powder emulsion is used for the manual method. This method is suitable for small-scale decontamination or when it must be done secretly. Bleaching powder must be spread as evenly as possible. It must be well mixed so that it will make good contact with poisonous chemical agents. Bleaching powder causes heat, fire or sometimes, poisonous gas by chemical reaction. Therefore, the direction of winds must be considered. In order to decontaminate flat land of 2.5 meters wide and 100 meters long manually by one person, it takes about 10 minutes in the daytime, 20 minutes at night and 40 minutes in col weather.

(c) Powdery bleaching powder is used with explosives. This method is comparatively easy and it can be secretly prepared. However, our activity will be disclosed when detonation occurs. When the wind is blowing in the right direction,

bleaching powder can be spread smoothly and rapidly. In order to spread it evenly, bleaching powder must be placed properly. Figure 18 shows an example of the explosive method.

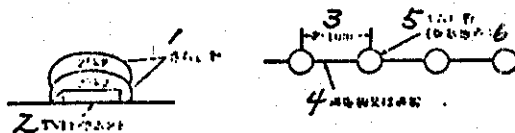


Figure 18. An Example of the Explosive Method of Bleaching Powder Dispersion

- Key:
- | | |
|----------------------------|----------------------|
| 1. bleaching powder | 5. bleaching powder |
| 2. TNT $\frac{1}{2}$ pound | 6. spot of explosion |
| 3. about 10 meters | |
| 4. fuse | |

- Notes:
1. The extent of the area where bleaching powder will spread by explosion must be estimated considering the wind direction. Then proper spots must be chosen to set explosives.
 2. When the wind is strong and contamination is severe, a larger quantity of bleaching powder must be used.

(d) Decontaminating vehicles using bleaching powder emulsion can decontaminate a wide area if it is relatively close to the rear.

2. Incineration

(1) Incineration can comparatively easily and rapidly accomplish decontamination for dry grassland when the wind direction is proper.

(2) Methods of incineration vary according to the condition of ground and of the enemy. Oil, withered grass or straw are used for ignition on the windward side.

(3) Incineration methods will disclose our activities. Poisonous gas caused by incineration will be blown a long distance by the wind. When the ground contains moisture, poisonous chemical agents occasionally remain around roots of grass. The chemical agents which permeated to the soil also remain for a long period of time.

3. Covering Contamination

(1) Usually earth, sand or snow is used to cover the contaminated ground. High bushes around it must be removed first. It requires more than ten centimeters thickness of earth and sand or more than fifteen centimeters of snow. Bulldozers are advantageous for decontamination on a large scale. This method should not be used to decontaminate the land where structures will be constructed in the future such as shelters or covered trenches.

(2) As an emergency method to pass through a contaminated area, withered grass, straw mats, straw, boards or metal sheets can be used to cover the route. This method requires decontamination during and after the procedures.

4. Removing Contaminated Soil

By removing five centimeters thickness of topsoil, the decontamination can be achieved. Removed soil must be properly disposed of or, if necessary, it should be decontaminated. Bulldozers are advantageous for this method.

5. Explosives

Fuses, cylinders and explosives are used for this method. These can be ignited by electricity or other non-electric methods. Explosives can be easily and secretly prepared and can achieve rapid decontamination. However, the decontamination is local and not complete. Where there is high grass, some quantity of contamination will still remain. When three explosive fuses are placed parallel to each other at intervals of 50 centimeters, they will make a passage one meter wide upon exploding. If six fuses are placed parallel to each other at intervals of 50 centimeters, they will make a passage 2.5 meters wide upon exploding.

6. Table 12 shows the decontamination method suitable for each ground condition.

Table 12 - Decontaminating Methods of the Ground

Condition of the Ground	Methods of Decontamination
Hard surface (Paved roads or runways)	<ol style="list-style-type: none"> 1. Wind drying for light contamination, or when there is enough time. 2. Washing with water when drainage well equipped and sufficient water is available. 3. Spreading bleaching powder 4. Incineration using petroleum, etc.
Soft surface	<ol style="list-style-type: none"> 1. Spreading bleaching powder 2. Removing soil or snow 3. Incineration using petroleum, etc. 4. Covering with soil
Grassland	<ol style="list-style-type: none"> 1. Incineration (This method is very efficient with certain condition of grass and seasons. Petroleum, etc., is used, if necessary.) 2. Explosives 3. Spreading bleaching powder by decontaminating vehicles or explosives 4. Removing soil or snow
Sand (Beach)	<ol style="list-style-type: none"> 1. Removing sand (5 to 10 centimeter thick top-layer should be removed.) 2. Spreading bleaching powder 3. Wind drying for at least 3 to 7 days 4. Washing with water 5. Covering with soil

Notes - To decontaminate craters made by chemical shells, bleaching powder should be thickly applied and well mixed with the soil. When these craters are covered with soil for decontamination, they should be covered thickly.

