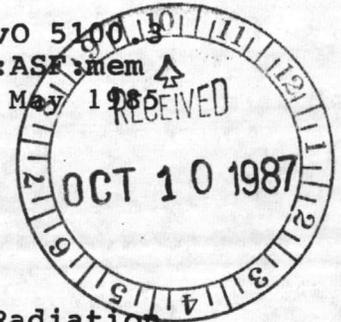




UNITED STATES MARINE CORPS
2d Marine Division, Fleet Marine Force
Camp Lejeune, North Carolina 28542-5500

G-4 FILES

DivO 5100.13
32:ASF:mem
22 May 1987



DIVISION ORDER 5100.3

From: Commanding General
To: Distribution List

Subj: Light Amplification by Stimulated Emission of Radiation
(LASER) Safety

- Ref: (a) American National Standard for the Safe Use of Lasers
ANSI Z136.1-1980 (NOTAL)
(b) SECNAVINST 5100.14A (NOTAL)
(c) NAVMEDCOMINST 6470.2 (NOTAL)
(d) NAVELEXINST 5100.12 (NOTAL)
(e) EO410-BA-GYD-010/7034 Laser (NOTAL)
(f) MCO P3570.1A
(g) ForO 5100.8 (NOTAL)

- Encl: (1) Laser Annual Inventory Report Format
(2) Laser Range Firing Log
(3) Laser Safety Inspection Checklist
(4) Laser Maintenance Safety Precautions

Report Required: I. Laser Annual Inventory Report

1. Purpose. To promulgate guidelines and assign responsibilities for the safe use of laser systems within the 2d Marine Division, in accordance with references (a) through (f).

2. Information

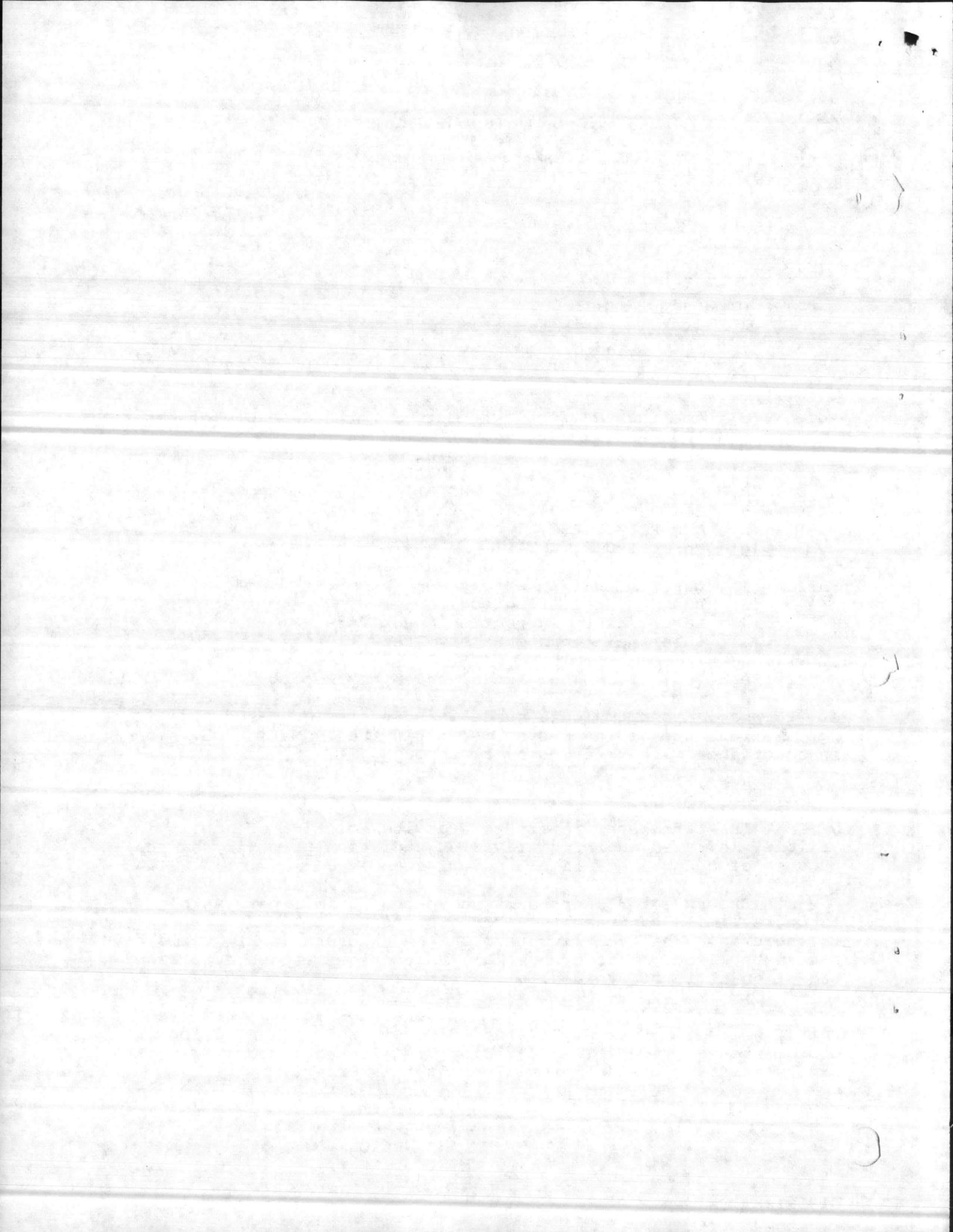
a. The term laser refers to a device emitting or amplifying visible, infrared and/or ultraviolet radiation primarily by the process of controlled stimulated emission.

b. Exposure to laser beams above the maximum permissible exposure limits can result in serious radiation burns, particularly to the eyes. While maximum permissible exposure (MPE) levels have been established by reference (a), unnecessary exposure to laser radiation is to be avoided.

3. Action. All 2d Marine Division personnel and all Reserve units, units of other U. S. Armed Forces, and foreign National units, when hosted by the 2d Marine Division will comply with the safety instructions and provisions of this Order.

H. M. NELSON
Chief of Staff

DISTRIBUTION: A

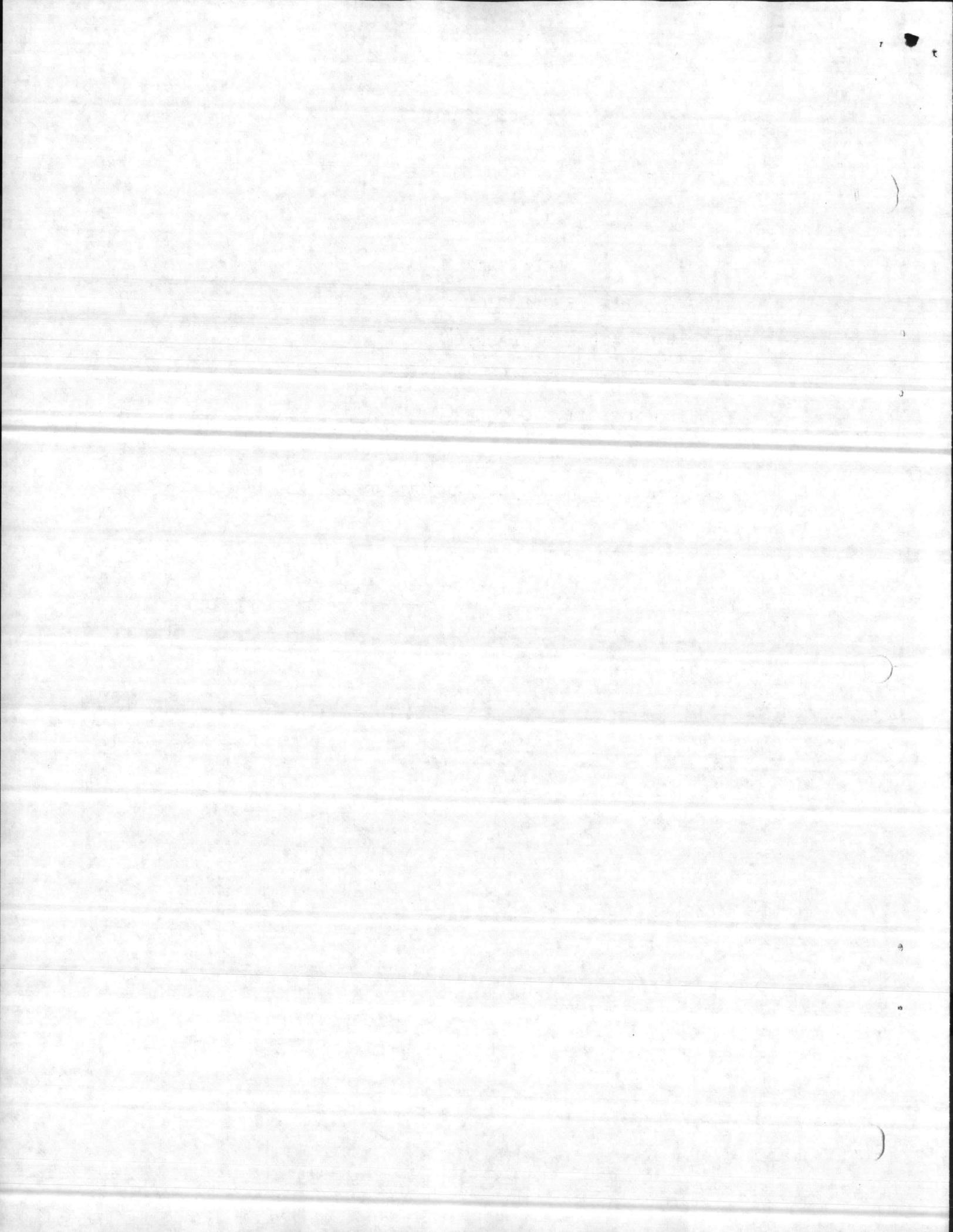


LASER SAFETY

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- 1 LASER SAFETY ORGANIZATION
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- 3 ACTIVITY AUDIT OF LASERS
- 4 LASER SAFETY TRAINING PROGRAM
- 5 LASER PROTECTIVE GOGGLES
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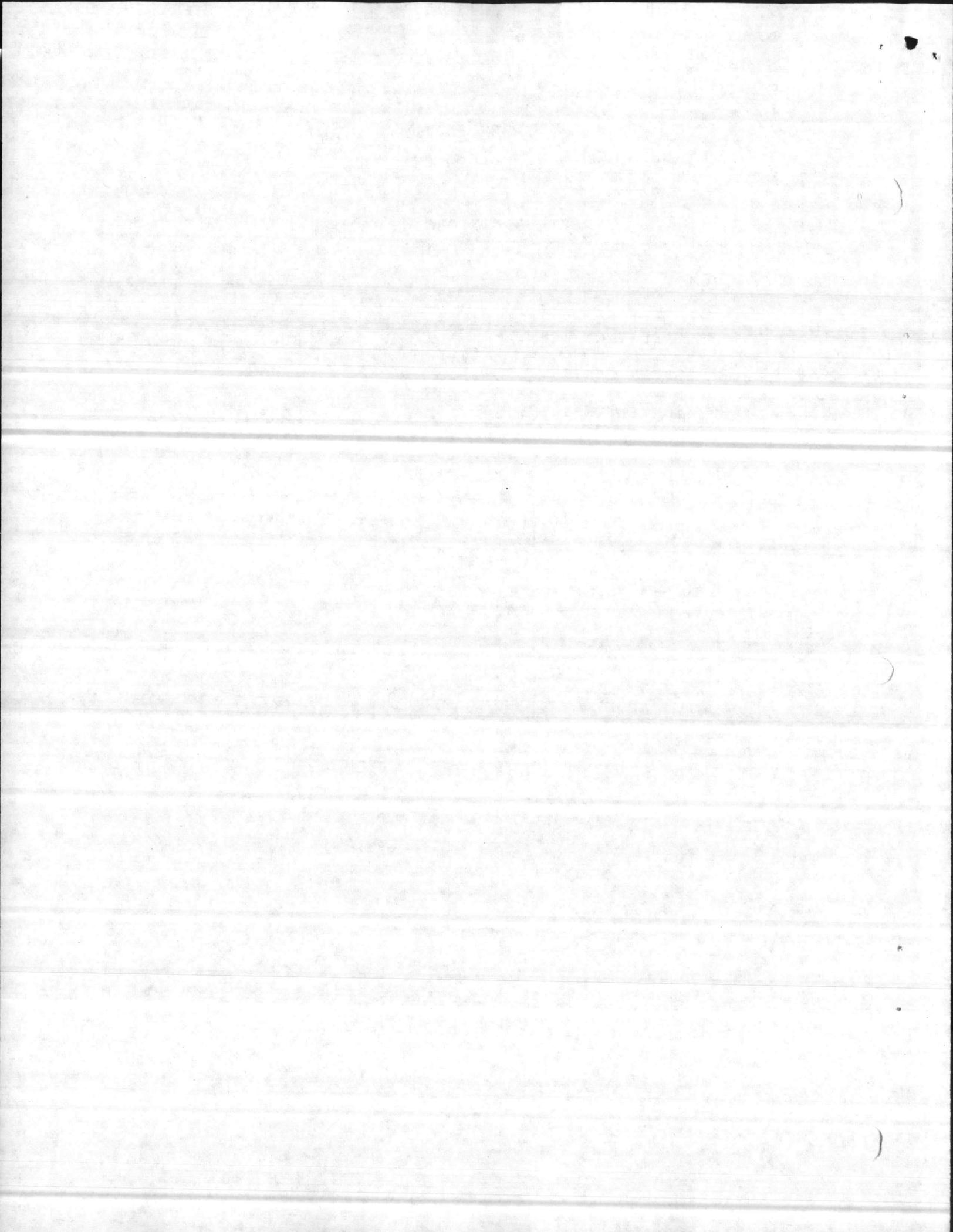


LASER SAFETY

CHAPTER 1

LASER SAFETY ORGANIZATION

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LASER SAFETY

CHAPTER 1

LASER SAFETY ORGANIZATION

1001. LASER SYSTEM SAFETY OFFICER (LSSO). All regiments and separate battalions utilizing lasers shall establish a laser hazard control program which shall include at a minimum:

1. A Laser System Safety Officer. An individual shall be designated by name as the laser systems safety officer with direct access to the commanding officer and sufficient technical competence and authority to approve or disapprove the local use of lasers. He shall:

a. Maintain a list of all lasers and their location at his activity. Submit an annual list (enclosure 1) of all class IIIb, class IV and military exempt lasers to the Division Safety Office by 15 October each year.

b. Maintain records as prescribed in paragraph 8001, on all personnel exposed to lasers. These records are to be submitted to the medical officer for medical surveillance.

c. Investigate laser radiation accidents and initiate appropriate corrective actions.

d. Establish and promulgate laser safety regulations. This includes standard operating procedures for safety for laser operations.

1002. RANGE LASER SAFETY OFFICER (RLSO). These responsibilities shall include operational procedures; a log of all laser range firings (enclosure 2), and assisting the LSSO in meeting laser hazard control. A copy of enclosure (2) must be delivered to the Range Control Officer upon completion of lasing. The operational procedures shall include:

a. Becoming familiar with MCO P3570.1A Chapter 19 and the FM and TM applicable to the particular laser devices to be used.

b. Briefing unit personnel who work with laser devices, including an explanation of laser-related hazards and safety devices.

c. Knowing the azimuths and elevations of each range, firing positions, and targets to be used.

d. Insuring protective eyewear is used when required.

e. Insuring compliance with the unit SOP for laser operations and training.

LASER SAFETY

f. Maintaining continuous communication with personnel in the target area and stop lasing immediately if communication is lost.

g. Stop lasing promptly if positive control of the beam is lost.

