

W. Whitten

NAVSEA OP 5 VOLUME 2

0630-LP-000-2226

FIFTH REVISION

**AMMUNITION AND EXPLOSIVES ASHORE  
STORAGE DATA**



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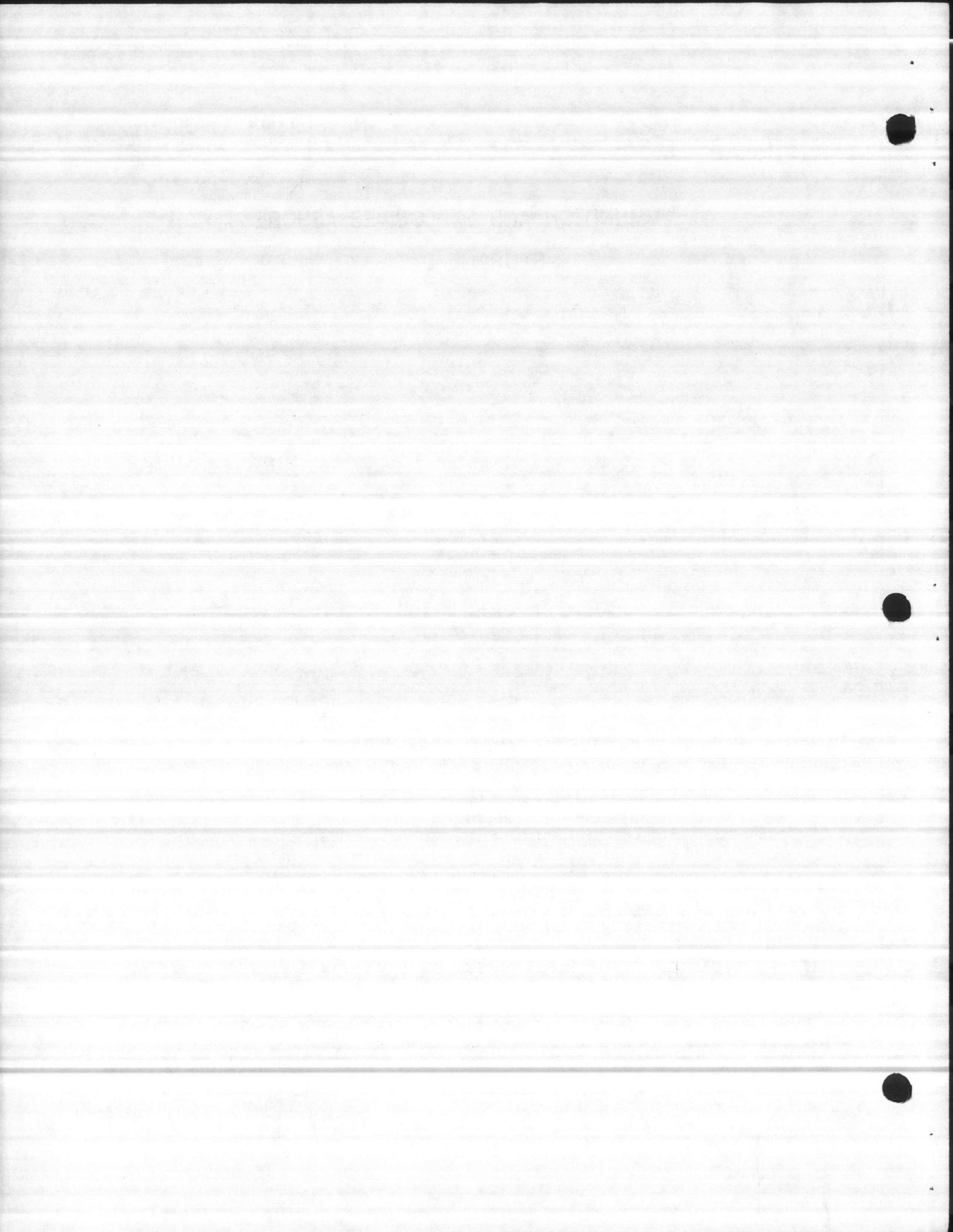
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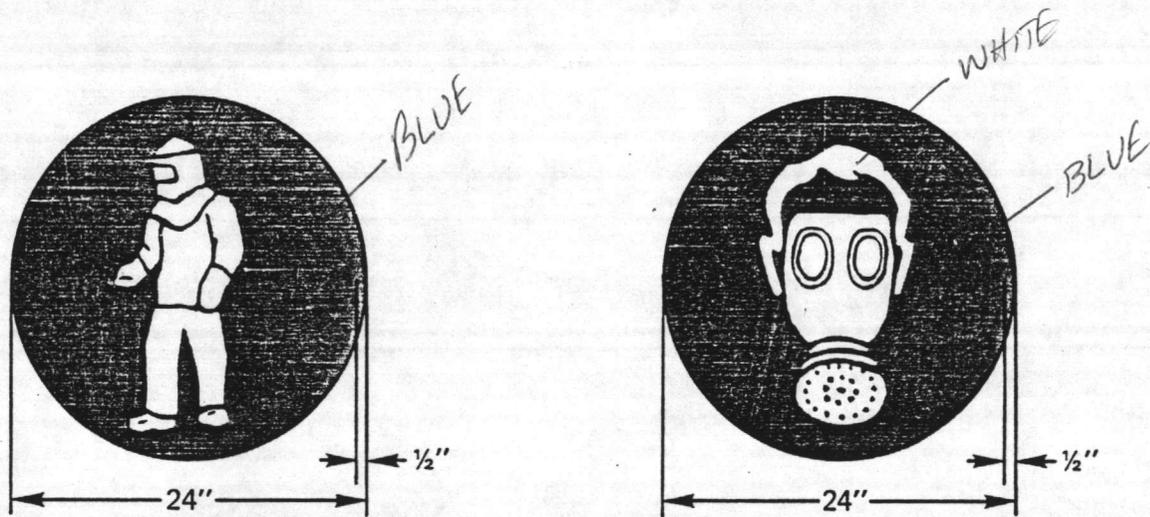
**THIS PUBLICATION SUPERSEDES NAVSEA OP 5 VOLUME 2 FOURTH REVISION  
DATED 1 SEPTEMBER 1978**