Chapter 4. Protection Against Biological Weapons

Section 143. Outline

In order to protect against biological weapons, all members must strictly observe regulations for prevention of epidemics and use protective devices in advance. Contamination must be found in its earliest stage. When contamination is suspected, warnings must be immediately given and necessary measures must be taken to prevent epidemics.

Section 144. Preparatory Activities

1. In order to protect against biological weapons, preparatory measures, especially health care of individuals and prevention of epidemics are important.

2. On battlefields, various health problems occur and it is hard to maintain a good sanitary environment. Each commander must consider the rest his unit needs and their sanitary environment. He must routinely give health examinations and vaccinations to his members.

3. Generally it is difficult to find signs of an attack with biological weapons. Therefore each member must try, with extreme care, to find the signs. Epidemic sources must be quickly detected by collecting epidemic information. These sources must be completely exterminated before any infection occurs or they spread over the region.

Section 145. Activities During an Attack with Biological Weapons

1. During an attack with biological weapons or when an attack is anticipated, each unit must immediately give an alarm, members must wear protective masks and light protective garments and take emergency actions, for example, hide in protective areas or evade, taking advantage of weather and geographical features.

2. Members must not forget to take precautions against other offensive activities following the attack. Units which received the attack must immediately report

the conditions, especially the kinds of weapon and the methods.

Section 146. Activities Against Different Methods of Delivery of Biological Agents

1. When an explosion or spray of biological agents is noticed, members must take protective measures, referring to those methods against chemical bombs or rain bombs. Each unit must try to find any sign of such attacks as much as possible. They must immediately report the attack to sanitary units for inspection of contamination. According to the detection result, members must move out of the area or engage in required activities such as disinfecting or detecting contamination.

2. When biological agents are secretly used by enemy spys or infiltrators, the signs of the attack are hard to find. The contamination will be detected by the disease of members and residents or by an extraordinarily large number of disease media. Protective measures must be taken according to the kinds of the disease. Survey and detection of the infection route, as well as other necessary treatments for preventing epidemics must be conducted with necessary prevention equipment and sufficient help from sanitary units.

Section 147. Activities After an Attack

1. Each unit must immediately take measures to exterminate the biological agents to stop the spread of an epidemic. Units must ask for support from sanitary units for what they cannot handle by themselves.

The following are important measures that each unit must take:

- (1) Decontamination or disinfection of quarters and assembly areas.
- (2) Inspection for infectious channels.
- (3) Inspection for germs.
- (4) Health examinations and vaccinations.
- (5) Signs indicating contaminated and restricted areas.

(6) Restriction on traffic and transportation of items suspected of contamination and personnel from outside.

(7) Disinfection or disposal of contaminated items and those which are suspected of contamination. Disinfection for facilities or restrictions on its use.

(8) Extermination of mice and insects.

2. High ranking commanders must estimate the extent of the contaminated area and, considering the overall conditions, give necessary instructions to the contaminated units on treatment and disinfection measures. They must also report the condition of contamination to other units in the area.

Section 148. Activities for a Contaminated Area

1. When the area is contaminated or suspected of contamination, the unit must clearly indicate the contamination to restrict traffic and enforce the restriction. They must immediately report it to sanitary units and take necessary disinfection measures.

2. When the unit must work in the contaminated area, each member must observe the sanitary regulations, wear a protective mask and light protective garments. They must treat their external wounds to prevent infection with biological agents. As soon as they leave the contaminated area, they must decontaminate themselves. Insects and animals around the area should be exterminated.

Section 149. Methods of Disinfection

Methods of disinfection against biological agents are disinfectants, heat treatment, sun drying, washing with a soap solution, burial and incineration.

1. Decontamination of Weapons

Firearms and vehicles should be decontaminated with bleaching powder emulsion, daunk solution or DS2 solution in the same way as decontamination against poisonous

chemical agents. Glass portions of communication equipment and optical instruments should be wiped with alcohol or with saponated cresol solution.

2. Decontamination of Clothes and Individual Equipment

Clothes, equipment and tools can be decontaminated by sun-drying, boiling or washing with soap solution. When formalin or ethylene oxide is available, contaminated items should be left in a tightly sealed polyethylene bag or in a building which is filled with the gas of these chemicals. These items should be wind-dried afterward.

3. Decontamination of Food

(1) Decontamination of foods must be done under the instruction of assigned sanitary staff. After decontamination, these foods must be strictly inspected.

(2) Most of the foods can be disinfected by high temperature, except foods contaminated with toxins. They must be boiled at least 15 minutes. Grain, such as rice and wheat, should be well washed with water and then heat-treated. Meats and fish must be completely heated. Vegetables should be soaked in 0.3% to 0.5% chlorous acid soda solution for 30 minutes and then rinsed thoroughly with water before being cooked.