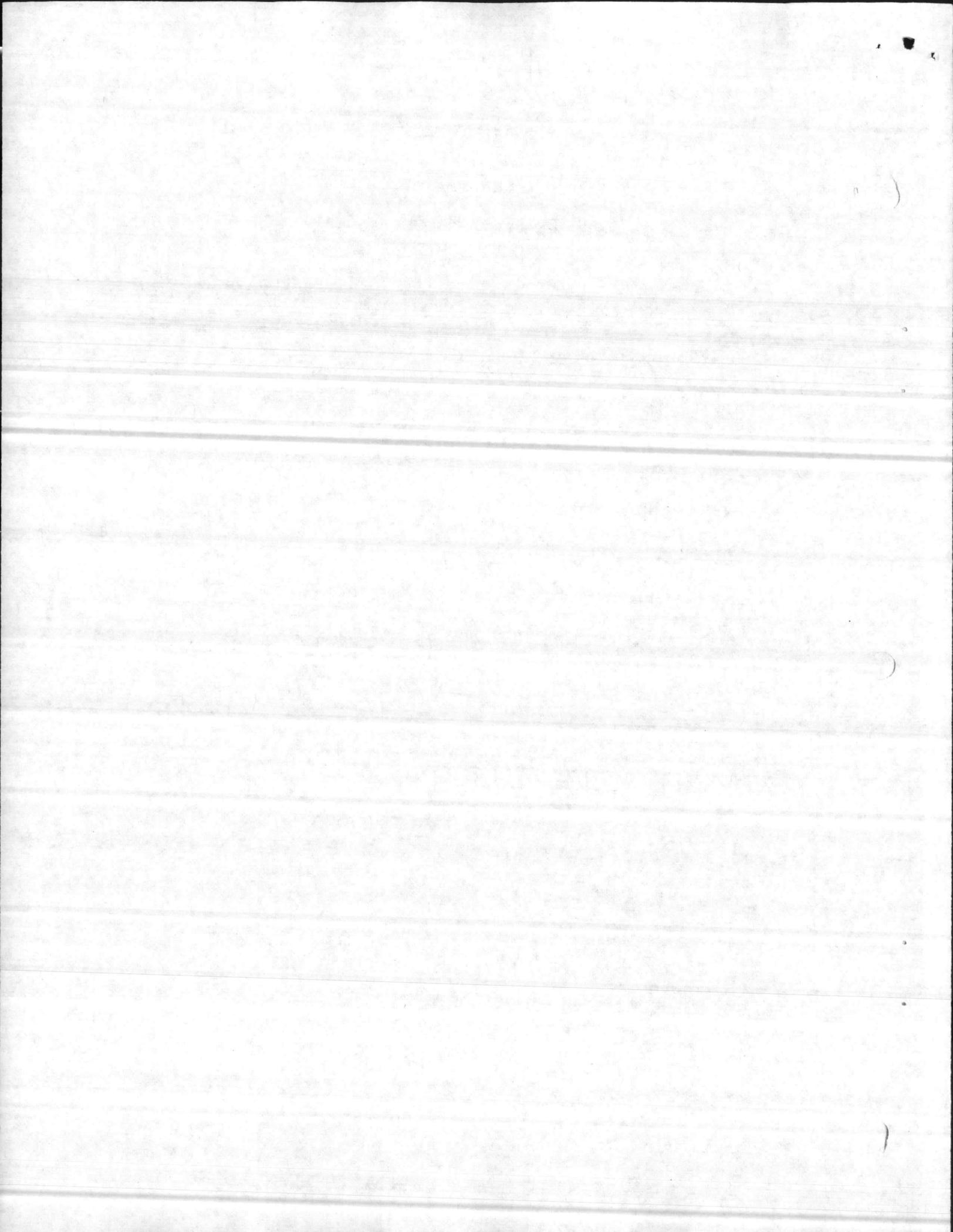
1003. LASER SAFETY COMMITTEE. Comprised of Regimental and separate Battalion LSSO's to assist the Division LSSO in maintaining an up to date laser hazard control program.

LASER SAFETY

CHAPTER 2

LASER SAFETY REGULATIONS

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SOP FOR RANGES.	2003	2-3



LASER SAFETY

CHAPTER 2

LASER SAFETY REGULATIONS

2001. POLICY. Control measures will be outlined for the firing of a laser on a given installation or range. Some of the control measures will be specific for a given installation or range, however, there are some general guidelines that can be adapted to every installation and laser system.

2002. STANDARD OPERATING PROCEDURES FOR MAINTENANCE FACILITIES

1. Most of the eye injuries from laser radiation have occurred in the laboratory. These have usually involved experienced laser specialists who had failed to wear protective eye wear. Control measures for the maintenance facility should be designed to protect not only the laser user, but the noncontrolled personnel having access to the area.

2. Control measures could be mechanical, administrative, or a combination of the two. The control measures initiated should be prescribed for the highest class laser in operation.

2003. STANDARD OPERATING PROCEDURES FOR RANGES

1. Range control procedures for laser operations. The controls to prevent exposure to hazardous levels of laser radiation are: beamstops, controlled access, restricted airspace, and a buffer zone around the target area.

2. Prior to laser operations on a given range, remove all specular reflectors such as glass, plexiglass, highly polished flat surfaces, chrome bumpers, mirrors, windshields and the head and tail lamps. If a tank is to be used as a target, the flat glass surfaces in the tank viewblocks and optics should be removed. Target areas should be inspected to determine if any large pieces of broken glass are present. Areas that could have ponds or standing water after precipitation should be avoided as a target area if possible. Snow does not usually present a problem unless melting and then freezing occurs, or if the melting creates a pool of water. Inspection of the target area is recommended after any precipitation to insure that standing water is not present.

3. If specular reflectors cannot be removed from the target area, the restricted airspace shall be evaluated to insure that noncontrolled aircraft do not enter the zone of hazardous radiation. All mountains, hills, observation towers, etc. within the nominal ocular hazard distance (NOHD) where optically aided viewing of the laser location may occur should be identified and evaluated to insure that no occupied areas could be within a reflected beam path.

LASER SAFETY

4. The following general rules apply to all laser range operations:

a. The range boundary must be posted to advise personnel of laser operations.

b. The laser beam and its associated buffer zone must be contained within controlled areas.

c. Any personnel within the target area must wear appropriate laser eye protection when laser firing is in progress.

d. Officer-in-charge of firing must be RLSO qualified.

e. Laser operations must be scheduled and approved by range control prior to any lasing.

f. Laser operations must be conducted in accordance with the installation range SOP/Regs.

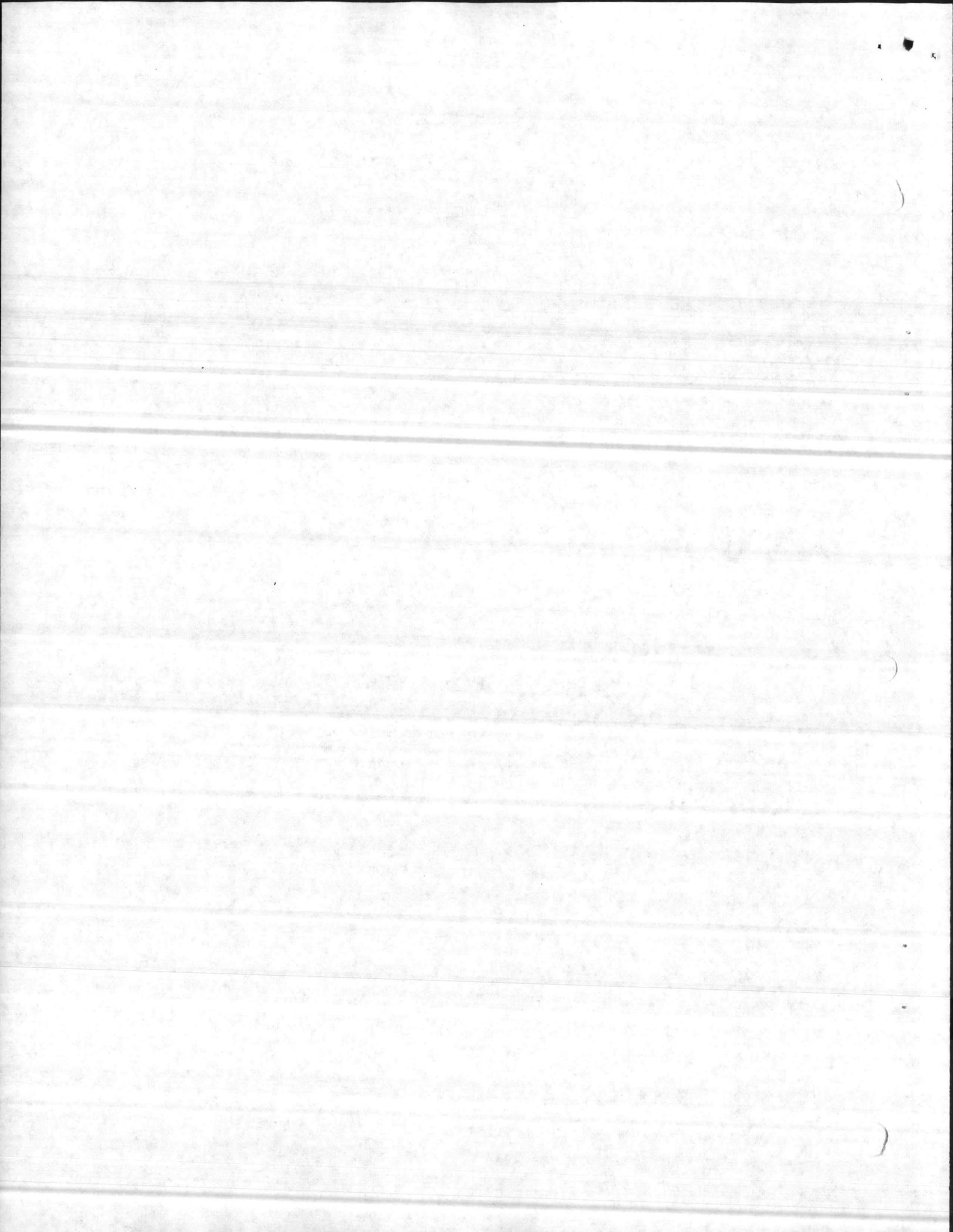
g. Laser operations must be conducted in accordance with references (a), (b), and (f).

LASER SAFETY

CHAPTER 3

ACTIVITY AUDIT OF LASERS

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LASER SAFETY

CHAPTER 3

ACTIVITY AUDIT OF LASERS

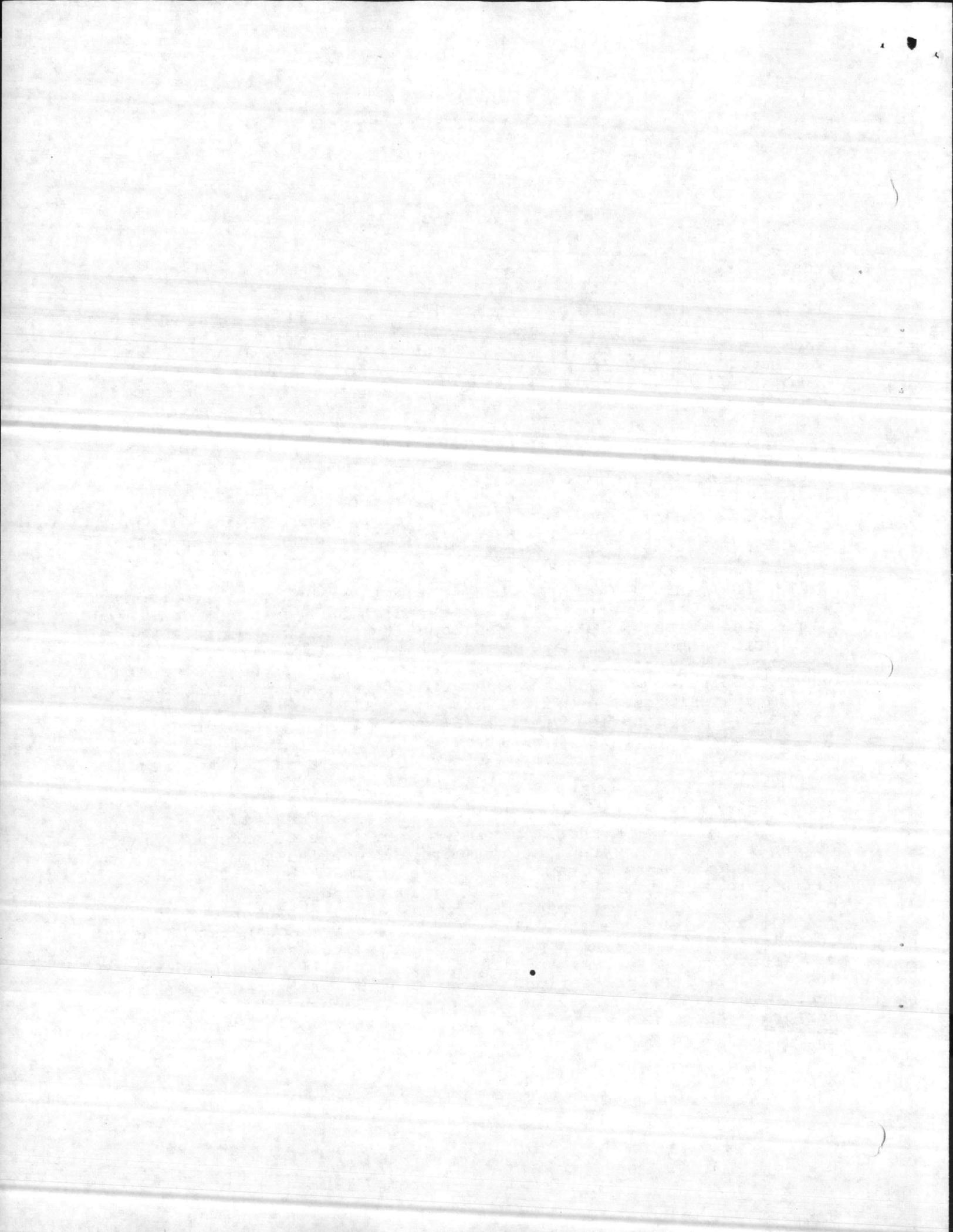
3001. LASER EQUIPMENT INVENTORY

1. A laser audit must be completed to establish a laser equipment inventory, identify personnel who require medical surveillance, and provide safety survey inspections of laser installation. This audit will be conducted by the Regimental or separate Battalion LSSO annually, using the sample inspection checklist contained in enclosure (3) of this Order, and other applicable directives.

2. A laser equipment inventory and classification of laser hazards is required for hazard control. The inventory records should identify the type of laser, operating characteristics, hazards classification, application, frequency of operation, physical location, and the individual(s) responsible for disposition (if applicable), as contained in reference (b), and other applicable directives.

3002. USER IDENTIFICATION. During the laser audit, all personnel who operate or are exposed to laser radiation should be identified. Risk category may be established identifying (low, moderate, or high) risk exposure situations, as explained in Chapter 4. Personnel exposure records must be kept regarding the equipment used, job assignments, laser education, training, time on the job, and laser related medical history. All records shall be maintained for a period of five (5) years with the exception of the medical records which shall be maintained at the regional Medical Center for a period of fifty (50) years as per reference (c).

3003. LASER INSTALLATION SAFETY SURVEY. Each individual laser installation must be thoroughly inspected at least once a calendar year to ensure that it meets and continues to meet safety requirements. Inspections must include, but is not limited to, a review of the standing operating procedures, operator training, equipment condition, and the condition and use of protective eye wear and all other protective equipment. In addition the installation must be inspected to assure that the required warning systems and signs are posted in all appropriate locations for the protection of all personnel from the laser radiation. Safety survey inspections are done by the Naval Surface Weapons Center in Dahlgren, Virginia, and are requested by Marine Corps Base.