**PUBLISHED BY DIRECTION OF COMMANDER, NAVAL SEA SYSTEMS COMMAND**

**1 FEBRUARY 1987**

**CHANGE 1 - 15 AUGUST 1988**





Symbol 1. Wear full protective clothing

Background is blue.  
Figure and rim is:

- 1 Red for Set 1 Protective Clothing  
24" NSN-7690-01-081-9586  
12" NSN-7690-01-081-9585

Symbol 2. Wear Breathing Apparatus

Background is blue.  
Figure and rim are white.  
24" NSN-7690-01-081-9589  
12" NSN-7690-01-082-6710

- 2 Yellow for Set 2 Protective Clothing  
24" NSN-7690-01-081-9587  
12" NSN-7690-01-082-0281

- 3 White for Set 3 Protective Clothing  
24" NSN-7690-01-083-6272  
12" NSN-7690-01-081-9588

Colors per Fed. Std. 595A  
or GSA Catalog.  
Red #11105  
Blue #15102  
Yellow #13538  
White #17875  
Black #17038

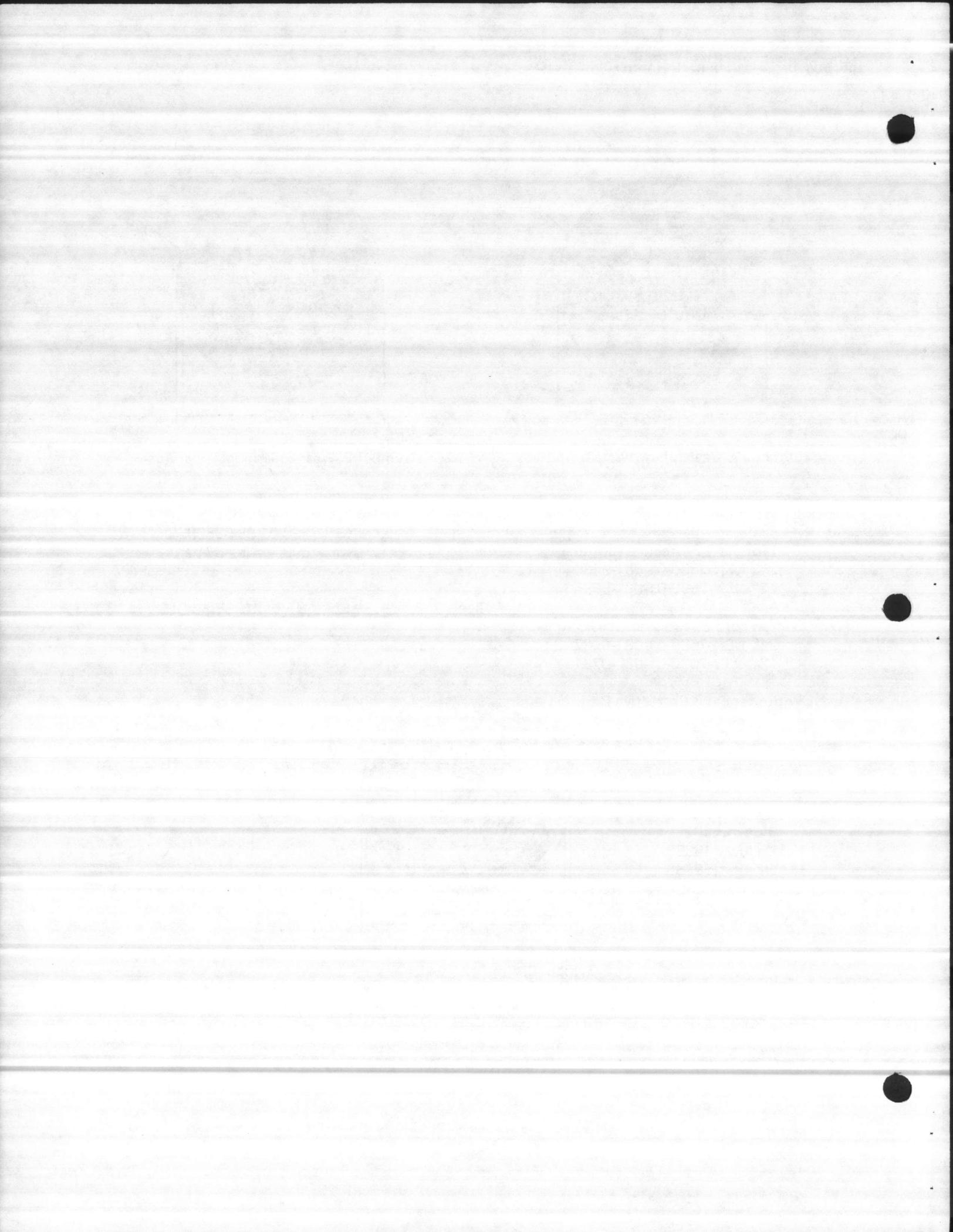
FIGURE 3-2. CHEMICAL HAZARD SYMBOLS



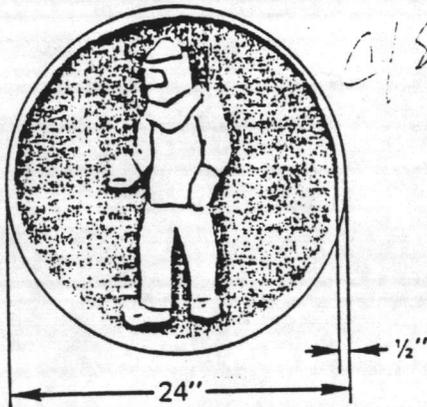
Symbol 3. Apply no water

Background is white, circle and  
diagonal are red, figures are black.  
24" NSN-7690-01-082-2254  
12" NSN-7690-01-082-0292