(3) Canned foods should be washed with soap solution. Foods which must be peeled or tightly sealed foods should be soaked in 0.3% to 0.5% chlorous acid soda solution for 30 minutes and then rinsed thoroughly with water before cooking.

4. Decontamination of Water

(1) Generally filtration of water is done by water supply units. However, when a unit must do it by itself, water can be decontaminated by purification tablets or by boiling. In some cases, however, decontamination is not complete with these methods. Water decontaminated by these methods must be inspected and judged of its drinkability by sanitary staff. Refer for details to Field Sanitation, Instructional Manual, #21-62.

(2) Decontamination with Filtering Containers

(a) Water is poured into a filtering container up to the mark on the container.

(b) 280 purification tablets are placed in the cup of a canteen, mixed well with a small amount of water and water is added to fill $\frac{2}{3}$ of the cup.

(c) The tablets' solution should be well stirred in a cup and slowly poured into the filtering container. The water should be stirred again and covered with a lid.

(d) The water in the filtering container should be drunk after 30 minutes or later.

(3) Decontamination with a Canteen

(a) Water is poured to fill $\frac{4}{5}$ of a canteen.

(b) Two purification tablets must be put into a canteen. If the contaminated water is cloudy, four tablets must be put in.

(c) After the cap is put on, the canteen must be shaken well to stir the water inside. The water should be drunk after 30 minutes or later.

(4) Decontamination by Boiling

Generally the contaminated water must be boiled at least 15 minutes.

Microbes in the water can be killed by boiling but some resist heat. Also, the contaminating agent might be toxin. Therefore, with this method, instruction from the sanitary staff is required.

5. Decontamination of Structures

(1) After all the outside openings of the structure are closed tightly, formalin is sprayed for disinfection. Spray formalin on or wash with soap solution the interior furniture and inside walls.

(2) Generally exterior surfaces of the structure are wind-dried. However, when it must be immediately decontaminated, bleaching powder or quicklime should be

sprinkled.

6. Decontamination of Ground

(1) The ground can be naturally decontaminated by the sunlight, wind and rain. When it must be immediately decontaminated, bleaching powder should be sprinkled. The incineration method is efficient also.

(a) Bleaching powder or quicklime can be used as powder or emulsion with the same methods as are used for decontamination against poisonous chemical agents.

(b) Incineration is preferable to decontaminate grassland when grass is withered. To decontaminate green grassland or a small area, fuel should be used for incineration. For this method, protective masks must be worn and the wind direction should be considered.

(2) In order to prevent secondary aerosol spreading of the biological agents which fell on the ground, a covering of water, oil or gravel should be put down to prevent dust where traffic is heavy. However, biological agents can remain for a long period of time with this method.

Appendices

Appendix 1 - An example of Operational Regulations Concerning Protection
Against Special Weapons

1. Protection Organization

(Groups which must be organized for protection, its duty, members and its equipment)

- (1) Reconnaissance, measuring
- (2) Weather observation
- (3) Precautions
- (4) Decontamination
- (5) Relief, rescue

2. Information

(Methods and procedures of report and notification)

- (1) Reconnaissance, measuring, sign-posting
- (2) Observation of nuclear explosion
- (3) Observation of weather
- (4) Wind reports, fallout reports
- (5) Making a condition map of a contaminated area
- (6) Report

3. Operation

(Its procedures in detail and the formats of report)

- (1) Precautions
- (2) Alarms
- (3) Protection against contamination
- (4) Decontamination
- (5) Maximum permissible dosage of radiation
- (6) Report

4. Logistics (Procedures, Quantity to be Carried, etc.)

- (1) Supplement:
- (2) Treatment of corpses
- (3) Supply
- (4) Sanitation
- (5) Maintenance

5. Others

Appendix 2 - List of Main Equipment for Protection

Kind	Names of Equipment
Individual	Protective mask, light protective garments, protective ointments, protective shoe cream, glass dosimeter
Detecting or measuring for units	Radiometer for detection, radiometer for companies (I.C. type or with alarm) radio meter for contaminated areas, radio meter for contaminated food, portable dosimeter set, glass dosimeter, gauge/meter
	Gas detector, detective paint, detection paper, detection crayon, automatic alarm system for chemical agents
	Tools for collecting samples
Decontamination for units	Portable decontaminating equipment, Decontamination vehicles, anti-chemical protection garments Bleaching powder, daunk, DS2, caustic alkali, detergent, etc.
Others	Air purifier system, first-aid medication for gas-inhalation, etc.