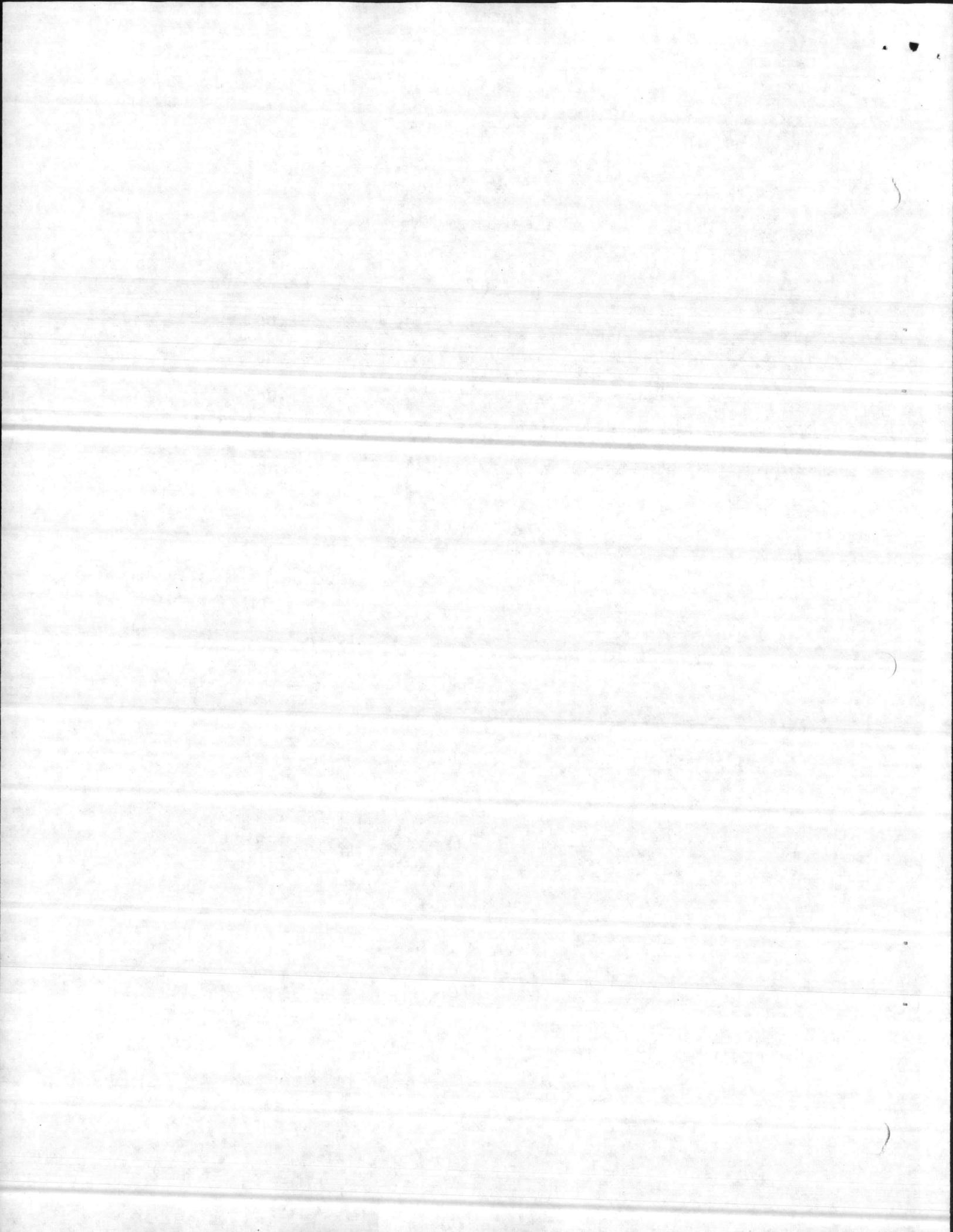


LASER SAFETY

CHAPTER 4

LASER SAFETY TRAINING

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CLASS IIIB AND CLASS IV LASERS.	4004	4-3
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LASER SAFETY

CHAPTER 4

LASER SAFETY TRAINING

4001. CLASS I LASERS. Class I lasers are nonhazardous devices which may be viewed directly or indirectly without any protective devices over extended periods of time.

4002. CLASS II LASERS. Class II lasers are low-risk laser devices which are hazardous only if viewed continuously without protective devices. Class I and II lasers require no special training.

4003. CLASS IIIA LASERS. Class IIIA lasers are moderate risk laser devices which require protective equipment for personnel and specific mechanical safety devices to ensure personnel safety during laser operations. Simple review of the lasers characteristics and hazards is sufficient training.

4004. CLASS IIIB AND IV LASERS. Class IIIB and IV lasers are high risk laser devices which require protective equipment for personnel and extensive mechanical safety devices to ensure personnel and physical safety during laser operations. These lasers require the following formal classroom training:

a. Type of eye protection to be worn (when and where, appropriate optical density for appropriate wavelength and proper periodic inspection).

b. Potential hazards in the target area, maintenance area, etc., types of warning signs to be posted and specific procedures to avoid these hazards.

c. Thorough briefing on all range procedures with specific emphasis to ensure that:

(1) Two way communications with all involved ships, aircraft, personnel, etc. are established before laser operations commence.

(2) Acquisition, identification and tracking of the specifically assigned target are established prior to laser activation.

(3) No lasing occurs until cleared by the range control officer.

(4) Lasing shall cease immediately whenever the laser is not pointed in the immediate vicinity of assigned targets or the Range Officer terminating the run.

LASER SAFETY

(5) Personnel know where to post signs, range barriers, or range guards and for what purpose.

(6) The importance of interlocks for maintenance buildings.

(7) Biological effects if any.

(8) Specular reflections (mirror like reflections).

(9) Diffuse reflections (refers to objects which can scatter the beam's reflection such as rocks, trees, etc.)

(10) The medical surveillance requirements.

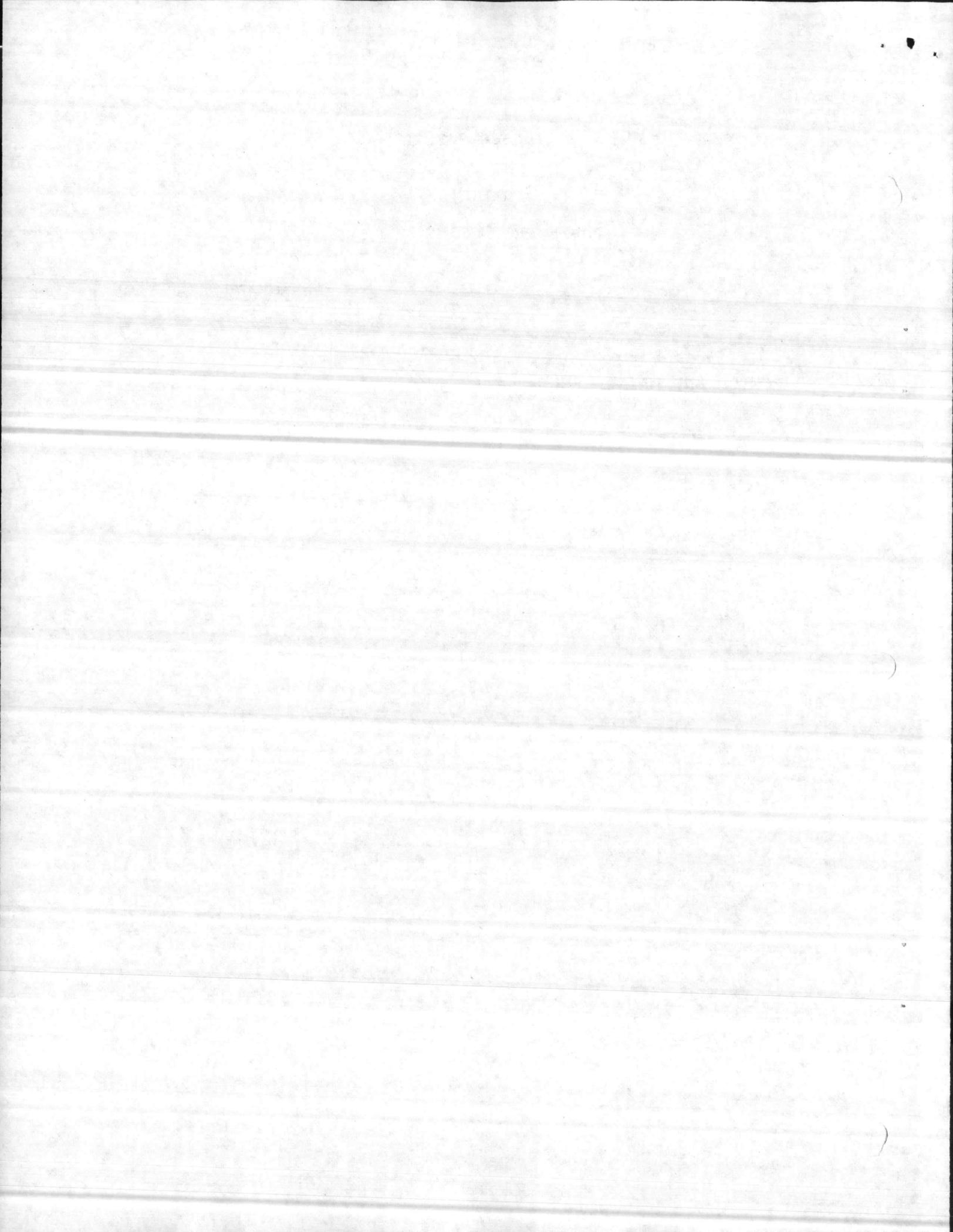
4006. MILITARY EXEMPT LASERS. These are all lasers which due to their military application and/or security classification are not specifically identified as to class, function of purpose and which may be exempt from the requirements contained in reference (a) and other applicable regulatory publications. However, safety requirements for use and operation do apply.

LASER SAFETY

CHAPTER 5

LASER PROTECTIVE GOGGLES

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LASER SAFETY

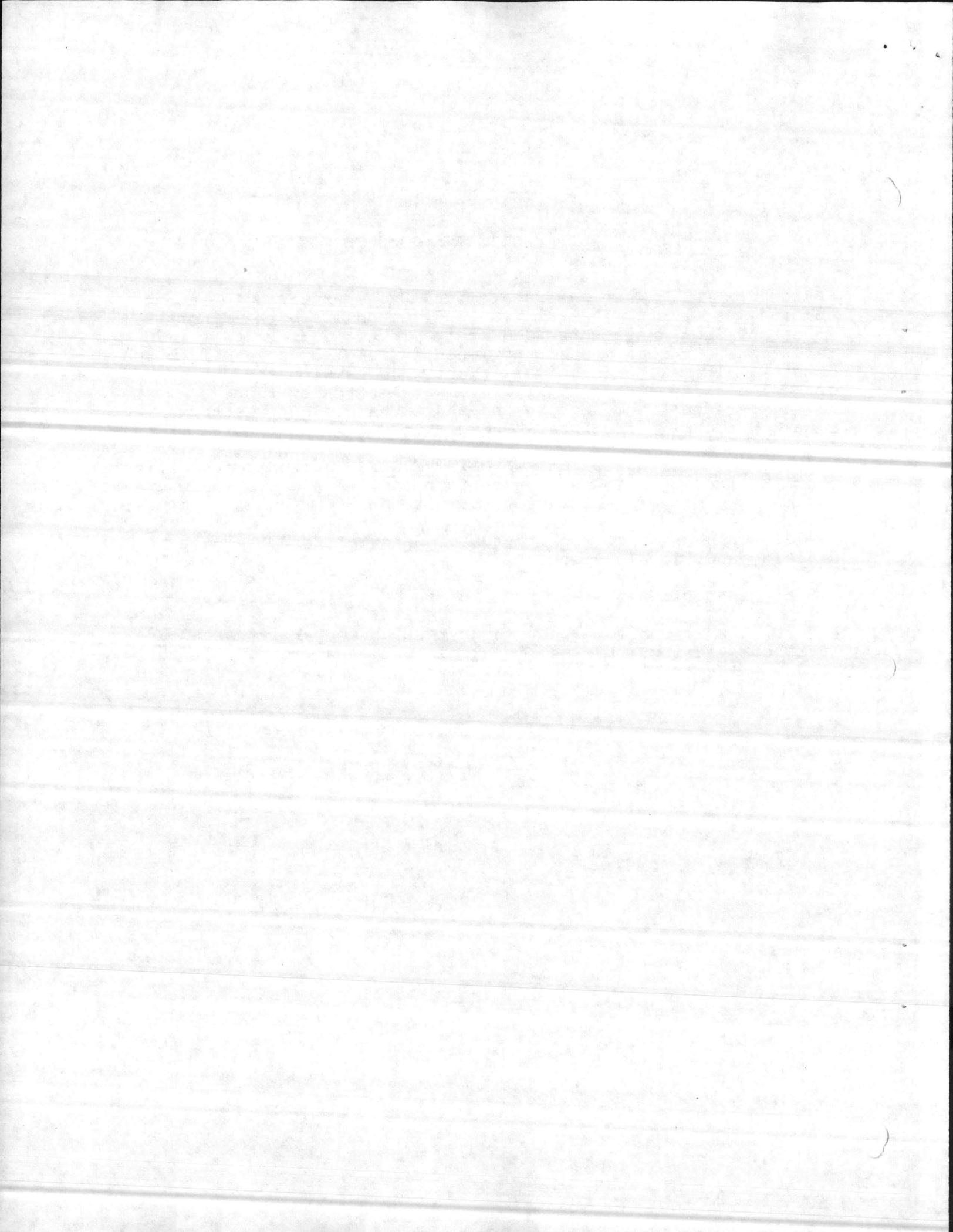
CHAPTER 5

LASER PROTECTIVE GOGGLES

5001. GENERAL. When lasers are put into operation, the using command must ensure that all exposed personnel, both in work areas and down range, are adequately protected from laser radiation. Goggles must be permanently labeled for their optical density. There should be sufficient goggles with the proper optical density at the appropriate wavelengths to issue to all personnel who require one and to handle any visitors required to be in the laser hazard area.

5002. PERIODIC INSPECTION AND MAINTENANCE. Periodic inspections shall be made by using commands of protective eyewear to ensure the maintenance of satisfactory conditions. This shall include:

- a. Inspection of the attenuator material for pitting, cracking and discoloration.
- b. Inspection of the frame for mechanical integrity.
- c. Inspection for light leaks that would permit hazardous intrabeam viewing. Eyewear in suspicious condition should not be used until tested for acceptability.