FIGURE 3-3. FIRE DIRECTION SYMBOL



CHEMICAL HAZARD SYMBOLS



Symbol 1. Wear full protective clothing

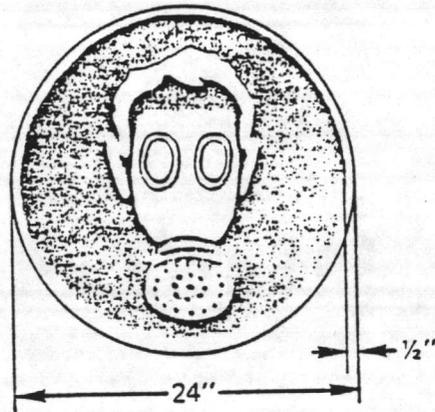
Background is blue.  
Figure and rim is:

Red for Set 1 Protective Clothing  
24" NSN-7690-01-081-9586  
12" NSN-7690-01-081-9585

Yellow for Set 2 Protective Clothing  
24" NSN-7690-01-081-9587  
12" NSN-7690-01-082-0291

White for Set 3 Protective Clothing  
24" NSN-7690-01-083-6272  
12" NSN-7690-01-081-9588

Colors per Fed. Std. 595A  
or GSA Catalog.  
Red #11105  
Blue #15102  
Yellow #13538  
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Black #17038



Symbol 2. Wear Breathing Apparatus

Background is blue.  
Figure and rim are white.  
24" NSN-7690-01-081-9589  
12" NSN-7690-01-082-6710

*CHTR 21*



Symbol 3. Apply no water

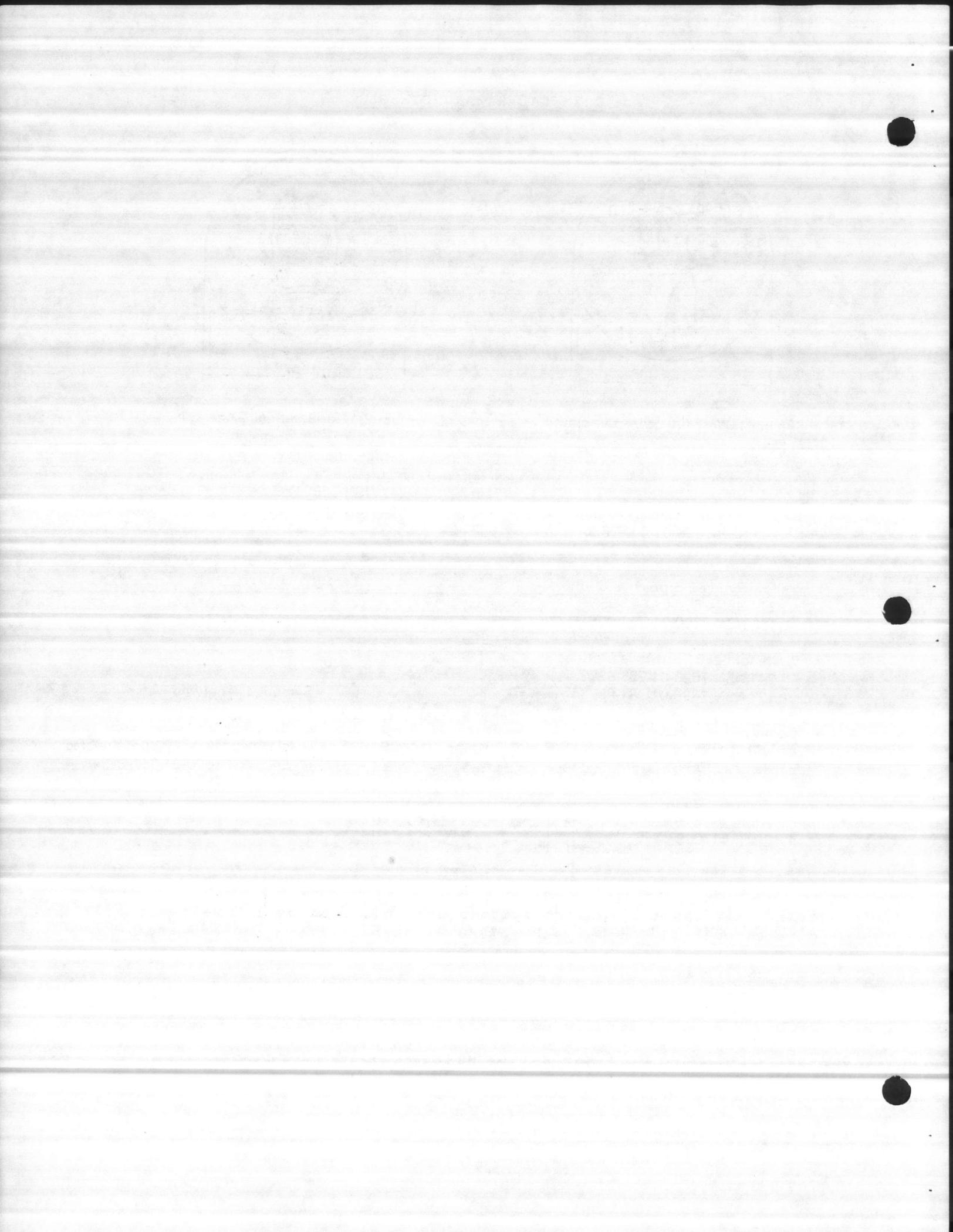
Background is white, circle and  
diagonal are red, figures are black.  
24" NSN-7690-01-082-2254  
12" NSN-7690-01-082-0292

Additional chemical hazard symbols are indicated by 24" yellow #13538 circles with 12" high black #17038 letters. These letters are:

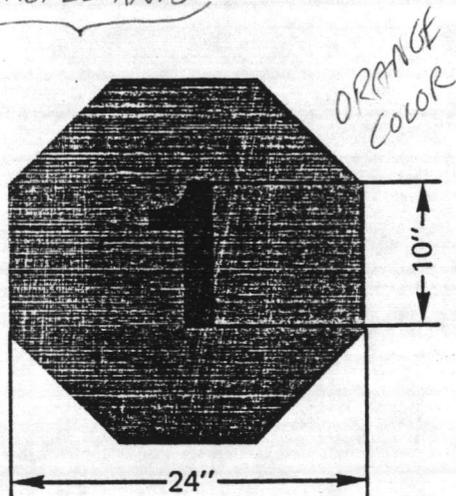
G for G-type Nerve Agents  
VX for VX Nerve Agent  
BZ for Incapacitating Agent BZ  
H for H-type Mustard Agents  
L for Lewisite

*OP5 VCL 1*  
*3-32*

*The same symbols...*



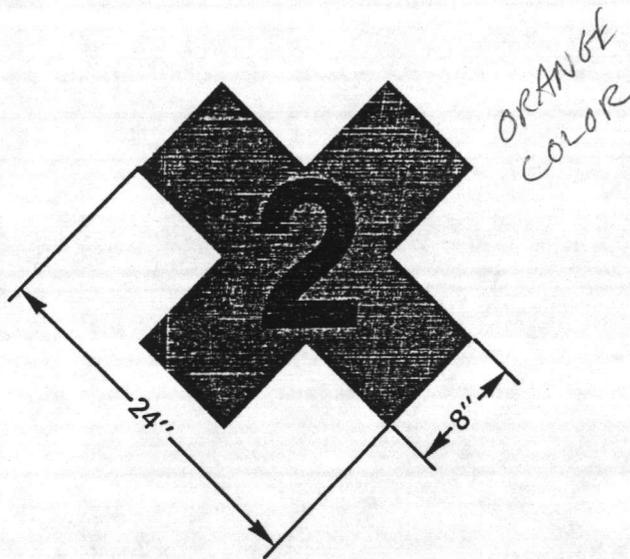
MASS DETONATION  
 - EXPLOSIVES &  
 - CERTAIN LIQUID  
 PROPELLANTS



Class 1, Division 1

24" NSN-7690-01-082-6290  
 12" NSN-7690-01-081-9581

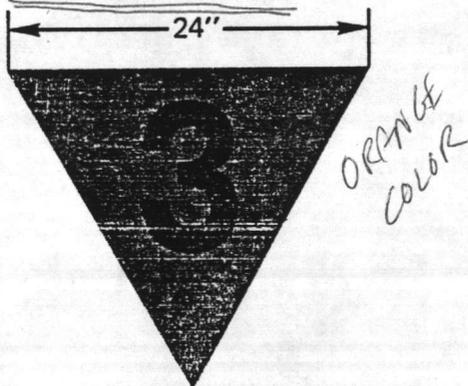
FRAGMENT EXPLOSION  
 AMMUNITION &  
 EXPLOSIVES



Class 1, Division 2

24" NSN-7690-01-082-0289  
 12" NSN-7690-01-087-7340

MASS FIRE

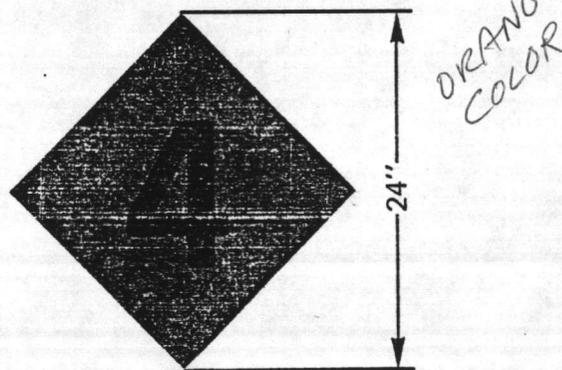


Class 1, Division 3

24" NSN-7690-01-081-9583  
 12" NSN-7690-01-081-9582

AMMUNITION &  
 EXPLOSIVES

MODERATE FIRE



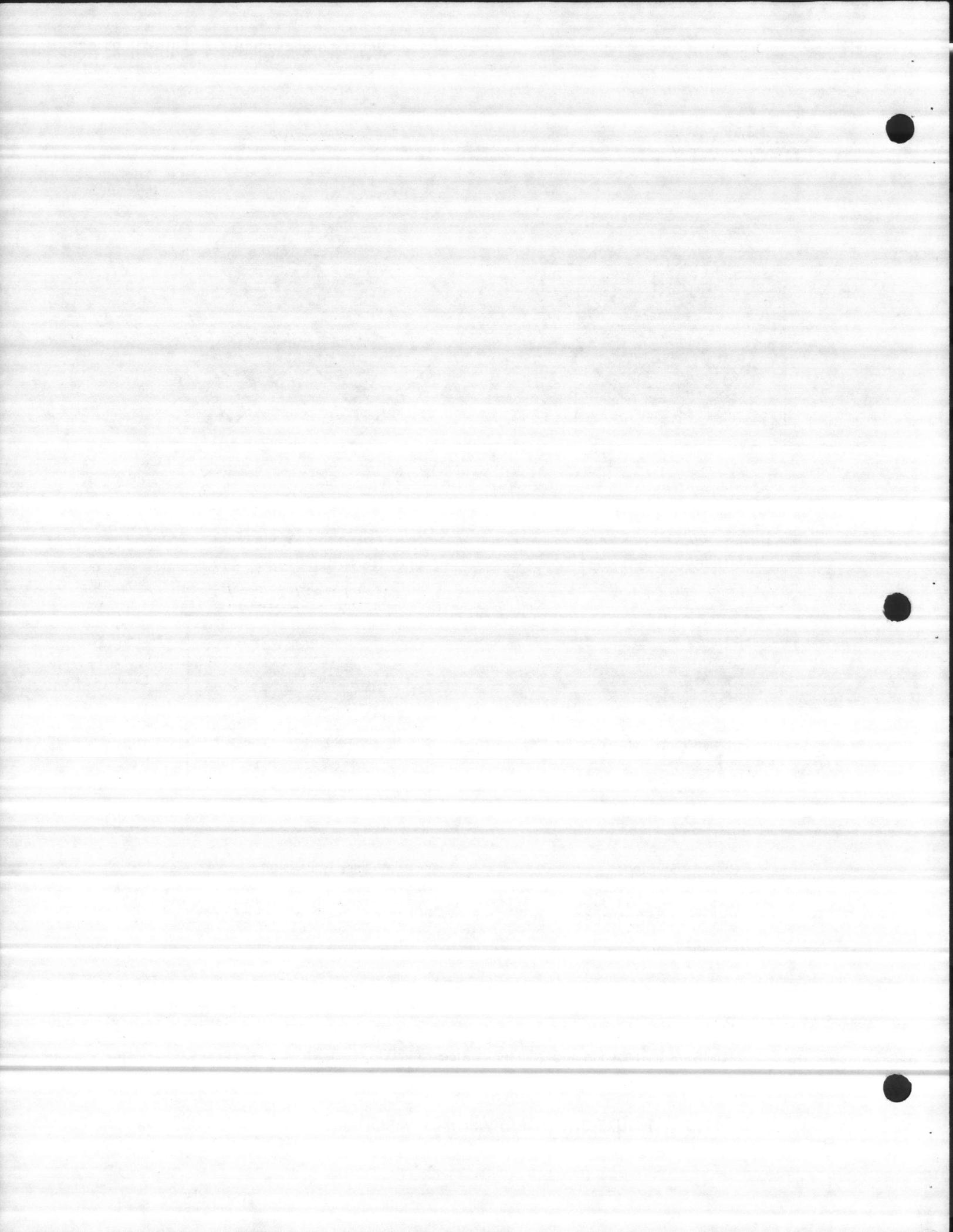
Class 1, Division 4

24" NSN-7690-01-082-6709  
 12" NSN-7690-01-081-9584

AMMUNITION &  
 EXPLOSIVES

BACKGROUND: Orange #12246 (Fed. Std. 595A)  
 NUMBERS: 10" High and 2" Thick: Black #17038 (Fed. Std. 595A)

FIGURE 3-1. FIRE DIVISION SYMBOLS



in NFPA Pamphlet No. 80. The requirements of the Life Safety Code (NFPA No. 101) shall be followed where fire doors also serve as exit doors.

### 3-3 FIRE AND CHEMICAL HAZARD SYMBOLS

3-3.1 GENERAL. There are three types of symbols which give guidance for firefighting forces, security forces, and other personnel; fire, chemical hazard and firefighting direction symbols.

3-3.2 FIRE SYMBOLS. These symbols represent the four explosive divisions, 1 through 4. The hazard decreases as the fire symbol number increases. The hazard is based on the burning or explosive characteristics of the material. Fire symbols do not apply to liquid propellants, except for Symbol 1, which is used to indicate a detonation hazard of Group IV propellant. Fire protection for insensitive high explosives (both bulk and filled items) is based on their equivalent storage classification. (See paragraph 5-2.2.5 and tables 5-3A and 5-3B). Each of the four fire symbols has a distinctive shape, with the class/division number shown. See figure 3-1. The hazard and firefighting precautions for each symbol are summarized in table 3-2.

3-3.3 CHEMICAL HAZARD SYMBOLS. These symbols are used to identify operating buildings and storage facilities which contain pyrotechnics and chemical munitions or agents and other hazardous materials. They may be used by themselves or in conjunction with fire symbols as appropriate. Hazard symbols vary with the type of agent. These symbols are described in figure 3-2. The hazard each symbol represents and the firefighting precautions are summarized in table 3-3.

3-3.4 FIRE-FIGHTING DIRECTION SYMBOL. The "apply no water" sign is intended for use with hazardous materials where use of water may intensify the fire or hazard of explosion, or spread the fire. This symbol is described in figure 3-3.