Appendix 3 - Major Decontaminating Materials for Use Against Radioactive Substances

Remark - Refer to Section 98 for disposition of cloth, water, etc., used in decontamination procedures

Kind	Items	Method	Caution	Notes
Water (Soap solution)	Personnel, materials, facilities in general	(1) Wipe, rinse, rub, spray, or soak (2) Wash with water under high pressure (3) Steam spray	Washing must be done from top to bottom, and towards the direction of wind. Used water must be properly disposed of.	(1) A mixture of synthetic detergent, soap, and sodium carbonate is effective. (2) For oil stains, boiling soap solution or steam spray is effective.
Alkali	Caustic alkali, caustic soda	Painted surface	Rub, wipe, soak, or spray with water solution	Solution should not be directly touched to the skin. Items must be rinsed thoroughly.
Acid	Sulphuric acid, hydrochloric acid, acetic acid	Metal surface	Rub, wipe, or soak	Particularly effective on rusty metal surfaces
Organic compound solution	Petroleum gasoline, Alcohol, acetone, turpentine oil, carbon tetrachloride	(1) Where grease wax is applied (2) Surface of plastic or painted materials (3) Minute portions (4) Small tools	Wipe, rub, rinse, spray, or soak	1. These must be carefully handled, because some are poisonous to humans, and some are flammable, especially carbon tetrachloride. 2. These should be used only in emergencies for materials made of rubber, and should be immediately rinsed with water
Resolvents	Citric acid, Citric acid soda, ammonium citrate E.D.T.A. multiple phosphate bases	Personnel materials in general	These solutions are used the same way as above	These solutions can dissolve radioactive substances, and decontaminate without hurting the surfaces of clothes or equipment.

Part Appendix 4 - Part 1. Decontaminating Agents for Use Against Poisonous Chemical Agents

Items	Methods	Characteristics	Cautions	Notes
Bleaching powder Personnel, land and materials contaminated with inflammatory chemical agents or neurolytic chemical agents	(1) Powdery bleaching powder mainly used to decontaminate land (2) Bleaching powder paste The volume ratio of 2 parts bleaching powder to 3 parts water. This is mainly used for land. (3) Bleaching powder emulsion. The weight ratio of 1 part bleaching powder to 1-3 parts water, according to the methods of poultice or kinds of contaminated materials.	(1) It stimulates respiratory organs. The chemical reaction occasionally causes heat or poisonous gas. (2) It corrodes metal and damages textiles. (3) When it reacts with inflammatory chemical agents, it occasionally causes heat or fire. (4) It absorbs moisture. After it is mixed with water, it gradually loses effect.	(1) When a large quantity is handled, protective masks must be worn. (2) Metal or clothes should not accidentally touch this agent. After decontamination, it must be thoroughly washed with water. (3) The liquid of poisonous chemical agents on the skin must be removed before applying this agent. (4) Highly concentrated bleaching powder causes excessive heat, fire, and discoloration of nighttime decontaminating activities. (5) It must be tightly sealed and stored in a dry cold and dark place. (6) It should be immediately used after mixing with water.	There are two kinds of bleaching powder. One is highly concentrated (decontaminating agent #1) and the other is regular bleaching powder. (Decontaminating agent #2) Agent #1 is twice as strong as agent #2.
Blank	(1) Powder of this agent must be gradually added to water, stirring well. (2) Poultices soaked in this solution should be applied to the contaminated area 3 times, and then the area should be washed thoroughly with a soap solution.	(1) Its corrosive effect upon metal is weaker than that of bleaching powder, but it can corrode it after a long period of time. (2) Both its vapor and liquid are harmful to humans. (3) It softens materials made of rubber or plastic and exfoliates paint. (4) After it is mixed with water, it loses its effect gradually.	(1) It must be mixed with water just before use. (2) In handling this agent, protective masks and rubber gloves must be worn. (3) It should not touch the skin. If it does accidentally, it must be immediately washed with soap solution. (4) When it is handled in a room, the room must have good ventilation. (5) Before putting the solution into a portable decontaminating container, impurities and lumps (6) be filtered.	(1) It cannot be used to decontaminate G agent. (2) This is called decontaminating agent #2.
D62 Firearms, vehicles and clothes contaminated with any poisonous chemical agents	(1) It can be used with a portable decontaminating container or with a poultice. (2) A poultice should be applied to the contaminated area once. After 30 minutes it should be washed with a soap solution.	(1) Its corrosive effect upon metal is weaker than that of daunk. (2) Both its vapor and liquid are harmful to humans. (3) It is inflammable. (4) It softens leather, and exfoliates paint. It is, however, weaker than daunk.	(1) It is extraordinarily inflammable. It should not be handled around engines which are running. (2) Protective masks and rubber gloves should be worn for handling. (3) It should not touch the skin. If it does, it must be immediately washed with a soap solution. (4) Tin, zinc, or painted surfaces must be thoroughly washed with water after decontamination.	