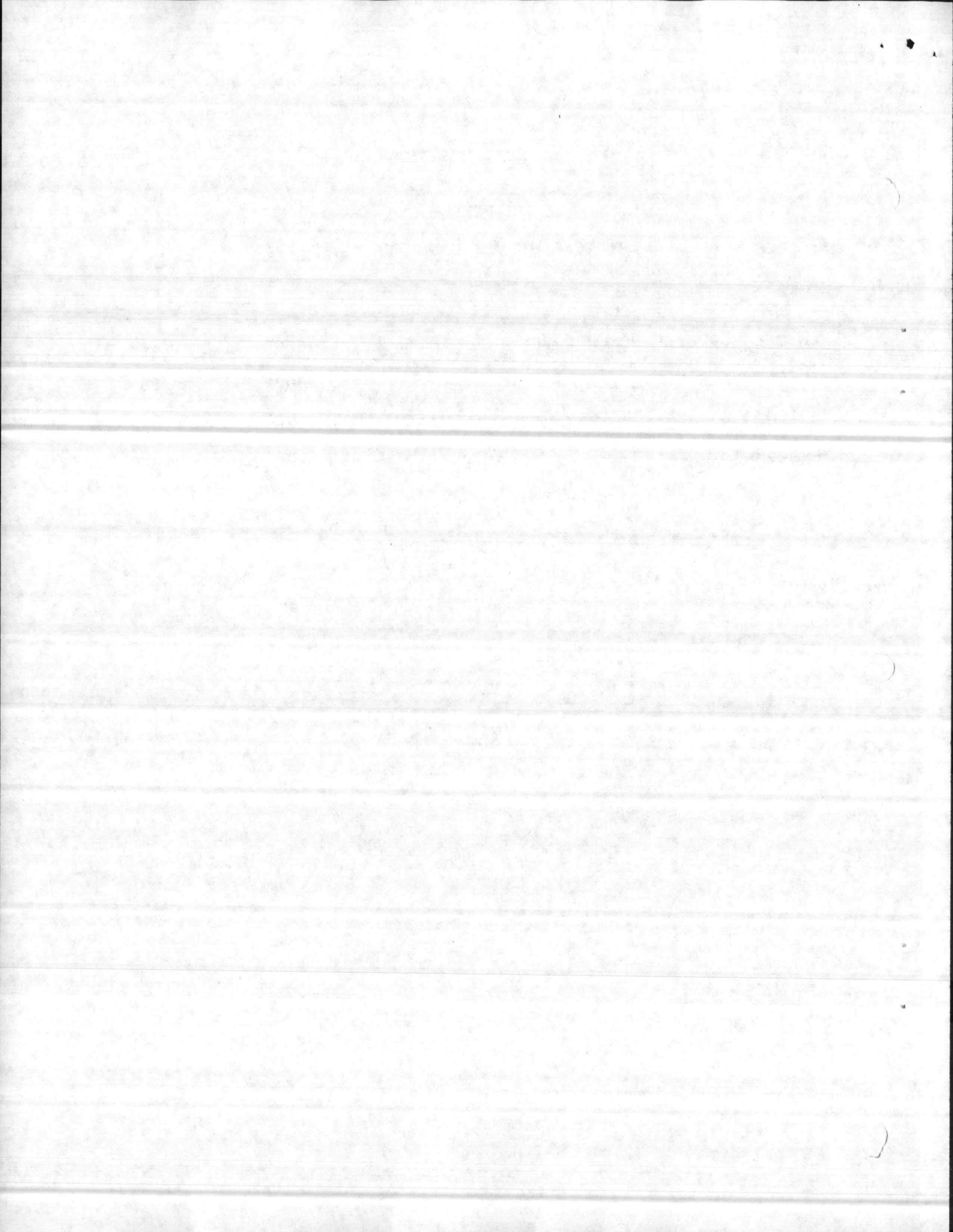


LASER SAFETY

CHAPTER 6

MEDICAL SURVEILLANCE PROGRAM

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LASER SAFETY

CHAPTER 6

SURVEILLANCE PROGRAM

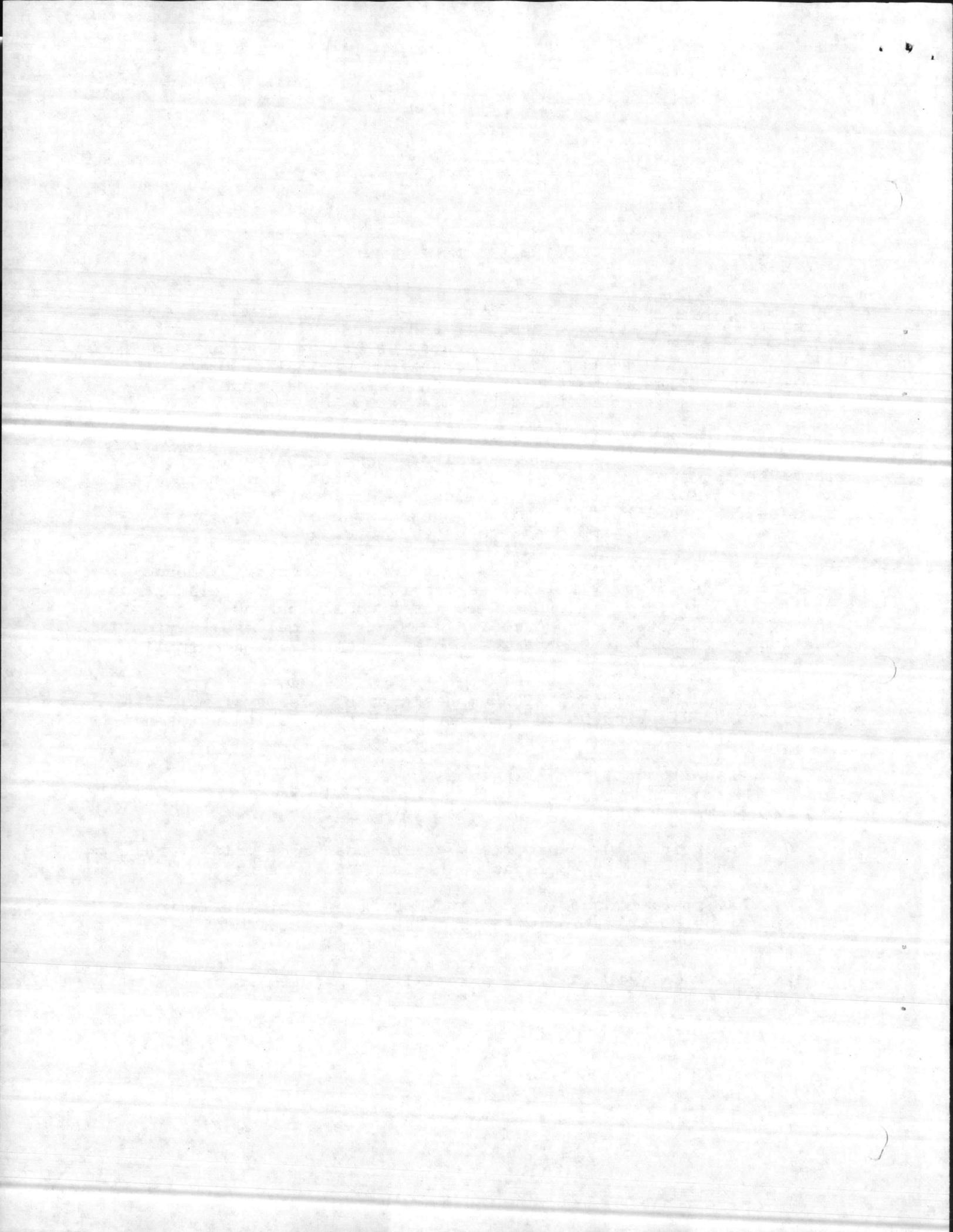
6001. MEDICAL SURVEILLANCE PROGRAM. A medical surveillance program is required for class IIIIB and class IV laser systems. All personnel designated as incidental laser personnel should have a documented visual acuity screening examination prior to assignment to laser systems operations. Laser personnel should have examinations as required by paragraph 6003.

6002. MEDICAL SAFETY. Personnel designated as incidental or laser personnel by their Regimental or separate Battalion LSSO's, shall be required to wear the proper eye protection when engaged in force-on-force tactical exercises. Additionally, any incidental personnel involved in work downrange, i.e., moving targets, shall wear approved eye protection.

6003. MEDICAL EXAMINATIONS. Prior to designation or commencement of tasks directly related to laser operations or maintenance; or if any individual is exposed to laser radiation and an eye injury is suspected or observed, a complete medical examination shall be performed as soon as possible. The examination shall consist of:

- a. A medical history with emphasis on ocular systems and history of medication usage (particularly potentially photosensitizing drugs).
- b. Visual acuity determinations.
- c. Examinations of various structures of the eye.
- d. Polaroid color photographs of the posterior pole of the funds including the area of the macula and optic nerve.
- e. Any other protocol recommended by the cognizant medical officer or by consultation with the Commander, Naval Medical Command (MEDCOM-21).

6004. REFERENCE. The medical surveillance program is in accordance with reference (c).

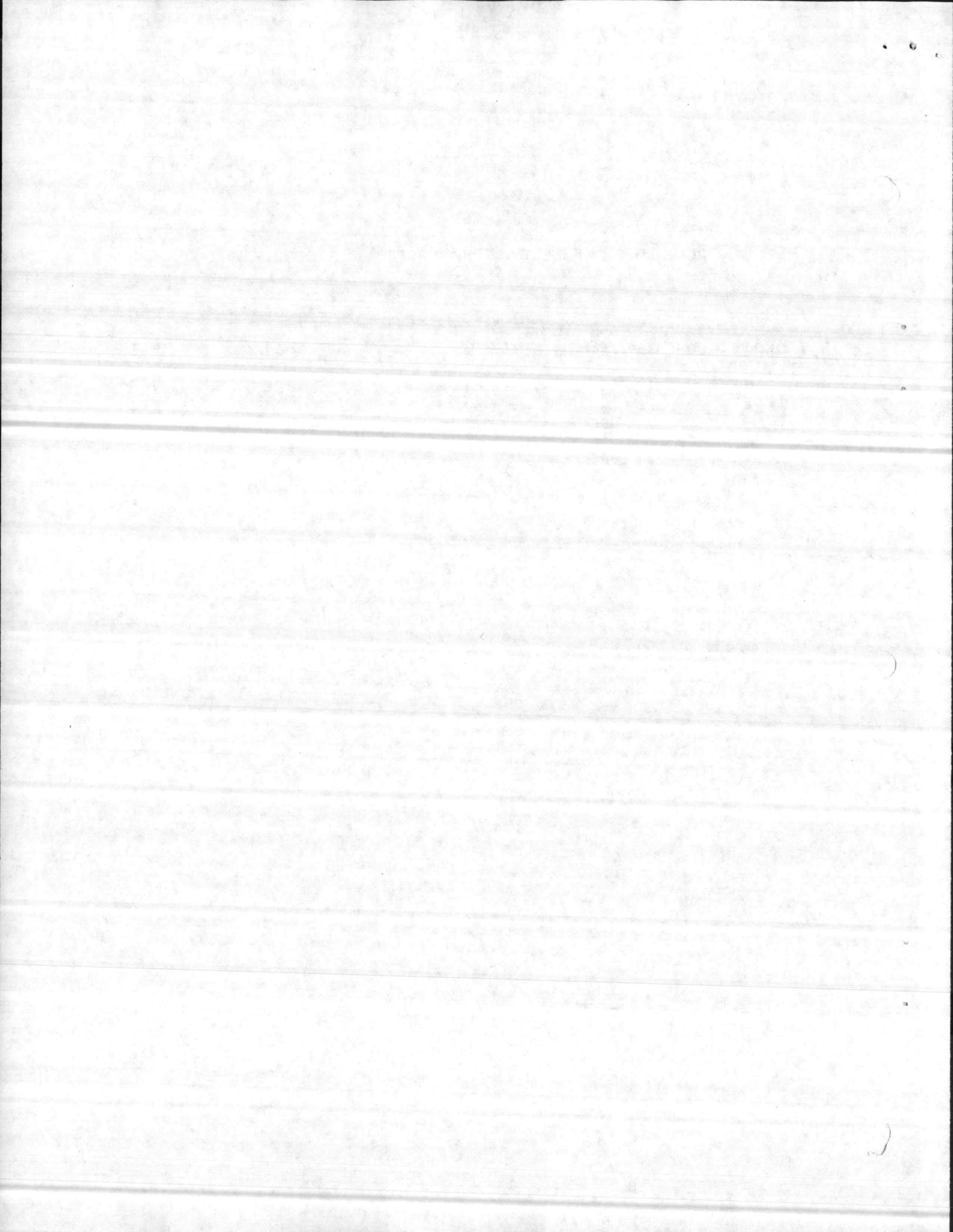


LASER SAFETY

CHAPTER 7

ACCIDENT INVESTIGATION/REPORTING PROCEDURES

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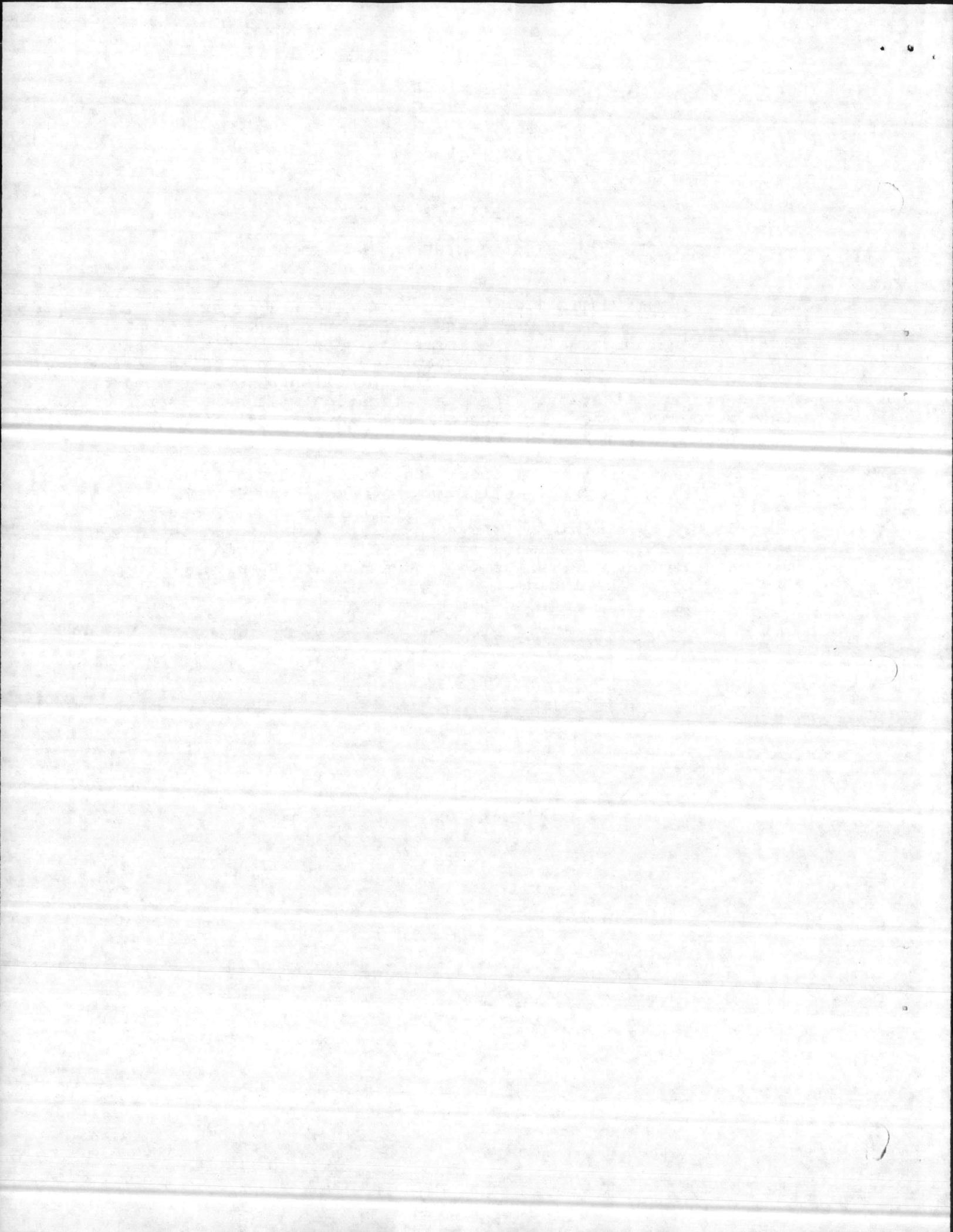
LASER SAFETY

CHAPTER 7

ACCIDENT INVESTIGATION/REPORTING PROCEDURES

7001. ACCIDENT INVESTIGATION. When an individual is exposed to laser radiation and an injury is suspected or observed, a complete medical examination shall be performed as soon as possible. Examination procedures are covered in Chapter 6. The Commanding Officer will direct the Regimental or separate Battalion LSSO's to conduct an accident investigation. This investigation will be forwarded to the appropriate installation commander (Attn: Range Control) in accordance with the requirements of reference (f).

7002. REPORTING. A letter report shall be submitted to the Commander, NAVMEDCOM (MEDCOM-21) via the Commanding General, 2d Marine Division (ATTN: Surgeon) within fifteen (15) days of the incident. As a minimum, the report shall contain a list of personnel exposed, an estimate of the exposure received, a copy of medical examinations performed, and a narrative summary of events leading to the incident.