Firefighting precautions are summarized in table 3-3.

3-3.5 SYMBOL DIMENSIONS. The dimensions shown in figures 3-1 through 3-3 are the normal minimum sizes. Half-size symbols may be used when appropriate, such as on doors and lockers inside buildings.

3-3.6 PROCUREMENT OF SYMBOLS. Fire and chemical hazard symbols may be obtained through normal Navy supply channels. National stock numbers (NSNs) of standard and half-size symbols are listed on figures 3-1 through 3-3.

3-3.7 POSTING OF SYMBOLS. The symbol(s) which represents the most hazardous material present shall be posted outside and/or inside hazardous materials storage sites and operating buildings unless security considerations make it undesirable to identify materials at the sites. The symbol should be located such that it will be visible during daylight for a minimum distance of 500 feet. If visibility is obstructed by vegetation, curves in roads, etc., it shall be placed at a point on the roadway at distances of not less than 500 feet. One symbol posted on or near the door end of an igloo magazine, or on the headwall of a box-type magazine is normally adequate. One or more symbols may be required on other buildings. In cases where all material within a storage area is covered by one fire symbol, it may be posted at the entry control point or access roadway. Where different class/divisions of explosives are stored in individual multi-cubicle bays or module cells, they may further be identified by posting the proper symbol on each bay or cell. Placement of symbols shall be coordinated with the station fire department. Backing material for symbols should be the shape of the symbol decal and should be noncombustible.

### 3-4 FIREFIGHTING INSTRUCTIONS

3-4.1 GENERAL CONSIDERATIONS. Fires occurring in buildings or magazines



containing ammunition or explosives vary in intensity and effect depending on the material involved in the fire. Certain explosives detonate with devastating results immediately on contact with a spark or flame or when subjected to frictional heat or concussion, and fire may or may not result from the detonation. Some explosive substances burn freely like ordinary materials of high flammability; some develop heat so intense that direct firefighting efforts are impossible and some produce fumes that are poisonous, explosive, or lacking in the oxygen content necessary to sustain life. Therefore, in order to successfully combat fires involving these substances, it is necessary that the personnel understand thoroughly what Class 1, Divisions 1 through 4; Class 2, Division 3 or Class 6 explosives or ammunition will or may do when subjected to heat or flame. General considerations in fighting fires involving ammunition and explosives are presented in this subparagraph.