- CONTINUED ON NEXT PAGE -

Appendix 4 - Part 1 Continued

Name	Items	Methods	Characteristics	Cautions	Notes
Caustic Soda	Materials and equipment contaminated with any poisonous chemical agent, especially Lewisite or G agent.	(1) Caustic soda must be gradually added to water, stirring thoroughly to make a 5% solution. (2) In order to avoid corrosion, caustic soda should be mixed with 50% alcohol instead of water to make a 5% caustic soda solution.	(1) It easily dissolves with water causing excessive heat. (2) Solid caustic soda and highly concentrated solution are harmful to humans. (3) It corrodes metal and damages textiles. (4) It is deliquescent.	(1) No/lo mixing. containers should not be handled with bare hands. (2) It should not touch the skin, or clothes. If it does, it should be immediately washed off with water. (3) It should be tightly sealed, and stored in a dry place.	Caustic alkali can be used as well.
Carbonic Acid Soda	Materials and equipment contaminated with inflammatory or neural chemical agents.	(1) 5% to 10% solution	(1) Powder stimulates the respiratory organs, and is harmful to the skin and eyes. It damages textiles. (2) It reacts slowly compared to caustic soda and hyposulfurous acid soda.	(1) It should not touch the skin or clothes. If it does, it must be immediately washed with water. (2) After decontamination, items must be thoroughly washed with water.	
Hyposulfurous Soda	Materials and equipment contaminated with inflammatory chemical agents or V agents	(1) 5% solution	(1) It corrodes metal and damages textiles. (2) It exfoliates paints.	(1) Items must be washed thoroughly after decontamination.	
Protective Shoe Cream	Shoes made of leather	(1) It should be applied to shoes			
Protective Ointment	Refer to Section 27 and Section 48.				

Appendix 4 - Part 2. Decontaminating Agents Against Poisonous Chemical Agents

Agent	Object	Method	Characteristics
Water Soap solution	(Same as appendix 3)		
Organic Solvents			
Petroleum	Land	(1) Petroleum is sprinkled for incineration (2) This is used for a flame thrower	Poisonous gas will flow a long distance with the wind.
Explosive	Land	Explosion	It rapidly spreads decontaminating agents, but the effect is limited to a small area.
Hot air	Equipment	Fan	(1) This method efficiently decontaminates without hurting materials. (2) Higher temperature is more efficient.
Earth and Soil	Land	(1) It requires 10 centimeters thickness of gravel. (2) It requires 15 centimeters thickness of snow. (3) Metal sheets, boards, or roofing is used.	Poisonous chemical agents still remain.

Notes - Refer to section 98 for disposal of cloth and water used for decontamination.

Cautions in Handling Decontaminating Agents and Remarks

Petroleum - (1) Directions of the wind must be considered.

(2) It must be secretly prepared.

Explosive - (1) Poisonous chemical agents occasionally remain around high grass.

Hot Air - (1) Damages to the equipment must be avoided during the procedures.

(2) Directions of the wind must be considered.

Earth and Sand - (1) Decontamination must be done afterwards.

(2) This method is used to temporarily cover poisonous chemical agents when other methods are not available.

Appendix 5 - Disinfectants

Name	Contaminated Items	Methods	Cautions	Notes
Soap Carbolic acid	Corpses, excrement, vomit, hands, feet, glass, clothes, bed-clothes, leather, tools	3% solution	This cannot be used for food, water, or cooking utensils.	(1) Decontaminating agents which are used against poisonous chemical agents, such as daunk, DS2, caustic soda can be disinfectants. (2) Methylene bromide is used as a gaseous agent. (3) DDT and BHC can be used as well.
Alcohol	Hands, fingers, skin, tools	70% to 80% solution of ethyl alcohol 30% to 50% solution of isopropyl This is stronger than ethyl alcohol.		
Formalin	Boats, vehicles	3% solution When gaseous formalin is used, contaminated items should be left in a tightly closed room for more than 7 hours, and then wind-dried.	Gaseous formalin should not be inhaled.	
Bleaching powder	Contaminated beverage, excrement, vegetables, fruits	5% solution	Vegetables must be washed with water after disinfection. Bleaching powder should not be heated.	
Calcium hydroxide	Excrement, garbage	20% emulsion		
Invert soap	Hands, fingers, cooking utensils	An undiluted solution is used for hands and fingers. 3% solution is used for hands and tools.	This should not be used for excrement, vomit, or water to drink.	

- Continued on next page -

Appendix 5 - Continued

Name	Contaminated Items	Methods	Cautions	Notes
Potassium acid soda	For gargling	0.01 % solution		
Hypochlorous acid soda	Beverages, food, vegetables	0.3 % to 0.5 % solution		
Ethylene chloride	Clothes, bedclothes, glass, precision machines, aircraft, vehicles	When used as gas, infected items must be left in a tightly closed room for 6 hours, and then wind-dried.	It is very inflammable. It should not be inhaled.	
B.P.L.	Same as above	When used as gas, infected items must be left in a tightly closed room for 2 hours, and then wind-dried.	It should not be inhaled.	