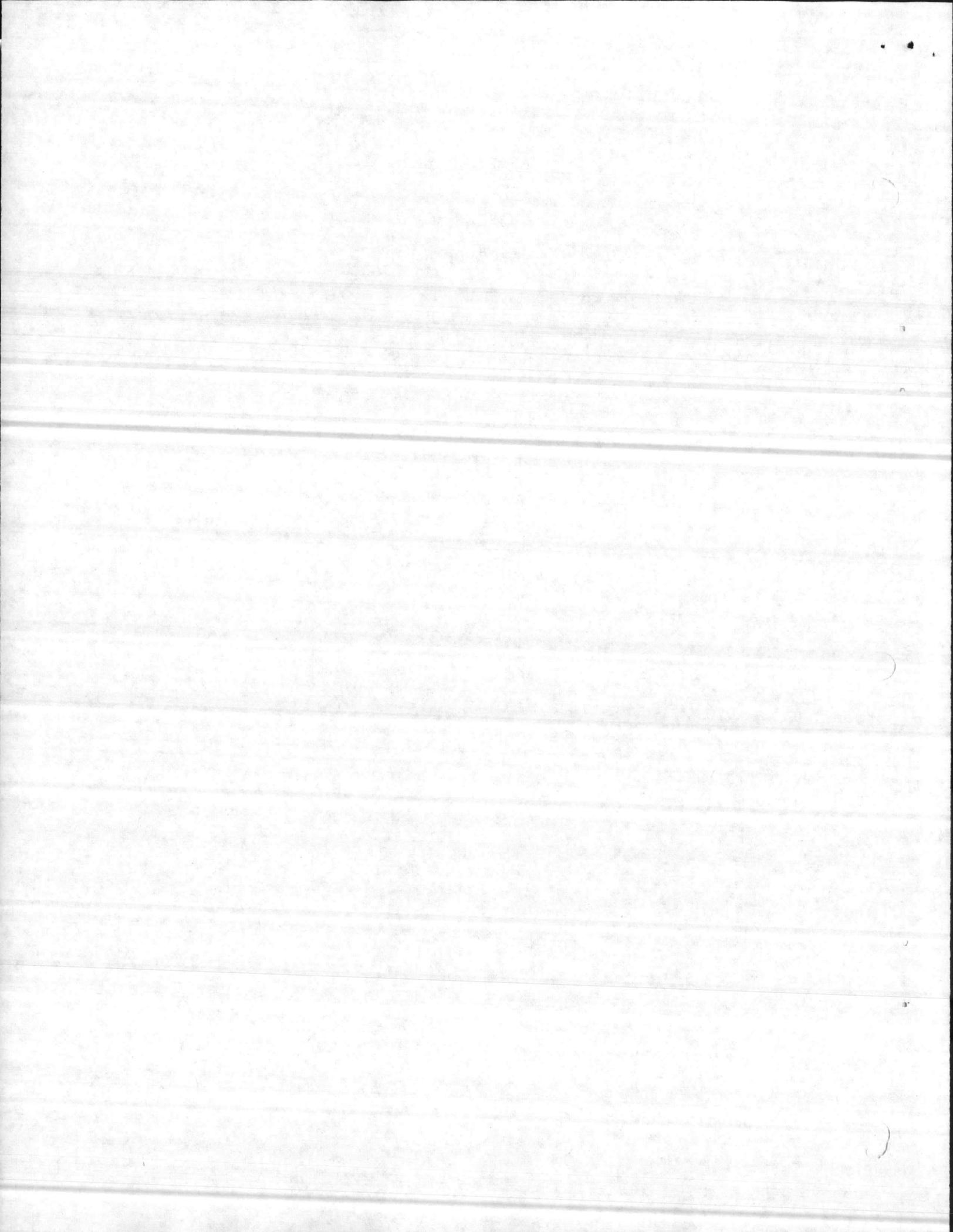


LASER SAFETY

CHAPTER 8

RECORDS

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LASER SAFETY

CHAPTER 8

RECORDS

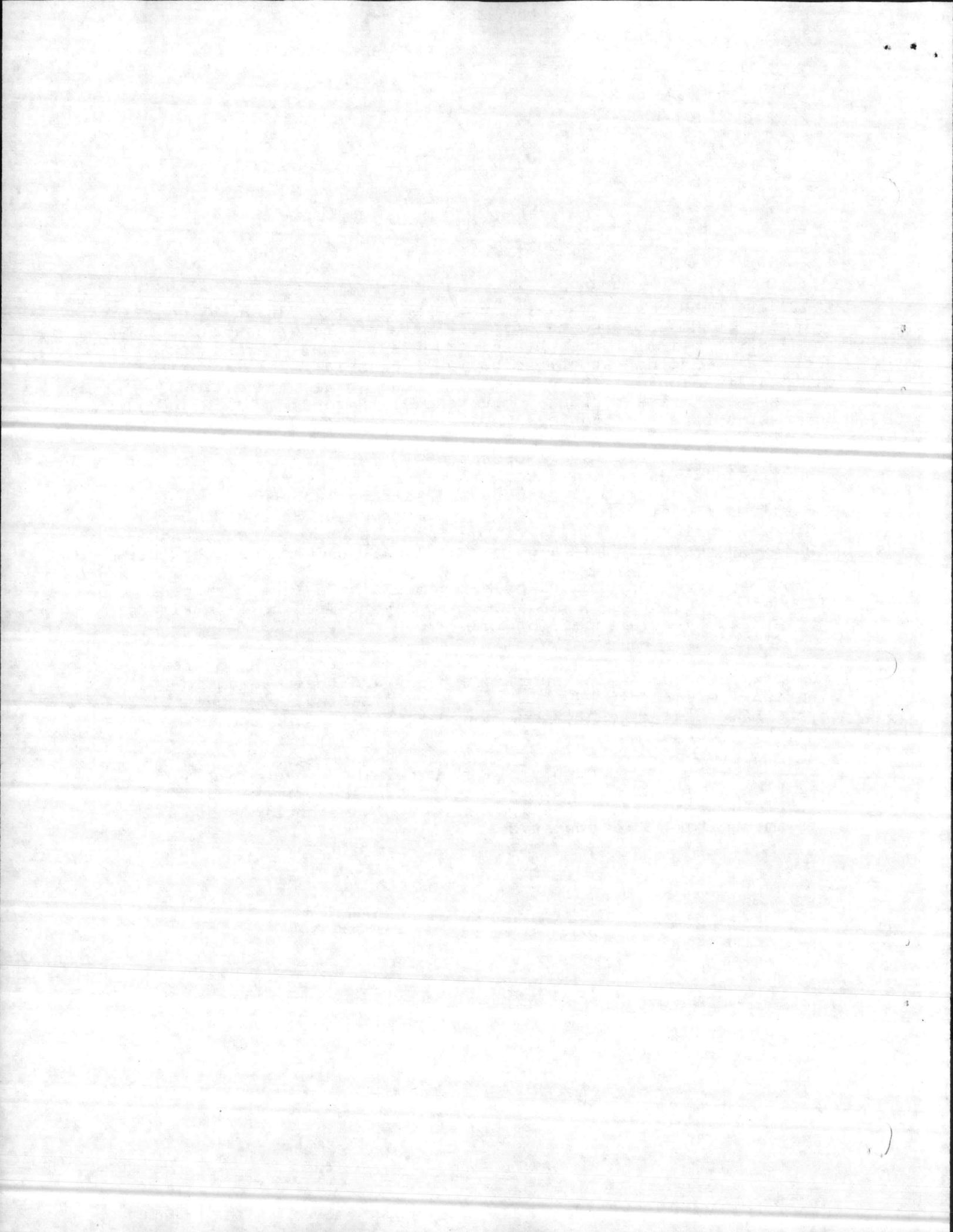
8001. RECORDS. At a minimum, the exposure records shall contain a list of exposed personnel, an estimate of the exposure received, and a description of the physiological symptoms. This report should also include as an enclosure, a description and examination of the situation and the corrective measures/recommendations necessary to prevent future occurrences. Records will include, but need not be limited to:

a. A log to record all operational, maintenance or training laser firings to include date, time, location, target, laser range officer, operator, purpose and personnel present. If the laser is fired airborne, include type aircraft, Bureau Number (BUNO), location/heading, altitude, and designated target. Additional documentation may also be included, as deemed appropriate.

b. An inventory record of all command held laser devices along with a Description and Analysis Report will be maintained, as required by references (b) and (d).

c. A current listing of all units and personnel who are authorized to engage in laser operations and their specific function/limitations. Such a list should be readily accessible to the LSSO, and range control and periodically updated when changes occur.

d. Training records of all personnel who engage in laser operations, maintenance or training, to include times and dates of training received, as well as copies of designations and assignments for laser operations.



DivO 5100.3
22 May 1985

LASER SAFETY

LASER ANNUAL INVENTORY REPORT FORMAT

From:
To: Commanding General, 2d Marine Division, FMF (Attn: Div Safety)
Subj: Exempt LASER Inventory Report for FY-____
Ref: (a) NAVELEXINST 5100.12

1. In accordance with the reference, the following annual report is submitted for FY-____:

- a. LASER Type_____
- b. Manufacturer_____
- c. Part Number_____ (if available)
- d. Contact Number_____ (if available)
- e. Number of LASERS_____
- f. National Stock Number_____ (if available)
- g. Exempt Qualification (check applicable boxes)
Combat Training_____
- Classified_____

2. STATUS

a. Number of LASERS:

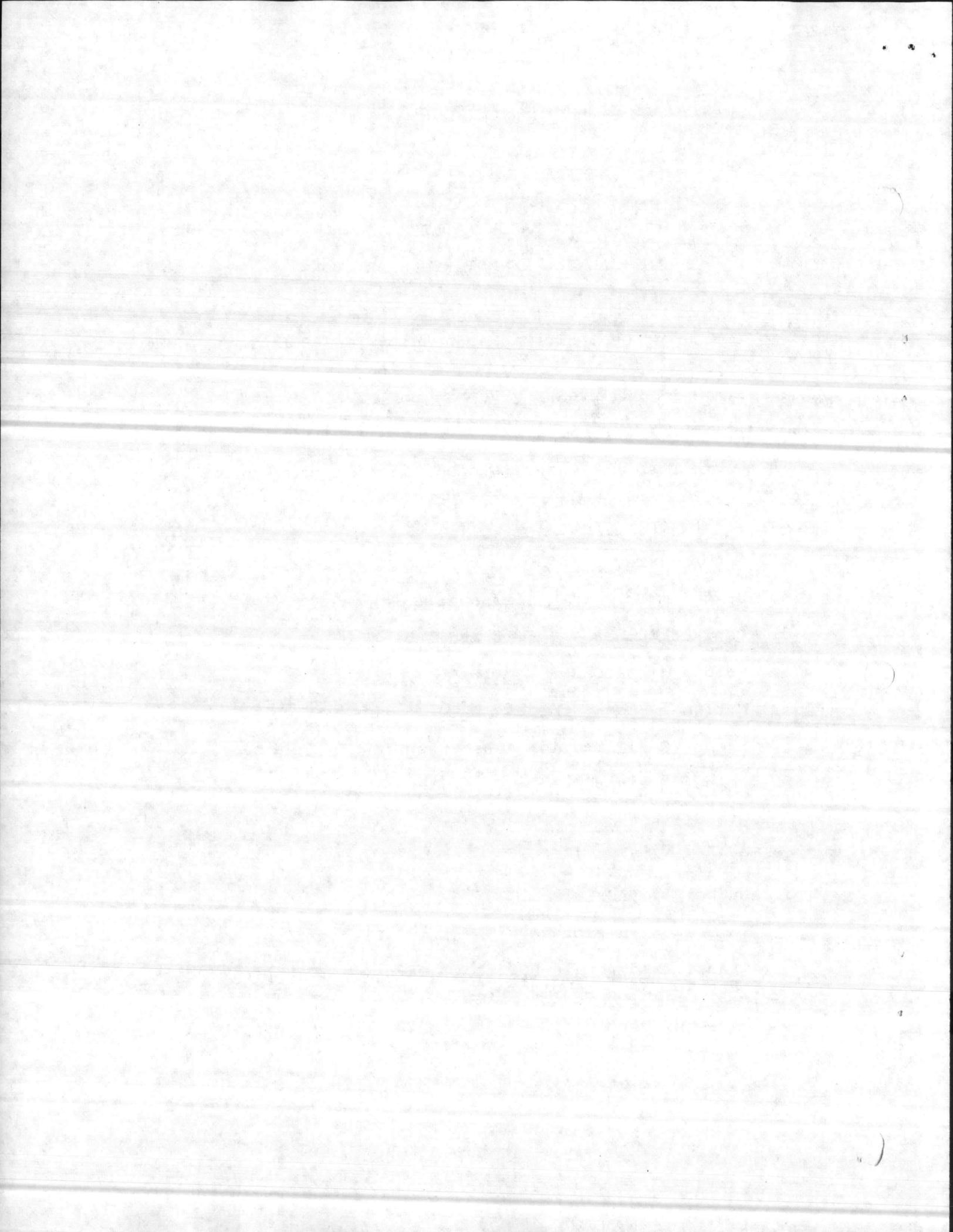
In use___ In storage___ Awaiting Disposition___

Transferred within DOD to___ Date___ ASD approval date___
(Provide Serial Numbers)

Disposed outside of DOD to___ Date___ ASD approval
date___ (Provide Serial Numbers)

//SIGNATURE//

ENCLOSURE (1)



DivO 5100.3
22 May 1985

LASER SAFETY

LASER RANGE FIRING LOG

COMMAND _____ DATE _____ RANGE _____

LASER SYSTEM _____ LASER SERIAL NUMBER _____

LEFT LIMIT _____ RIGHT LIMIT _____
(AZIMUTHS) (AZIMUTHS)

MAX. RANGE AUTHORIZED _____ MIN. RANGE AUTHORIZED _____

TIME CLEARED FOR USE _____ TIME SECURED FROM USE _____

LASER SAFETY OFFICER _____ RANK _____ UNIT _____

OPERATOR #1 NAME _____ RANK _____ TIME USED FROM _____ TO _____

OPERATOR #2 NAME _____ RANK _____ TIME USED FROM _____ TO _____

OPERATOR #3 NAME _____ RANK _____ TIME USED FROM _____ TO _____

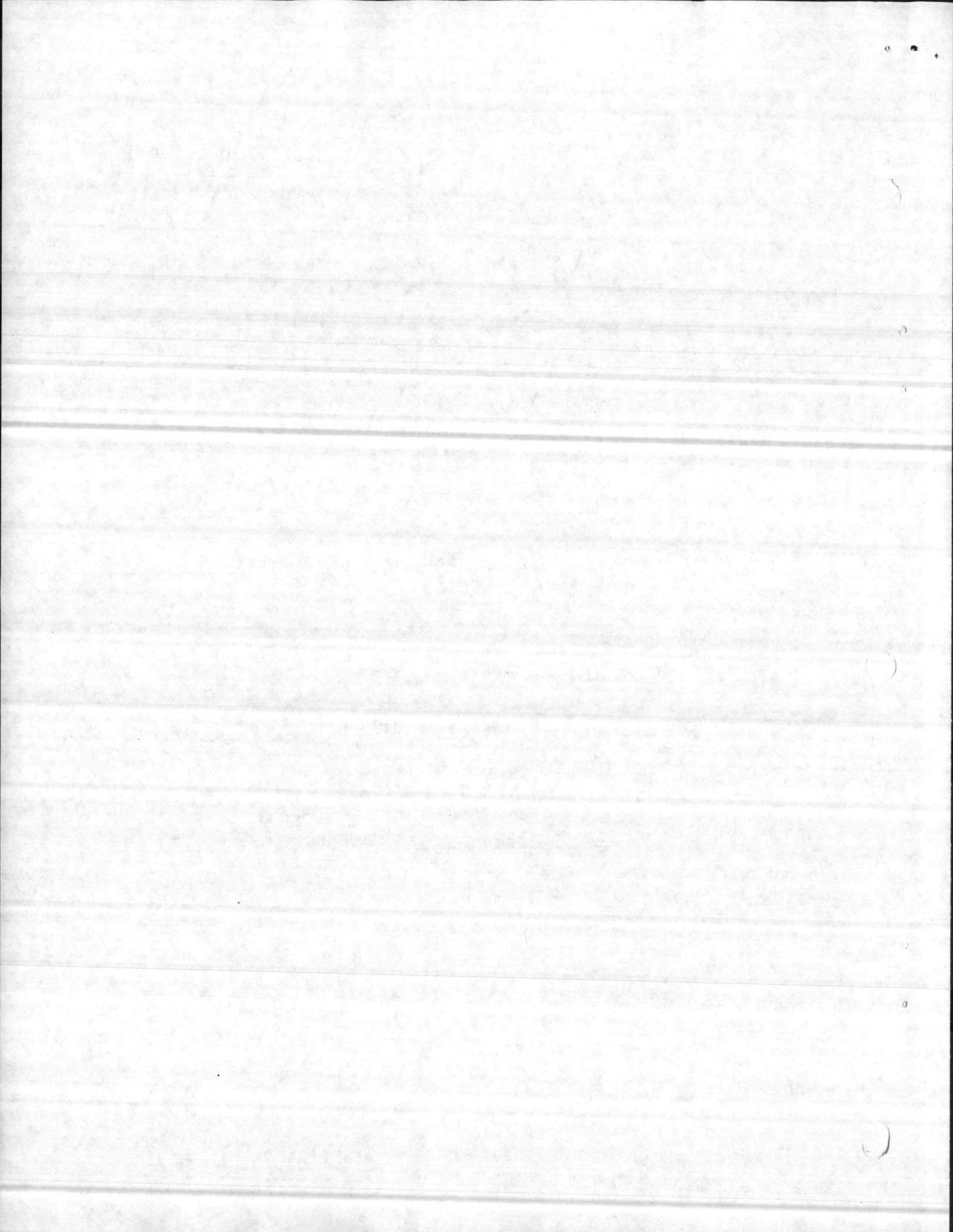
OPERATOR #4 NAME _____ RANK _____ TIME USED FROM _____ TO _____

WAS A FILTER REQUIRED YES NO

WHICH FILTER WAS USED

SAMPLE FORMAT LASER RANGE FIRING LOG

ENCLOSURE (2)



LASER SAFETY

LASER SAFETY INSPECTION CHECKLIST

		<u>YES/NO</u>
	Does the command have Class III or IV LASERS or military exempt LASERS?	___/___
REFERENCE	If yes, continue with the following:	
NAVELEXINST 5100.12 Encl (4)	Has a LASER hazard control program been established?	
NAVELEXINST 5100.12 Encl (4)	Has a LASER Systems Safety Officer (LSSO) been designated in writing and does he have direct access to the CO?	___/___
NAVELEXINST 5100.12 Encl (4)	Does the LSSO have sufficient technical competence and authority to approve or disapprove the local use of LASERS?	___/___
NAVELEXINST 5100.12 Encl (5)	Has the LSSO received a minimum of 20 hours of formal classroom training in LASER radiation? (LASER Safety School or equivalent)	___/___
NAVELEXINST 5100.12 Encl (4)	Has a local LASER Safety Organization or Committee been established to assist the LSSO in discharging his responsibilities? (If warranted by the magnitude of the Potential hazard in local operations)	___/___
NAVELEXINST 5100.12 Encl (4)	Has each local LASER user been approved or submitted for safety approval to higher authority by the LSSO?	___/___
NAVELEXINST 5100.12 Encl (4)	Does the LSSO maintain a list of all LASERS and their locations?	___/___
NAVELEXINST 5100.12 Encl (4)	Is a list of Class IIIB and IV LASERS and Military Exempt LASERS submitted annually to NAVELEXSYSCOM? (Due 15 October)	___/___

DivO 5100.3
22 May 1985

NAVELEXINST 5100.12
Encl (4) Have local LASER safety regulations been established including standing operating procedures for indoor maintenance and outdoor operational LASER operations? ___/___

NAVELEXINST 5100.12
Encl (4) Have safety responsibilities been written for LASER or LASER System Operations which include normal operational procedures, emergency procedures and documentation of all LASER firing? ___/___

NAVELEXINST 5100.12
Encl (4) Are all local LASER Ranges surveyed at least annually for safety? ___/___

NAVELEXINST 5100.12
Encl (4) Are warning systems and signs placed in appropriate locations to protect all personnel from LASER radiation? ___/___

NAVELEXINST 5100.12
Encl (5) 2.e Has a LASER protective goggles program been established? Are they properly labeled and periodically inspected and evaluated? ___/___

NAVELEXINST 5100.12
Encl (5) Have all personnel in areas with LASERS been informed by formal classroom training about the potential hazards associated with accidental exposure to LASERS? ___/___

NAVELEXINST 5100.12
Encl (4) Are local LASER radiation accidents and incidents investigated with appropriate recommendations and corrective actions initiated? ___/___

NAVMEDCOM INST 6470.
2.5 d&e Is medical evaluation performed and an incident report submitted via the chain of command to COMNAVMEDCOM (MEDCOM 21) within 30 days of the incident with a copy to NAVELEXSYSCOM (ELEX 7034)? ___/___

Medical Surveillance

NAVMEDCOM INST 6470.
2.5.b Has the LSSO determined and designated incidental and LASER personnel?
NOTE: Incidental personnel - Those

whose work make it possible but unlikely for them to be exposed to LASER energy sufficient to damage eyes or skin. (e.g., range personnel)

LASER personnel - those who operate laser devices.