**3-4.2 USE OF AVAILABLE COVER.** Forces engaged in fighting fires involving explosives and ammunition shall seek cover, when available, and never expose themselves unnecessarily to the intense heat, flying fragments or possible explosions.

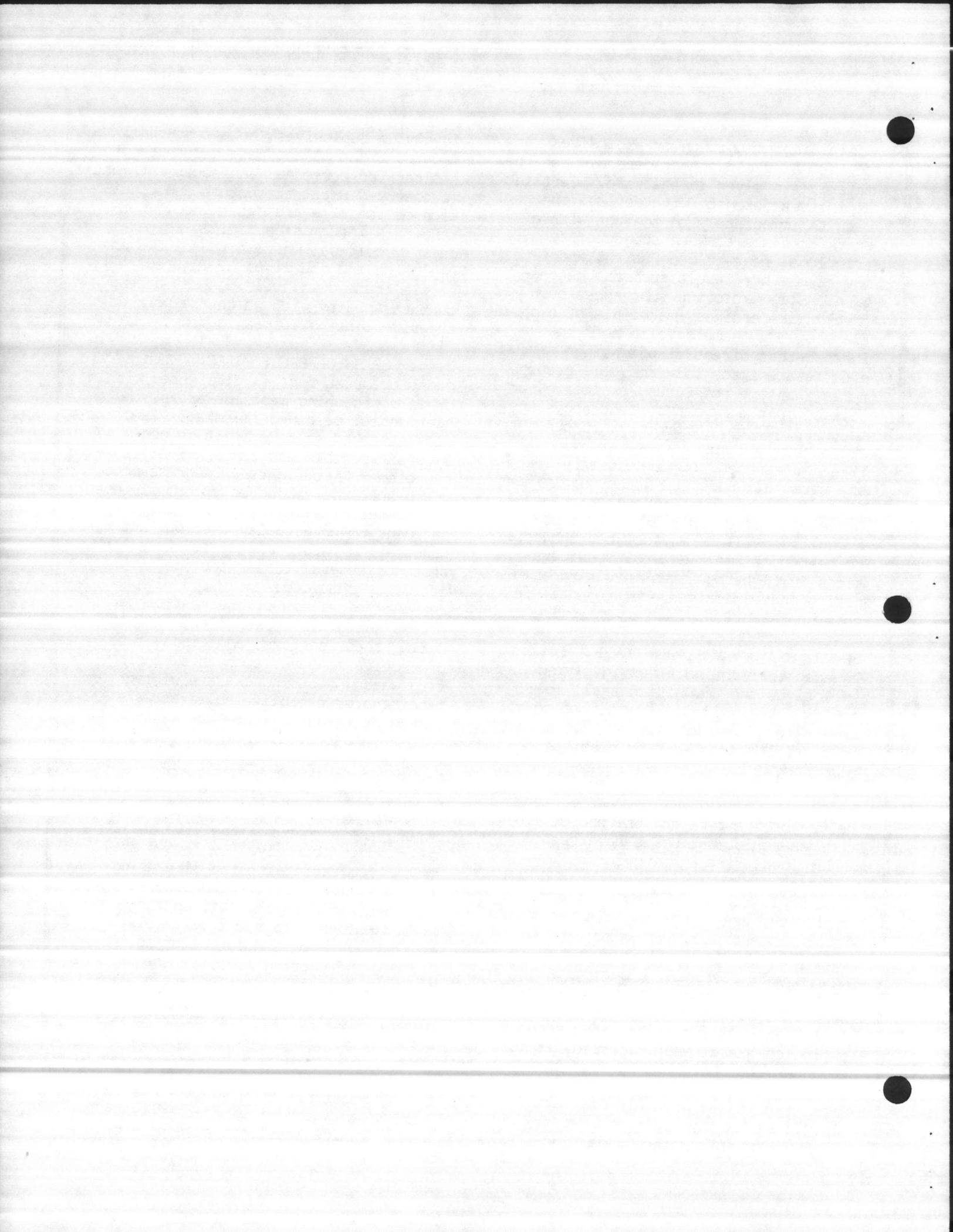
**3-4.3 APPROACHING FIRES.** After the nature of the fire and the proper procedures for combating it have been determined, firefighting forces may approach a fire to extinguish it or to protect adjacent buildings. Where explosives are involved, this decision is contingent upon one or both of the following conditions: it must be known that a safe distance, a barricade, or a dividing wall of masonry or concrete separates burning nonexplosive materials from high explosives; or, if a primary explosion has already occurred, it must be known that only the heat of the burning wreckage menaces other buildings, regardless of their contents. When there is any doubt about the accuracy of information regarding a fire

involving explosives, no effort shall be made to fight it and safe distances or shelter for personnel and equipment must be observed until the nature and condition of the fire are determined. Getting this information rapidly is particularly critical where fire follows an explosion and the lives of injured people trapped in buildings may depend on the rapidity with which the work of the firefighting forces is done.

**3-4.4 GRASS OR BRUSH FIRES.** When a grass or brush fire is discovered within or is approaching magazine areas, the alarm shall be given immediately and the fire attacked at once if it is considered feasible and comparatively safe to do so. Fire fighting in grass or brush shall be conducted vigorously even though the fire may be immediately adjacent to or actually over but not penetrating into a magazine. Local and state or federal forest service officials should be consulted with respect to periods of greatest danger of forest and grass fires in the vicinity. During these periods, additional fire protective measures such as expanding fire watch, securing extra equipment and repairing or establishing firebreaks should be taken, if necessary. (See paragraph 3-1.2.1d.)

**3-4.5 FIRES IN BUILDINGS OR OPEN MAGAZINES.** When employees are in a building or open magazine and a fire occurs in or around the structure, the fire shall be reported immediately. Employees shall attempt to extinguish the fire using suitable first-aid firefighting equipment available to the building or magazine. However, if the fire involves explosive or toxic material or is immediately endangering it or if the fire is so large that it cannot be extinguished with the equipment at hand, the employees shall vacate the magazine or building and seek safety.