Appendix 6 - Decontamination Method Against Poisonous
Chemical Agents by Using Each Material

Kind of Material	Items	Method of Decontamination	Note
Cotton	Clothes	<p>(1) Wind-drying - 4 to 8 hours of wind-drying for materials contaminated with vaporous inflammatory chemical agents More than 2 days for materials contaminated with liquid G agent</p> <p>(2) Protective ointment - Suitable for fast decontamination of small areas</p> <p>(3) Washing</p> <p>(4) Boiling - 1 hour of soaking in boiling water</p> <p>(5) Organic compound solution - Materials should be soaked for 2 minutes and squeezed, repeating twice with new solution each time, and then wind-dried.</p> <p>(6) Dry cleaning</p> <p>(7) DS2 solution - Poultices should be applied for 30 minutes, and then the material should be rinsed with water.</p> <p>(8) 5% sodium carbonate solution - Suitable to decontamination of G agent. Soak or apply with poultices. Must be rinsed thoroughly afterward.</p> <p>(9) 5% hypochlorous acid soda solution - The same method as above. Suitable to decontamination of V-agent.</p> <p>(10) Daunk solution - Poultices should be applied to the same area at 10 to 15 minute intervals. It should be left on 30 minutes after the last poultice and then rinsed with water. Suitable to canvas.</p> <p>(11) Bleaching powder emulsion - The weight ratio of 3 parts bleaching powder to 7 parts water. Items must be rinsed with water immediately after decontamination.</p>	
Wool	Clothes Equip- ment	<p>(1) Wind-drying - It requires twice as much time as cotton does.</p> <p>(2) Protective ointment - It is suitable to decontaminate small areas.</p> <p>(3) Washing</p> <p>(4) Warm soap solution (40 degrees C) - After one hour of soaking with careful stirring, it needs wind-drying at least for a day.</p>	DS2 and daunk solution are used only in emergencies, and they must be rinsed well afterwards.

-continued on next page -

Appendix 6 - Continued

Kinds of Material	Items	Method of Decontamination	Note
		(1) Organic compound solution - The same method as cotton (2) Dry cleaning	
Leather	Shoes	(1) Wind-drying - For several days. (2) Bleaching powder paste - After it is rubbed on shoes, it should be removed by shaking. (3) Boiling soap solution - After shoes are rubbed in the solution, they are rinsed with water. (4) Washing with water - After removing drops of liquid and mud on the surface, highly concentrated soap solution should be rubbed on shoes. Then they must be soaked in lukewarm water for 4 hours, rinsed with water, dried and then grease is applied. (5) Hypochlorites soda or carbonate soda - same as cotton materials (6) Protective shoe cream - It should be applied to shoes.	Same as wool
Rubber	Protective mask, gloves, boots, tires, hose	(1) Wind-drying for several days. (2) Protective ointment - This is used only for the protective mask. (3) Boiling soap solution - After an item is soaked in it for 2 to 8 hours, it should be rinsed with water. Items which directly touch the skin should be soaked for 6 to 8 hours. (4) DS2 solution - Poultice soaked with this solution should be applied for 30 min., and rinsed with water. (5) Bleaching powder emulsion - After an item is soaked in the emulsion of the weight ratio of 1 part bleaching powder to 2 parts water for 4 hours, it should be rinsed, and wind-dried for 3 days. Tires and hose should be wind-dried for 30 min. after application of poultices.	Daunk solution and organic compound solution should be used only in emergencies, and they must be immediately rinsed with water.
Rubber Water-proof	Anti-chemical garment	(1) Wind-drying for 2 to 4 hours. (2) Boiling soap solution - Items should be washed with boiling soap solution, or soaked in it for 1 hour without stirring.	Daunk solution and organic compound solution should be

- continued on the next page -

Appendix 6 - Continued

Kinds of Material	Items	Method of Deccontamination	Note
		They should be rinsed and wind-dried. (3) Bleaching powder emulsion - The same method as decontamination for rubber. (4) DS2 solution - Poultices are applied for 30 minutes, and it is rinsed with water. (5) 10 % sodium carbonate solution - Preferable to decontaminate G agent	used only in emergencies, and it must be immediately rinsed with water.
Plastic	Radios, insula- tors, wires, etc.	(1) Wind-drying - in case of vapor contamination. (2) Boiling soap solution - After drops of liquid poisonous chemical agents are removed, it should be washed with boiling soap solution and rinsed. (3) Organic compound solution - After items are wiped with this solution, they should be wind-dried. (4) DS2 solution - After 30 min. of application of poultice, an item should be thoroughly rinsed with water. (5) Daunk solution - This solution is used only for opaque plastic.	Daunk solution softens plastic. It should be used only in emergencies.
Glass	Windows	(1) Wind-drying (2) Wiping (3) Water or soap solution - Boiling soap solution is effective. (4) Organic compound solution - After wiping with this solution, items must be wind-dried. (5) DS2 solution - After 30 min. of application of poultice, items must be rinsed with water. (6) Daunk solution (7) Hypochlorite/soda solution - Preferable for use to decontaminate V agent	
Metal	Fire- arms, equip- ment, vehicles, food, utensils, etc.	(1) Wind-drying (2) Water or soap solution (3) Organic compound solution (4) DS2 solution - After 30 min. of application of poultice, it should be rinsed with water. (5) Daunk solution	