NAVELEXINST
5100.12
Encl (4)

Has the LSSO submitted records of personnel exposed to LASER emissions to the medical officer for medical surveillance?

___/___

NAVMEDCOM
INST 6470.
2.5.b

Are all personnel designated either as Incidental or LASER Personnel enrolled in the appropriate medical surveillance program?

___/___

NAVMEDCOM
INST 6470.
2.5.b

Are the required examinations performed prior to participation in and upon termination of LASER work and following any suspected LASER injury?

___/___

NAVMEDCOM
INST 6470.
2 Encl (2)

Have incidental personnel received eye examinations for visual acuity?

___/___

NAVMEDCOM
INST 6470.
2 Encl (2)

Do LASER personnel receive visual acuity determinations and eye examinations based on the wave length of LASER radiation? Is a medical history taken?

___/___

NAVMEDCOM
INST 6470.
2.5.b

Are there any military exempt LASERS? (Those designed for combat, combat training or classified)

___/___

If yes

SECNAVINST
5100.14A
7.c(1)

Have all military exempt LASERS in use been reviewed and approved safe by the NAVY LASER Safety Review Board? (Contact NAVELEXSYSCOM (ELEX 7034)).

___/___

SECNAVINST
5100.14A
7.b(2)

Is the required caution label affixed to all military exempt LASERS?

___/___

SECNAVINST
5100.14A
7.c(3)

Is an inventory and record of the status of all exempted LASER products maintained?

___/___

DivO 5100.3
22 May 1985

SECNAVINST
5100.14A
7.c

Is a report on military exempt LASERS
provided to NAVELEXSYSCOM by 15
October of each year?

___/___

SECNAVINST
5100.14A
7.c(5)

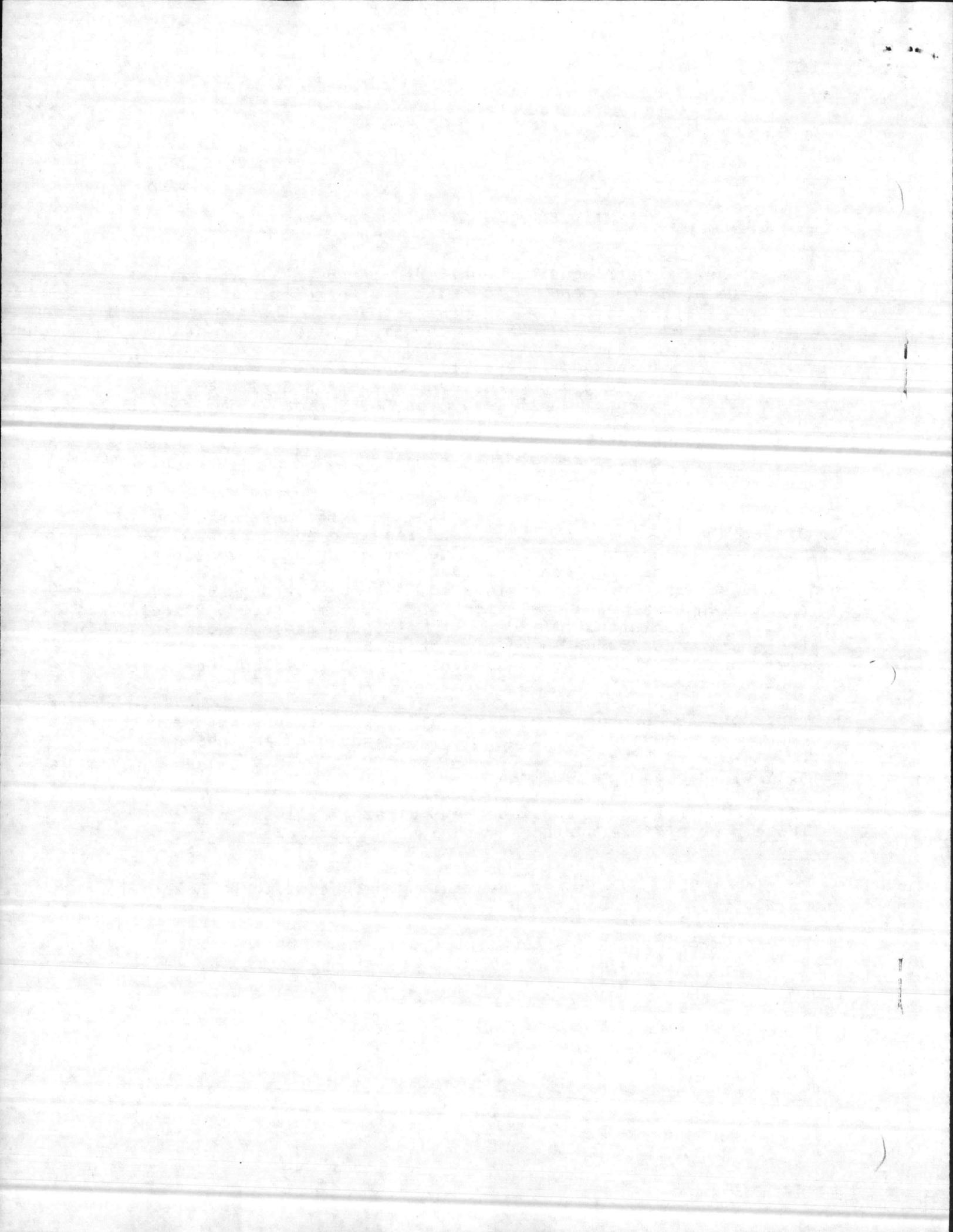
Is approval received from the Deputy
Assistant Secretary of Defense for
Equal Opportunity and Safety Policy,
via COMNAVELEXSYSCOM, prior to the
transfer or disposal of any military
exempt LASER?

___/___

DivO 5100.3
22 May 1985

LASER MAINTENANCE SAFETY PRECAUTIONS

1. LASER hazard warning signs shall be posted on all entrances to LASER maintenance areas in accordance with reference (b), so as to minimize the risk of accidental exposure. The LASER units and test benches shall be marked with warning signs as well.
2. All personnel engaged in essential duties concerned with LASER firing shall wear approved, eye protection during firing. Non-essential personnel shall leave the LASER area during firing.
3. All functional entrances to bench and boresight LASER firing areas shall be interlocked so that opening such a door will stop LASER emission.
4. Equipment interlocks shall be maintained in operating condition at all times. In the event required and approved maintenance procedures can only be performed by circumventing some interlock feature, that procedure will be performed only under the supervision of a designated LASER Safety Supervisor, with prior approval of a qualified LASER Systems Safety Officer or qualified Maintenance Officer. In all such cases, a documented quality assurance inspection shall be performed at the completion of that work to ensure that proper interlock operation has been restored.
5. Appropriate and adequate LASER safety radiation containment procedures and devices shall be in effect whenever any LASER is fired. Examples of containment devices are lens covers, diffusers, shields, and enclosures.
6. The LASER test area shall be kept clear of all specular reflectors or diffuse surfaces with a high coefficient of reflection.
7. During LASER operations, the minimum amount of personnel (normally two) shall be present.
8. Where practical, a countdown procedure shall be followed prior to LASER firings.





CRITICAL FILE COPY
UNITED STATES MARINE CORPS
2d Marine Division, Fleet Marine Force
Camp Lejeune, North Carolina 28542-5500

DivO 5100.3
32:ASF:mem
22 May 1985

DIVISION ORDER 5100.3

From: Commanding General
To: Distribution List

Subj: Light Amplification by Stimulated Emission of Radiation
(LASER) Safety

Ref: (a) American National Standard for the Safe Use of Lasers
ANSI Z136.1-1980 (NOTAL)
(b) SECNAVINST 5100.14A (NOTAL)
(c) NAVMEDCOMINST 6470.2 (NOTAL)
(d) NAVELEXINST 5100.12 (NOTAL)
(e) EO410-BA-GYD-010/7034 Laser (NOTAL)
(f) MCO P3570.1A
(g) ForO 5100.8 (NOTAL)

Encl: (1) Laser Annual Inventory Report Format
(2) Laser Range Firing Log
(3) Laser Safety Inspection Checklist
(4) Laser Maintenance Safety Precautions

Report Required: I. Laser Annual Inventory Report

1. Purpose. To promulgate guidelines and assign responsibilities for the safe use of laser systems within the 2d Marine Division, in accordance with references (a) through (f).

2. Information

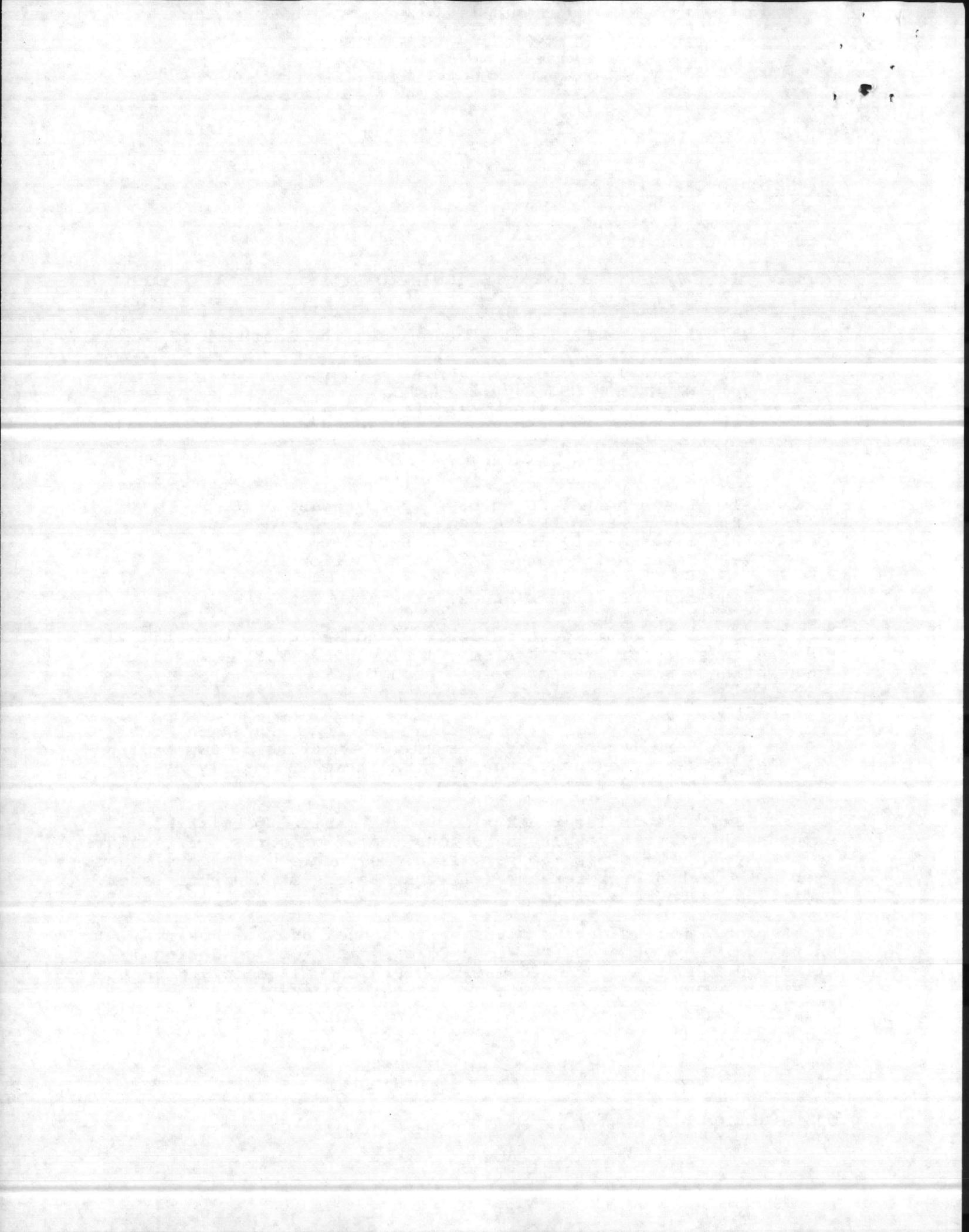
a. The term laser refers to a device emitting or amplifying visible, infrared and/or ultraviolet radiation primarily by the process of controlled stimulated emission.

b. Exposure to laser beams above the maximum permissible exposure limits can result in serious radiation burns, particularly to the eyes. While maximum permissible exposure (MPE) levels have been established by reference (a), unnecessary exposure to laser radiation is to be avoided.

3. Action. All 2d Marine Division personnel and all Reserve units, units of other U. S. Armed Forces, and foreign National units, when hosted by the 2d Marine Division will comply with the safety instructions and provisions of this Order.