**3-4.6 FIRES IN CLOSED MAGAZINES.** Closed magazines from which smoke is issuing or which give other evidence of a fire inside shall not be opened before



[PAGE 3-32A/(3-32B BLANK) DELETED BY CHANGE 13]

Table 3-2. Fire Symbol Hazards and Actions

| Fire Symbol | Materials                                     | Hazard                   | Action/Remarks  |
|-------------|---|--------------------------|---|
| 1           | 1.1 Explosives and certain liquid propellants | Mass detonation          | <ol style="list-style-type: none"> <li>Will not be fought unless a rescue attempt is being made.</li> <li>If there is suitable separation between nonexplosive and symbol 1 materials and if approved by the fire chief, firefighting forces may attempt to extinguish the fire.</li> <li>If personal safety is in doubt, take suitable cover. Note 1.</li> </ol>   |
| 2           | 1.2 Ammunition and explosives                 | Explosion with fragments | <ol style="list-style-type: none"> <li>Give the alarm and attempt to extinguish the fire if in an early stage.</li> <li>Firefighting forces should fight the fire. If not possible, prevent the spreading of the fire.</li> <li>Detonations of items could occur. Provide protection from fragments. Note 2.</li> </ol>   |
| 3           | 1.3 Ammunition and explosives                 | Mass fire                | <ol style="list-style-type: none"> <li>May be fought if explosives not directly involved.</li> <li>If WP munitions are involved, smoke is liberated. <ol style="list-style-type: none"> <li>WP munitions may explode.</li> <li>Phosphorus should be immersed in water or sprayed with water continuously.</li> </ol> </li> <li>For fires involving HC and incendiaries. <ol style="list-style-type: none"> <li>Water should not be used unless large quantities are available.</li> <li>Use dry sand or dry powder agent in the early stage.</li> </ol> </li> <li>For fires involving pyrotechnics and magnesium incendiaries. <ol style="list-style-type: none"> <li>Protect adjacent buildings and magazines.</li> <li>Do not use CO<sub>2</sub>, or Halon extinguishers or water.</li> <li>Allow magnesium to cool unless upon flammable material. In this case, use a 2-inch layer of dry sand or powder on the floor and rake the burning material onto this layer and resmother. Note 3.</li> </ol> </li> </ol> |
| 4           | 1.4 Ammunition and explosives                 | Moderate fire            | <ol style="list-style-type: none"> <li>Fight these fires.</li> <li>Expect minor explosions and hot fragments.</li> </ol>  |

Note 1. Withdrawal distance is 2000 feet or inhabited building distance, whichever is greater.

Note 2. Withdrawal distance is 1800 feet.

Note 3. Withdrawal distance is 600 feet (800 feet for quantities greater than 500,000 lbs. NEW.)



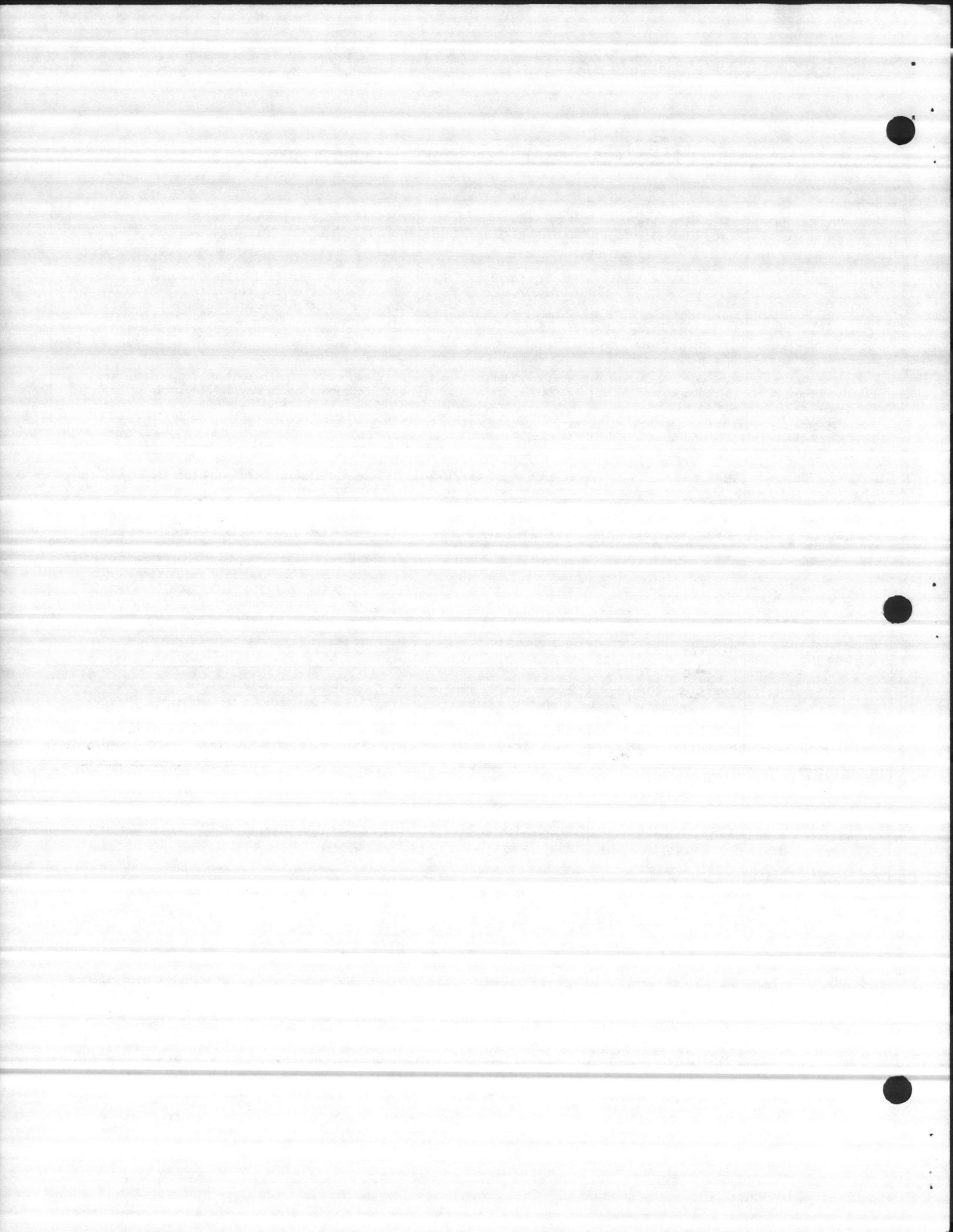
Table 3-3. Chemical Hazard Symbols and Actions