Appendix 6 - Continued

Kinds of Material	Items	Method of Decontamination	Note
Wood	Stock of a rifle, vehicles, trenches, structures,	(1) Wind-drying (2) Covering (3) Bleaching powder emulsion - After 12 to 24 hours of application of poultice, it should be rinsed with water.	
Concrete, Brick, Stone, Asphalt, etc.	Structures, roads, trenches, shelters, etc.	(1) Wind-drying (2) Covering - 10 centimeters thickness of gravel should cover contaminated areas. (3) Soap solution - Boiling soap solution is effective. (4) Powdery bleaching powder or paste bleaching powder should be spread on the areas. (5) Bleaching powder emulsion - After 24 hours of application of poultice, it should be rinsed with water.	The wind drying method is not applicable for decontamination against V agent.

Appendix 7 - Incapacitating Agents

Kind	Name	Sign	Physical Com- position at 20°C	Odor	How Fast It Shows Effects	How Long It Stays Effective
Agents which cause sneezing	Diphenyl, chlorarsine	DA	White or brown powder	Stimula- tive	Rapid	Comparatively short. It evaporates faster than water.
	Adamsite	DM	Yellow or green powder	Stimula- tive	Rapid	Short
Agents which cause tears	Chloraceto- phenone	CN	White powder	Similar to odor of apple flowers	Rapid	Short
	Ortho- chlorobenzal, malononitrile	CS	White powder	Similar to odor of pepper	Rapid	Short
Illusive agents	BZ, etc.					

Note - Incapacitating chemical agents are used to temporarily incapacitate persons and animals by physical reaction.

- continued on the next page -

Physical Symptoms and First Aid Treatment		
Class	Physical Symptoms	First Aid Treatment
Agents which cause sneezing	<ol style="list-style-type: none"> (1) It stimulates nose and throat and causes coughing and sneezing. (2) It causes strong pain in the throat, trachea, teeth and gums. (3) Nausea and vomiting. (4) Headache 	<ol style="list-style-type: none"> (1) A person should be exposed to clean air and wind. (2) He should keep his eyes open as much as possible. He should avoid rubbing his eyes, wash them, and use eye drops.
Agents which cause tears	<ol style="list-style-type: none"> (1) It stimulates eyes and causes excessive tears. (2) It stimulates the nose, and causes a running nose. CS also stimulates the throat, and causes coughing, respiratory problems, a feeling of pressure on the chest. (3) It stimulates the skin, especially when the skin is wet. (4) Highly concentrated CS causes nausea, vomiting, and dizziness. (5) It stays effective for a short period of time. 	<ol style="list-style-type: none"> (3) He should expose the skin in the wind, and wash it if necessary. (4) He should beat his clothes, and expose them in the wind. (5) When he vomits with protective mask on, he should slightly lift the bottom of the mask.
Illusive agents	<ol style="list-style-type: none"> (1) Skin becomes dry and red. (2) It stops urine and causes constipation. (3) It causes headaches, dizziness, drowsiness, and mental and physical activities become slow. (4) It causes hallucinations and insanity. (5) It raises the body temperature. (6) These symptoms are only temporary and a person recovers completely. 	<ol style="list-style-type: none"> (1) When the agent adheres to the skin, it should be washed with soap solution. (2) Eyes must be washed with water. (3) A person must beat his clothes, and expose them in the wind or wash them with water.

Note - Protective masks can protect against these agents.

Appendix 8 - Chemical Agents Used Against Vegetation (Herbicidal Agents)

Chemical agents used against vegetation are used to cause defoliation, to wither vegetation, or to stop the growth by its chemical reactions.

Name	Physical composition	Effects	Toxicity to Humans
Zinc chloride	Solution	This is harmful to all vegetation. The color of leaves change to yellow within 2 to 3 days. After 5 days, leaves start falling	Highly concentrated agents stimulate skin. Very harmful if a large quantity of agent is inhaled.
Rhodan ammonium	Solution	Harmful to all the vegetation. Discoloring starts within 24 hours, and after 9 days, leaves start falling.	A large quantity of this agent is harmful.
2.4D (2-4 Dichlorophenoxyacetates)	Solution, emulsion, or powder	This is effective on broad leaf trees. Discoloring starts within 24 hours. After 9 days leaves start falling. (Agricultural weed killer)	It stimulates eyes and skin.
I.P.C. (Isopropylphenylcarbamine)	Solution	It is effective on needle-leaf trees. Roots absorb the agent. Discoloration starts within one to two weeks, and the plant stops growing. Withering starts from the edge of a leaf. (Agricultural weed killer)	It is harmless.