H. M. NELSON
Chief of Staff

DISTRIBUTION: A

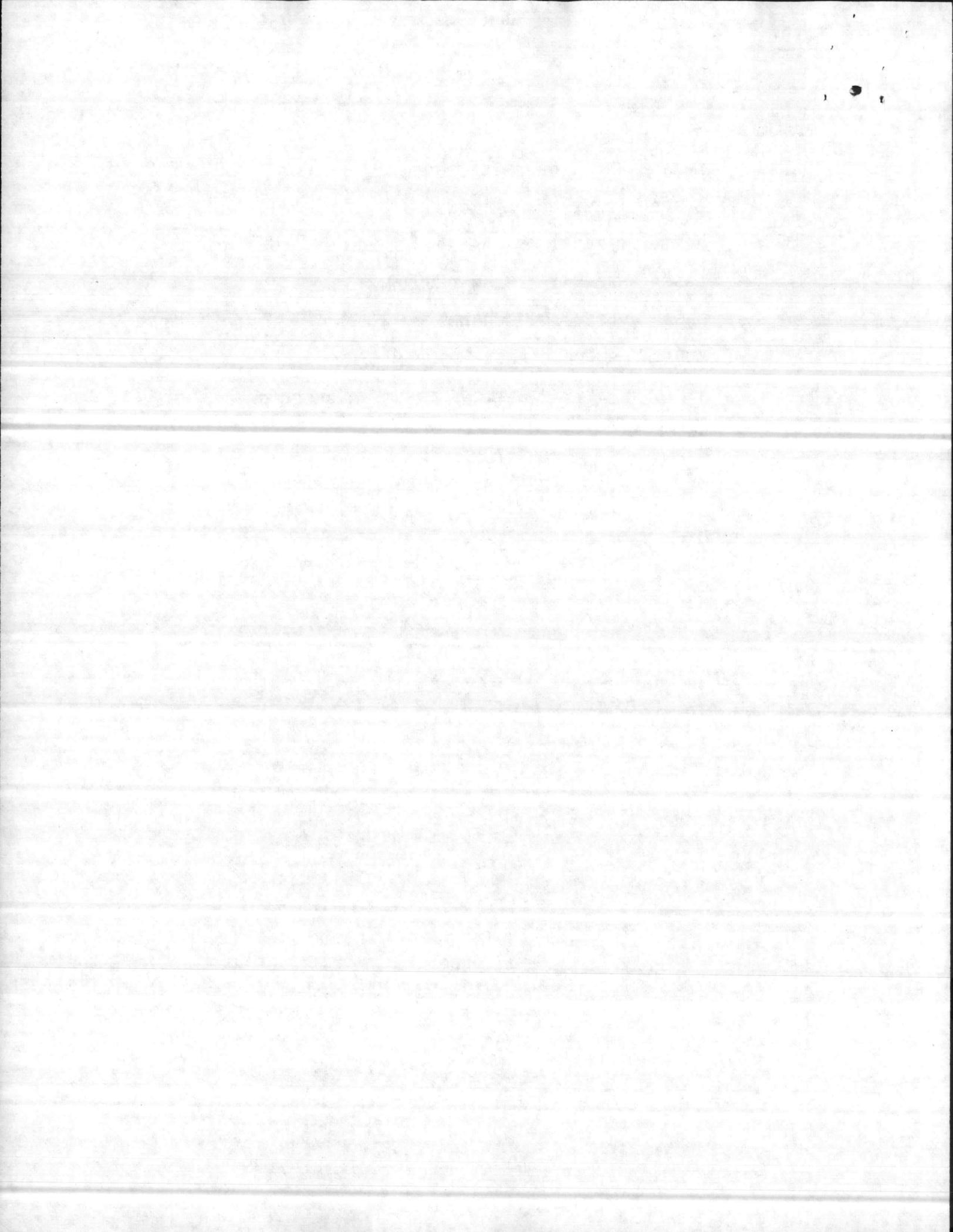


LASER SAFETY

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- 1 LASER SAFETY ORGANIZATION
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- 6 MEDICAL SURVEILLANCE PROGRAM
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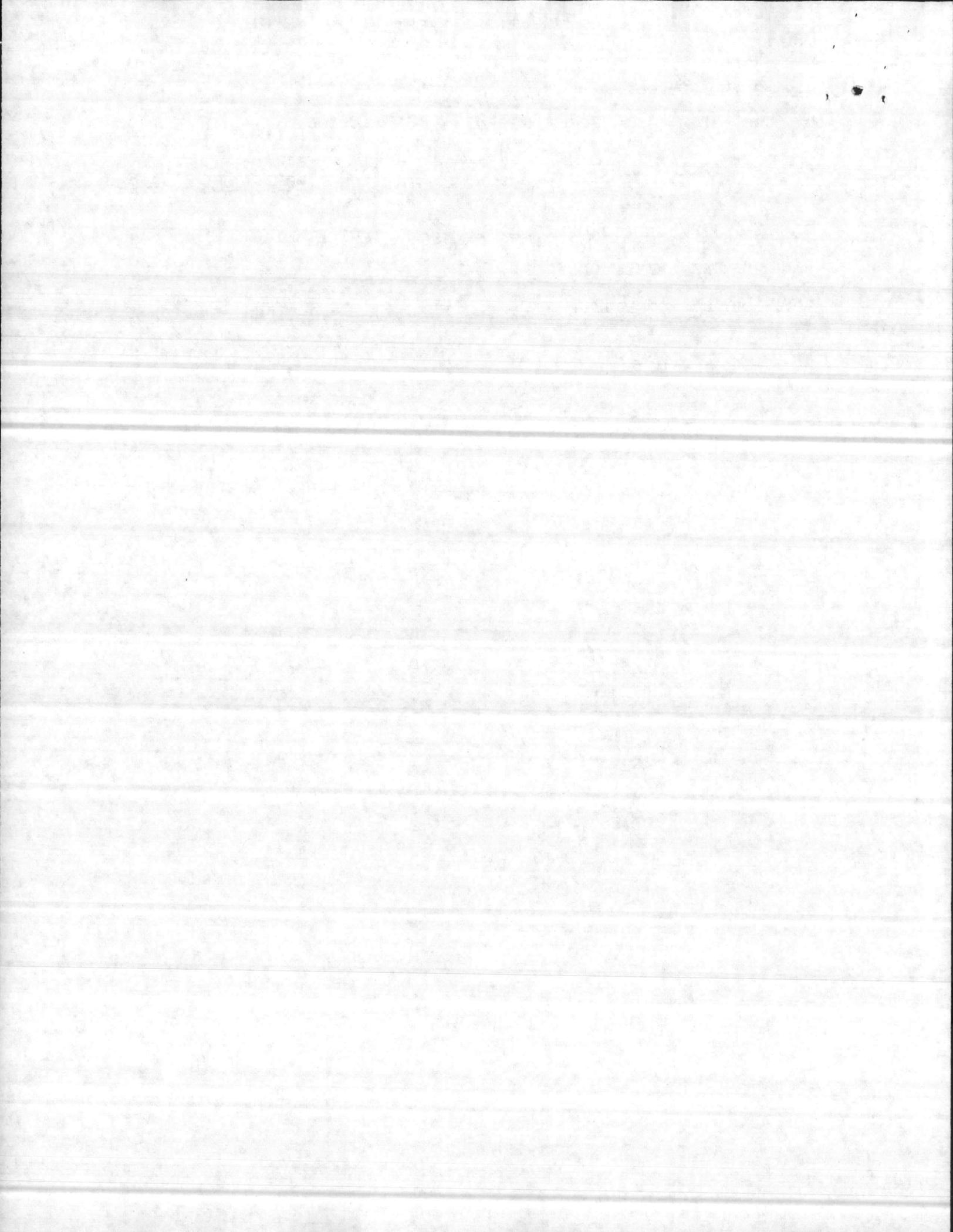


LASER SAFETY

CHAPTER 1

LASER SAFETY ORGANIZATION

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RANGE LASER SAFETY OFFICER	1002	1-3
LASER SAFETY COMMITTEE	1003	1-3



LASER SAFETY

CHAPTER 1

LASER SAFETY ORGANIZATION

1001. LASER SYSTEM SAFETY OFFICER (LSSO). All regiments and separate battalions utilizing lasers shall establish a laser hazard control program which shall include at a minimum:

1. A Laser System Safety Officer. An individual shall be designated by name as the laser systems safety officer with direct access to the commanding officer and sufficient technical competence and authority to approve or disapprove the local use of lasers. He shall:

a. Maintain a list of all lasers and their location at his activity. Submit an annual list (enclosure 1) of all class IIIb, class IV and military exempt lasers to the Division Safety Office by 15 October each year.

b. Maintain records as prescribed in paragraph 8001, on all personnel exposed to lasers. These records are to be submitted to the medical officer for medical surveillance.

c. Investigate laser radiation accidents and initiate appropriate corrective actions.

d. Establish and promulgate laser safety regulations. This includes standard operating procedures for safety for laser operations.

1002. RANGE LASER SAFETY OFFICER (RLSO). These responsibilities shall include operational procedures; a log of all laser range firings (enclosure 2), and assisting the LSSO in meeting laser hazard control. A copy of enclosure (2) must be delivered to the Range Control Officer upon completion of lasing. The operational procedures shall include:

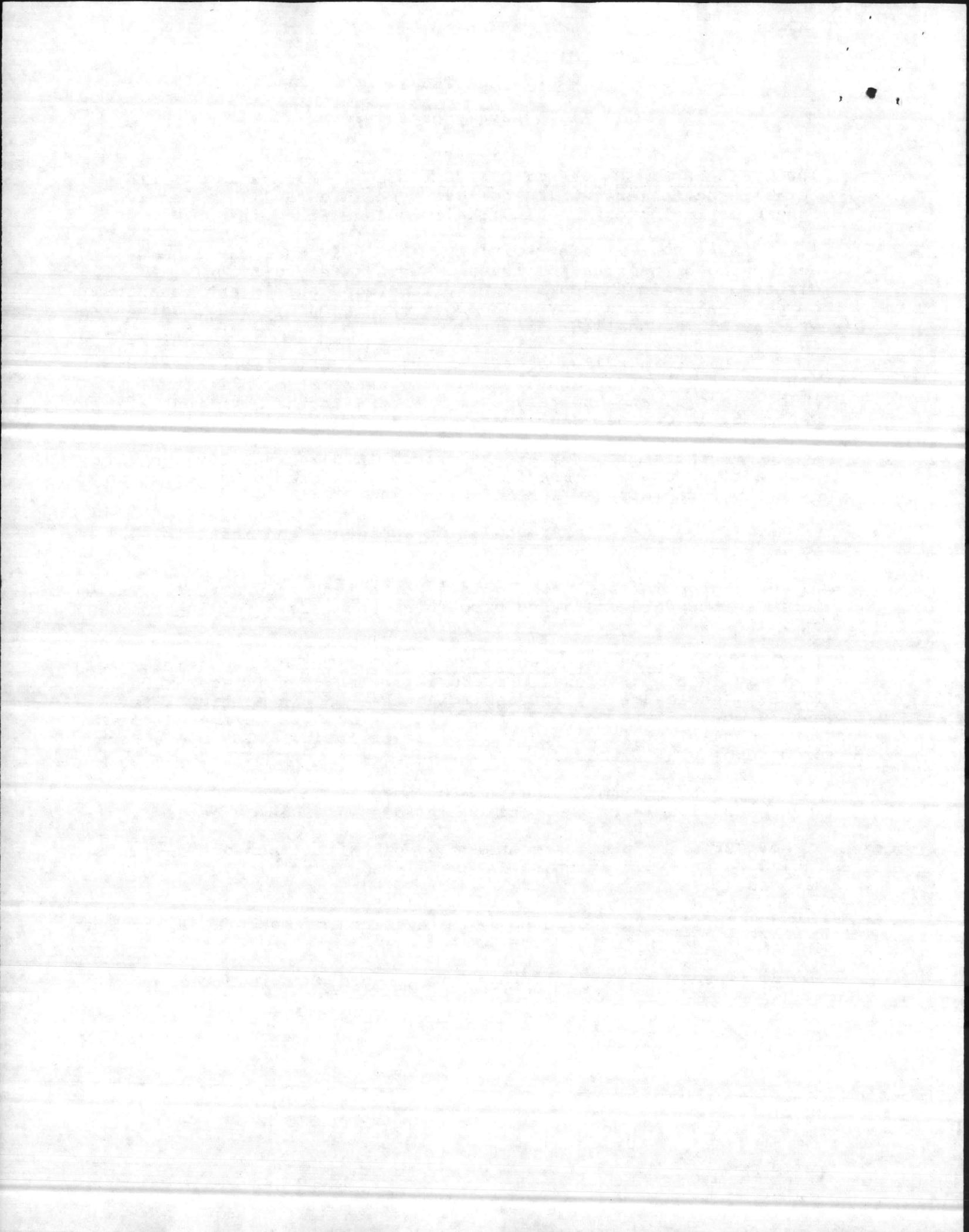
a. Becoming familiar with MCO P3570.1A Chapter 19 and the FM and TM applicable to the particular laser devices to be used.

b. Briefing unit personnel who work with laser devices, including an explanation of laser-related hazards and safety devices.

c. Knowing the azimuths and elevations of each range, firing positions, and targets to be used.

d. Insuring protective eyewear is used when required.

e. Insuring compliance with the unit SOP for laser operations and training.

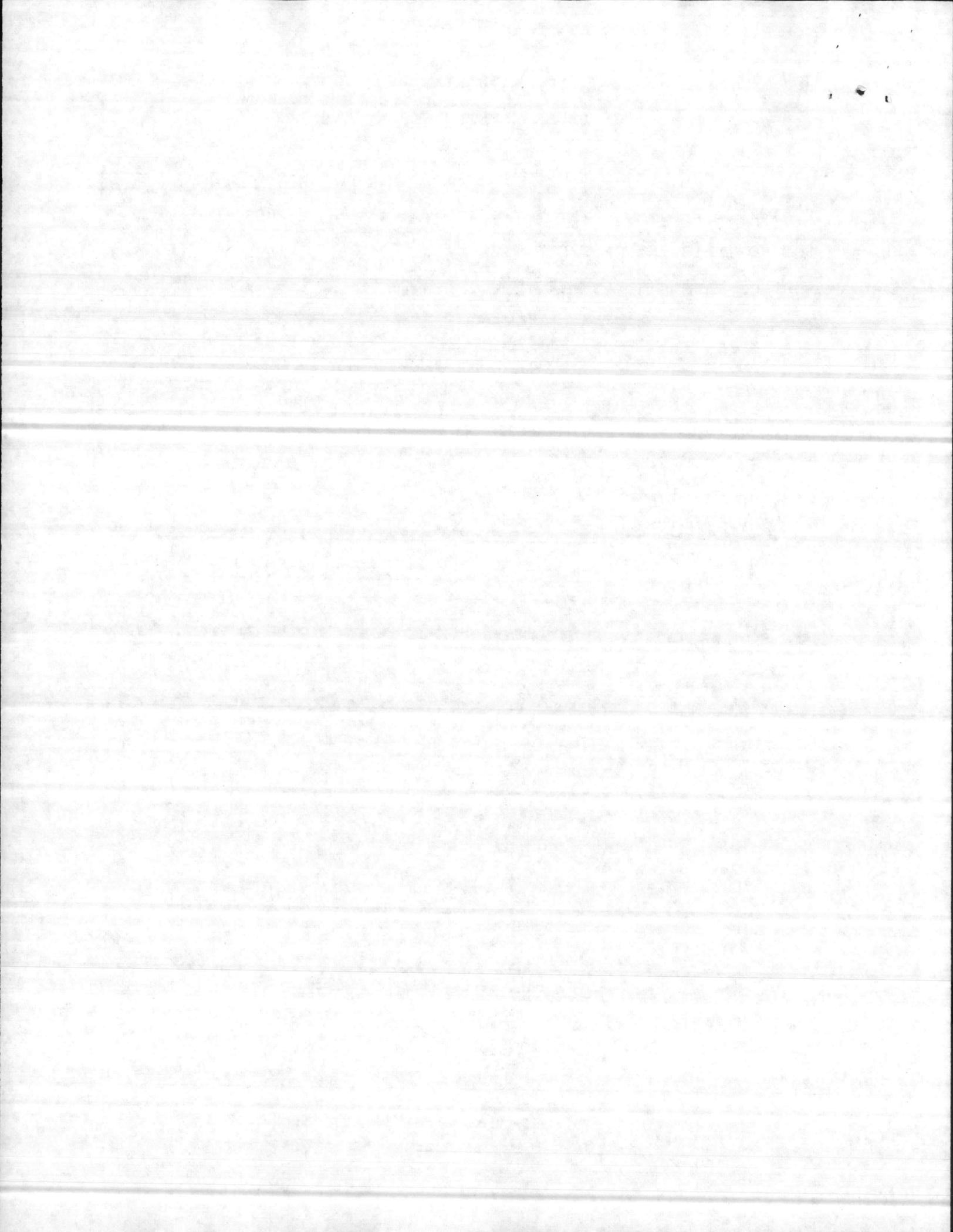


LASER SAFETY

CHAPTER 2

LASER SAFETY REGULATIONS

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CHAPTER 2

LASER SAFETY REGULATIONS

2001. POLICY. Control measures will be outlined for the firing of a laser on a given installation or range. Some of the control measures will be specific for a given installation or range, however, there are some general guidelines that can be adapted to every installation and laser system.

2002. STANDARD OPERATING PROCEDURES FOR MAINTENANCE FACILITIES

1. Most of the eye injuries from laser radiation have occurred in the laboratory. These have usually involved experienced laser specialists who had failed to wear protective eye wear. Control measures for the maintenance facility should be designed to protect not only the laser user, but the noncontrolled personnel having access to the area.