| Chemical Symbol                                    | Materials (Compatibility Gp)                                  | Hazard                                       | Action/Remarks  |
|--|---|--|---|
| Full Protective Clothing—Set 1 (Red)<br>Note 1.    | Nerve/Blister Agents (K)                                      | Highly toxic as aerosol/vapor                | <ol style="list-style-type: none"> <li>1. Evacuate public 2 miles downwind or 1 mile upwind or to the sides.</li> <li>2. Use munitions decontamination procedures.</li> <li>3. If explosion does not occur, approach from upwind and extinguish fire.</li> </ol>  |
| Full Protective Clothing—Set 2 (Yellow)<br>Note 2. | Riot Control/Smokes (G) Incapacitating Agents(K)<br><i>OS</i> | Toxic as aerosol/vapor                       | <ol style="list-style-type: none"> <li>1. Approach from upwind and extinguish fire.</li> <li>2. Decontamination may be required.</li> </ol>   |
| Full Protective Clothing—Set 3 (White)<br>Note 3.  | TEA Smoke (L)   | Spontaneously flammable                      | <ol style="list-style-type: none"> <li>1. Do not look at burning material.</li> <li>2. Do not use water.</li> </ol>   |
|  | White Phosphorus (H)  | Spontaneously flammable when exposed to air. | <ol style="list-style-type: none"> <li>1. Post fire guard until leaking phosphorus has been removed.</li> <li>2. After removal of agents, post fire guard for 2 days for possible reignition.</li> <li>3. Use putty knife to remove small amounts, then use blowtorch to burn off remainder.</li> </ol> |
| Wear Breathing Apparatus                           | HC Smoke (G)  | Smoke  | <ol style="list-style-type: none"> <li>1. Do not use water.</li> </ol>  |
|  | Incendiary (G)  | Burns with extremely high temperature        | <ol style="list-style-type: none"> <li>1. Do not use water.</li> <li>2. Do not look at burning material.</li> </ol>   |
|  | Napalm (J)  | Mass fire                                    | <ol style="list-style-type: none"> <li>1. Fight fire as a POL fire.</li> </ol>  |
| Apply no Water                                     | HC Smoke (G)  | Smoke  | <ol style="list-style-type: none"> <li>1. Do not use water.</li> </ol>  |
|  | Incendiary (G)  | Burns with extremely high temperature        | <ol style="list-style-type: none"> <li>1. Do not use water.</li> <li>2. Do not look at burning material.</li> </ol>   |
|  | TEA Smoke (L)   | Spontaneously flammable                      |   |

**Note 1.** Set 1 consists of gas mask, M9 series; butyl impermeable suit (coveralls, hood, gloves, fireman's boots and boot covers.) The chemical warfare defense ensemble with M17 series mask may be substituted where contact with liquid agent is highly improbable.

**Note 2.** Set 2 consists of gas mask, M9 or M17 series; coveralls; protective gloves. (Firefighting protective clothing and equipment may be used.)

**Note 3.** Set 3 consists of flame retardant coveralls; flame-resistant gloves; gas mask, M9 or M17 series. Used primarily with white phosphorus and triethylaluminum. (Firefighting protective clothing and equipment may be used.)



## SCG STORAGE COMPATIBILITY GROUPS

Group A - Bulk initiating explosives. Examples are wet lead azide, wet lead styphnate, wet mercury fulminate, and wet tetracene; and dry PETN. *Very sensitive*

Group B - Detonators and similar initiating devices which contain initiating explosives. Examples are detonators, blasting caps, small arms primers, and fuzes.

Group C - Bulk propellants, propelling charges, and devices containing propellant with or without their means of ignition. Examples are single-, double-, triple-base, and composite propellants, rocket motors (solid propellant), and ammunition with inert projectiles.

Group D - Black powder, high explosives (HE), and ammunition containing HE without its own means of initiation and without propelling charge. Where sufficient storage space is available, it is desirable to store bulk HE separately from ammunition containing HE even though they are both in the same compatibility group.

Group E - Ammunition containing HE without its own means of initiation and with propelling charge. Examples are artillery ammunition, rockets, or guided missiles.

Group F - Ammunition containing HE with its own means of initiation and with or without propelling charge. Examples are grenades, sounding devices, and similar items having an in-line explosive train in the initiator.

Group G - Fireworks, illuminating, incendiary, smoke including HC, or tear producing munitions other than those munitions that are water activated or which contain white phosphorus, or flammable liquid or gel. Examples are flares, signals, incendiary or illuminating ammunition, and other smoke or tear producing devices.

Group H - Ammunition containing white phosphorus or other pyrophoric material with or without explosives.

Group J - Ammunition containing flammable liquids or gels with or without explosives. Examples are liquid or gel filled incendiary ammunition.

Group K - Ammunition containing toxic chemical agents with or without explosives.

Group L - Ammunition not included in other compatibility groups. Examples are water activated devices, prepackaged hypergolic liquid-fueled rocket engines, fuel-air explosive devices (FAE), TPA (thickened TEA), and damaged or suspect ammunition of any group. Types presenting similar hazards may be stored together but not mixed with other groups.

Group S - Ammunition presenting no significant hazard. *See also HKM*