Appendix 8 - Chemical Agents Used Against Vegetation (Herbicidal Agents)

Chemical agents used against vegetation are used to cause defoliation, to wither vegetation, or to stop the growth by its chemical reactions.

Name	Physical composition	Effects	Toxicity to Humans
Zinc chloride	Solution	This is harmful to all vegetation. The color of leaves change to yellow within 2 to 3 days. After 5 days, leaves start falling	Highly concentrated agents stimulate skin. Very harmful if a large quantity of agent is inhaled.
Rhodan ammonium	Solution	Harmful to all the vegetation. Discoloring starts within 24 hours, and after 9 days, leaves start falling.	A large quantity of this agent is harmful.
2.4D (2-4 Dichlorophenoxyacetates)	Solution, emulsion, or powder	This is effective on broad leaf trees. Discoloring starts within 24 hours. After 9 days leaves start falling. (Agricultural weed killer)	It stimulates eyes and skin.
I.P.C. (Isopropylphenylcarbamine)	Solution	It is effective on needle-leaf trees. Roots absorb the agent. Discoloration starts within one to two weeks, and the plant stops growing. Withering starts from the edge of a leaf. (Agricultural weed killer)	It is harmless.

Appendix 9 - Terminology

Special weapons	A general term for nuclear weapons, chemical weapons and biological weapons. Chemical weapons is a term for special weapons which use poisonous chemical agents. It excludes weapons of incapacitating chemical agents, herbisidal agents and incendiary agents.
Contamination	The fact that radioactive substances, poisonous chemical agents or biological agents are adhered to personnel, equipment, facilities, and land or are floating in the air.
Deccontamination	To remove contamination with either chemical or physical methods
Disinfection	To exterminate microbes of biological agents
Wind dry	To dry in the wind for decontamination against poisonous chemical agents
Sun dry	To dry in the sun for decontamination against poisonous chemical agents or biological agents
Center of explosion	The center of explosion of nuclear weapons
Ground zero	Right under the center of explosion or the center spot of explosion on the ground or water
Low altitude explosion	The altitude of explosion is between $53W^{1/3}$ to $120W^{1/3}m$ and the fireball does not reach the ground. W is the number of kilotons of power for nuclear weapons. (For example, when the weapon is 20KT, the center of explosion is between 144m to 326m)
High altitude explosion	The altitude of explosion is more than $120W^{1/3}m$ and the explosion affects the ground. (When the weapon is 30KT, the lowest altitude of the center of explosion is 326m.)
Ultra-high altitude explosion	The explosion is higher than a high altitude explosion. It hardly affects the ground.

Roentgen	A unit to count the amount of gamma particles. R is an abbreviation of Roentgen rays. In this textbook, R is used to measure the radioactivity of all radioactive particles for convenience.
Count	Count of radioactive particles
Radiation intensity	Amount of radioactive particles during a certain period of time. R/h is the abbreviation of Roetgens/hour.
Dosage	Total amount of radiation dosage a person or object received. R is the abbreviation of Roentgen.
50 % fatal dose	Amount of radiation or poisonous chemical agents which kills 50 % of persons who are exposed to radiation or chemical agents without protection.
Fatal dose	Minimum amount of radiation or poisonous chemical agents which kills 100 % of persons who are exposed.
High altitude weather	Weather at high altitude. The flow of fallout should be observed at every 2000 meter interval.
Effective wind	Estimated wind direction and speed from the high altitude to the ground in order to estimate the flow of fallout.
Fallout	The descent of radioactive materials resulting from a nuclear explosion.
Area of induced radiation	An area contaminated with neutrons which were radiated in a nuclear explosion.
Maximum permissible dose of radiation	The maximum amount of radiation a person can receive during a certain period of time. Commanders set this number according to the conditions.
Aerosol	A system consisting of colloidal particles of radioactive substances, poisonous chemical agents, or biological agents dispersed in the air.

Defense Against Special Weapons, Instructional Manual,
#21 - 101, Change #1 dated 13 August 1971

Page	Section	Line	Original Text	Reversed Text
72	77	7	Chemical unit and chemical information unit	Chemical <u>protection</u> unit and chemical information unit
149			Appendix 7 - Harmless Chemical Agents	Appendix 7-Incompacitating Chemical Agents <u>Described in Foreign Army Information</u>
151			Appendix 8 - Chemical Agents Used Against Vegetation	Appendix 8-Incompacitating Agents Used Against <u>Vegetation Described in Foreign Army Information</u>