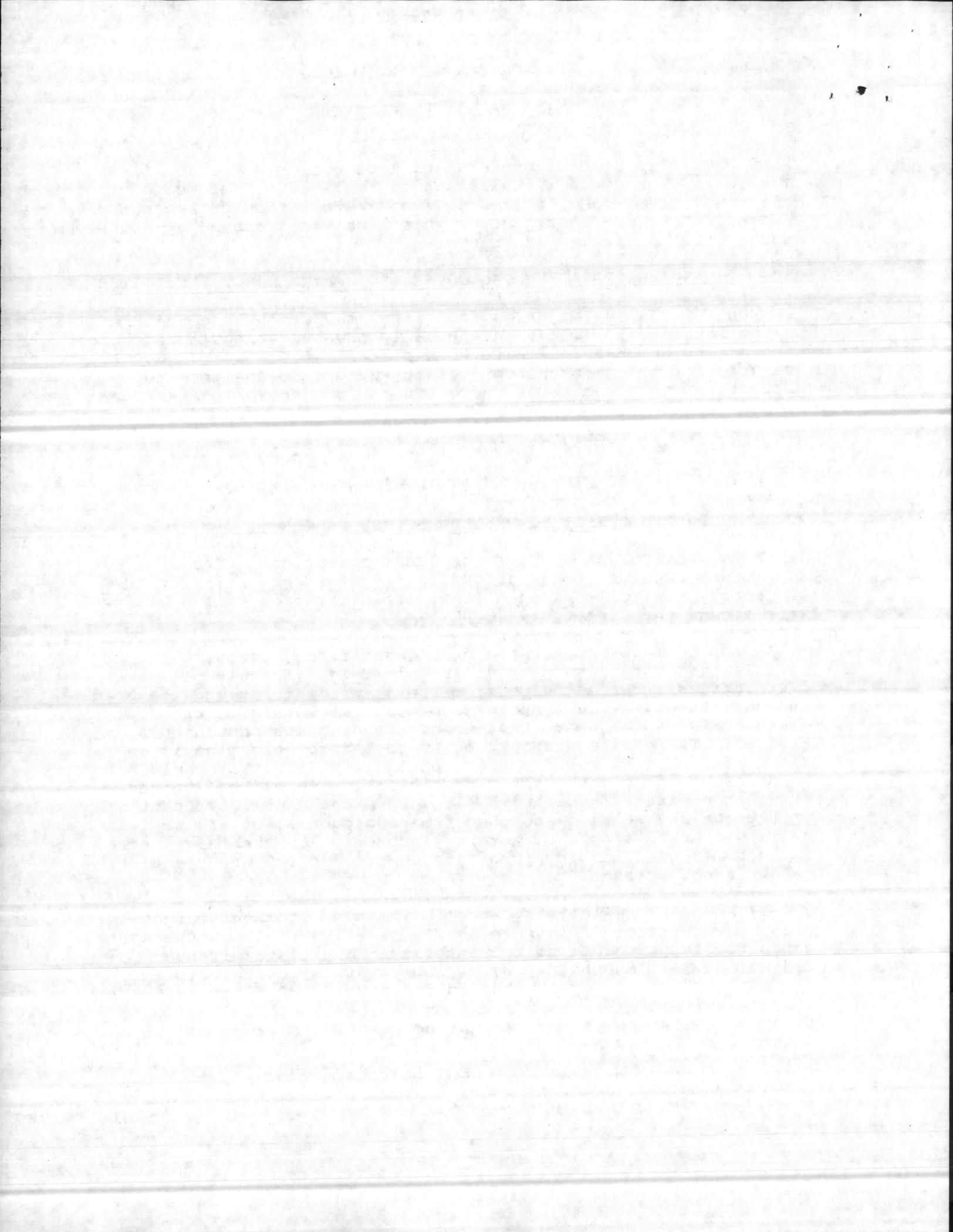
2. Control measures could be mechanical, administrative, or a combination of the two. The control measures initiated should be prescribed for the highest class laser in operation.

2003. STANDARD OPERATING PROCEDURES FOR RANGES

1. Range control procedures for laser operations. The controls to prevent exposure to hazardous levels of laser radiation are: beamstops, controlled access, restricted airspace, and a buffer zone around the target area.

2. Prior to laser operations on a given range, remove all specular reflectors such as glass, plexiglass, highly polished flat surfaces, chrome bumpers, mirrors, windshields and the head and tail lamps. If a tank is to be used as a target, the flat glass surfaces in the tank viewblocks and optics should be removed. Target areas should be inspected to determine if any large pieces of broken glass are present. Areas that could have ponds or standing water after precipitation should be avoided as a target area if possible. Snow does not usually present a problem unless melting and then freezing occurs, or if the melting creates a pool of water. Inspection of the target area is recommended after any precipitation to insure that standing water is not present.

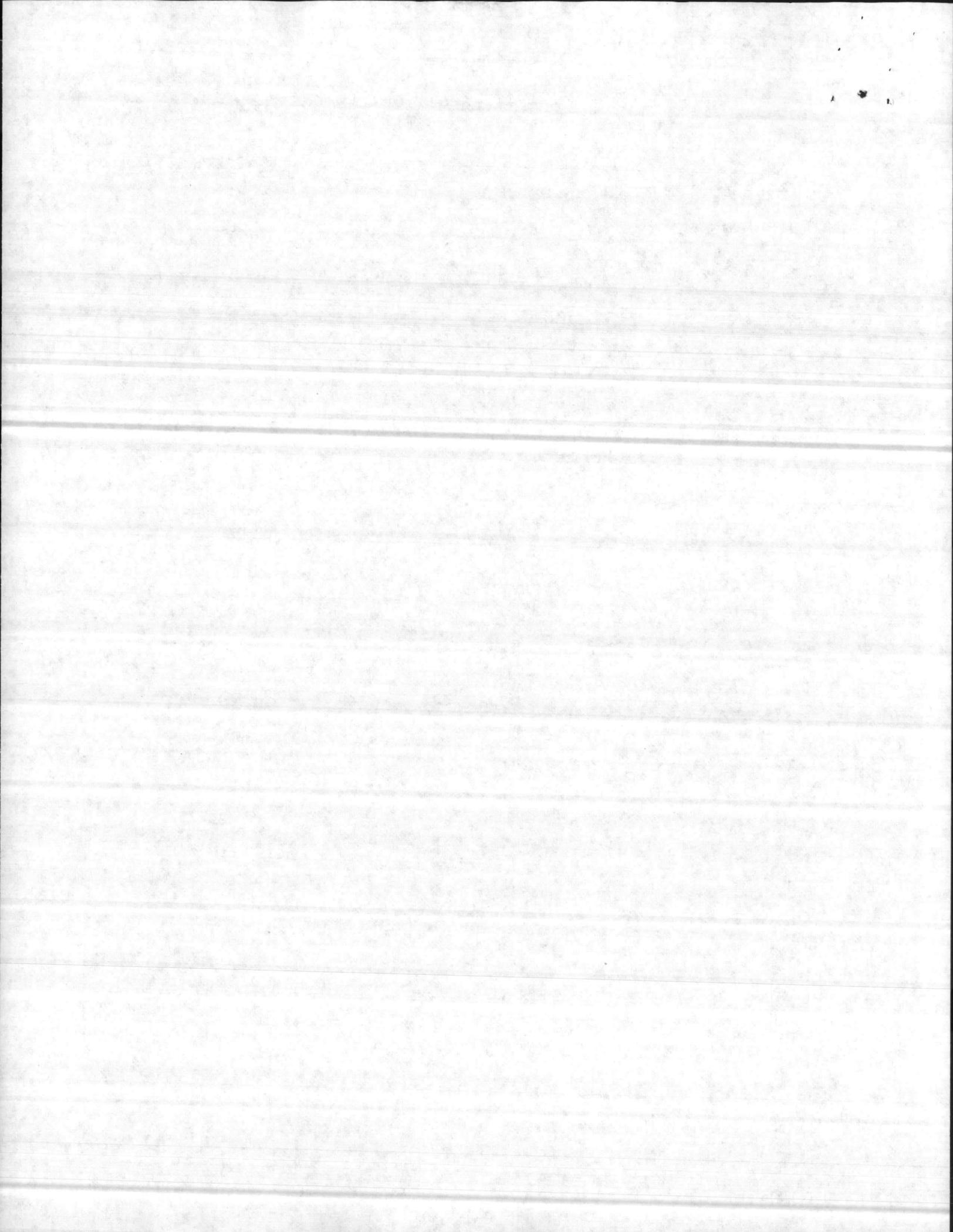
3. If specular reflectors cannot be removed from the target area, the restricted airspace shall be evaluated to insure that noncontrolled aircraft do not enter the zone of hazardous radiation. All mountains, hills, observation towers, etc. within the nominal ocular hazard distance (NOHD) where optically aided viewing of the laser location may occur should be identified and evaluated to insure that no occupied areas could be within a reflected beam path.



CHAPTER 3

ACTIVITY AUDIT OF LASERS

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CHAPTER 3

ACTIVITY AUDIT OF LASERS

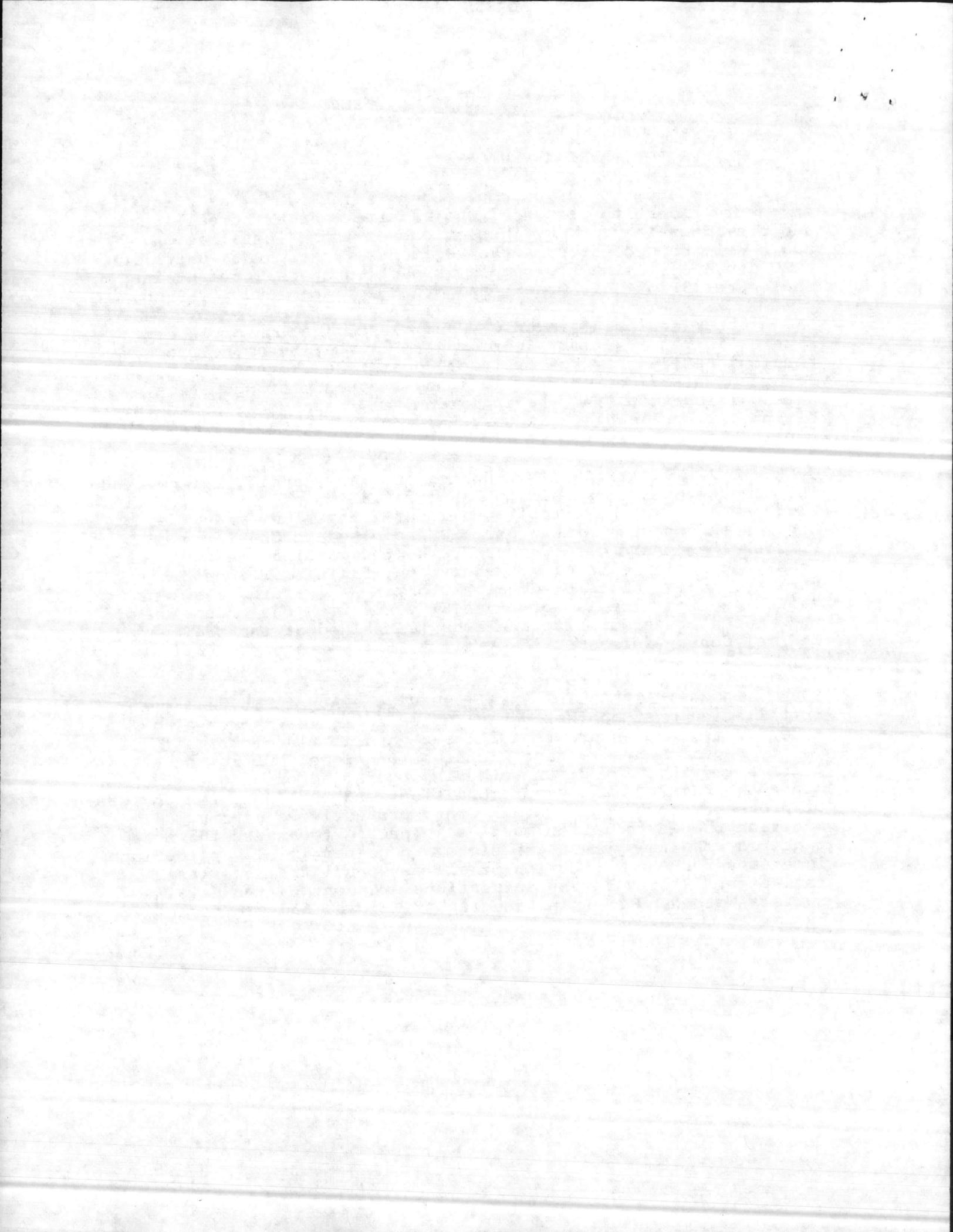
3001. LASER EQUIPMENT INVENTORY

1. A laser audit must be completed to establish a laser equipment inventory, identify personnel who require medical surveillance, and provide safety survey inspections of laser installation. This audit will be conducted by the Regimental or separate Battalion LSSO annually, using the sample inspection checklist contained in enclosure (3) of this Order, and other applicable directives.

2. A laser equipment inventory and classification of laser hazards is required for hazard control. The inventory records should identify the type of laser, operating characteristics, hazards classification, application, frequency of operation, physical location, and the individual(s) responsible for disposition (if applicable), as contained in reference (b), and other applicable directives.

3002. USER IDENTIFICATION. During the laser audit, all personnel who operate or are exposed to laser radiation should be identified. Risk category may be established identifying (low, moderate, or high) risk exposure situations, as explained in Chapter 4. Personnel exposure records must be kept regarding the equipment used, job assignments, laser education, training, time on the job, and laser related medical history. All records shall be maintained for a period of five (5) years with the exception of the medical records which shall be maintained at the regional Medical Center for a period of fifty (50) years as per reference (c).

3003. LASER INSTALLATION SAFETY SURVEY. Each individual laser installation must be thoroughly inspected at least once a calendar year to ensure that it meets and continues to meet safety requirements. Inspections must include, but is not limited to, a review of the standing operating procedures, operator training, equipment condition, and the condition and use of protective eye wear and all other protective equipment. In addition the installation must be inspected to assure that the required warning systems and signs are posted in all appropriate locations for the protection of all personnel from the laser radiation. Safety survey inspections are done by the Naval Surface Weapons Center in Dahlgren, Virginia, and are requested by Marine Corps Base.

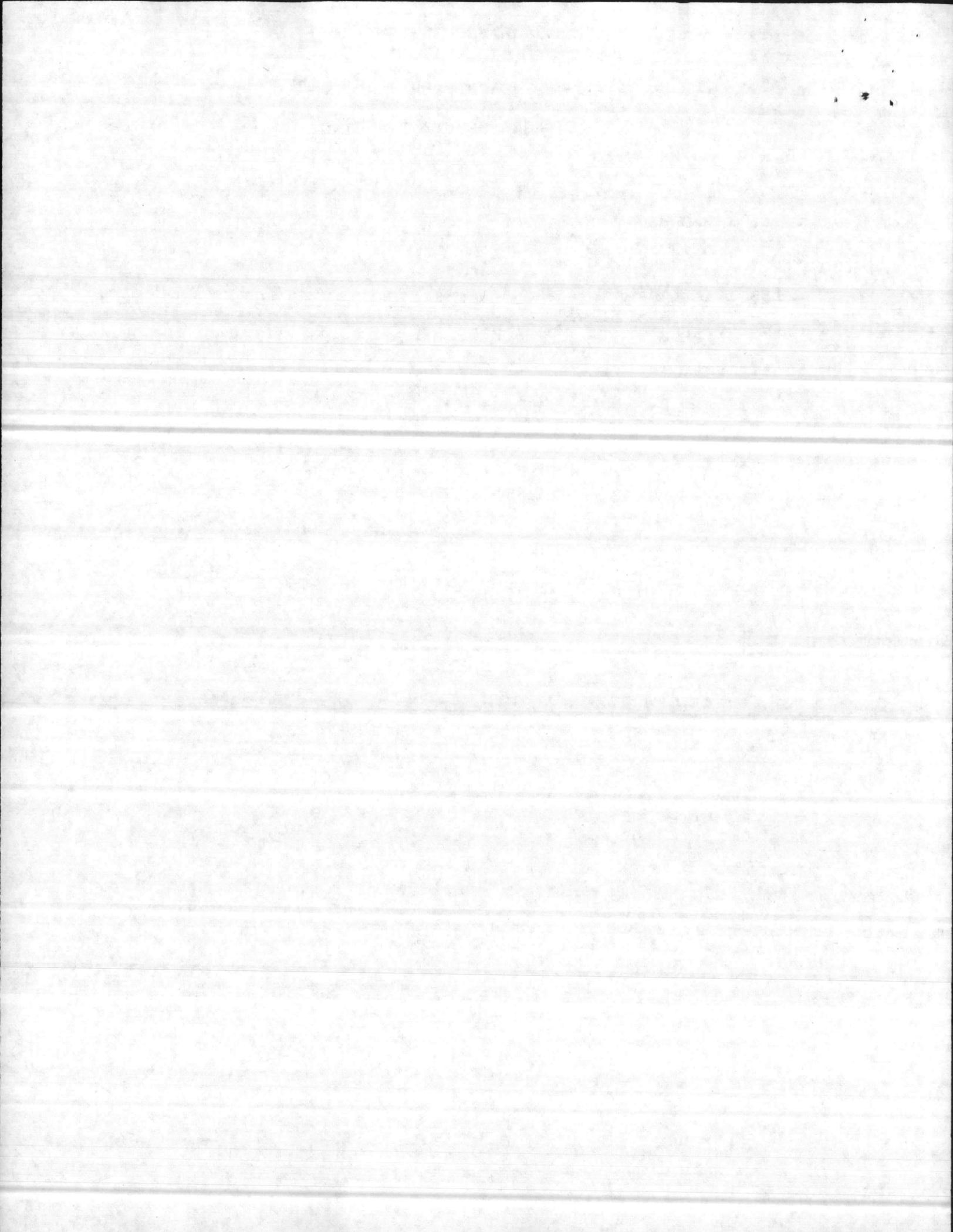


LASER SAFETY

CHAPTER 4

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CHAPTER 4

LASER SAFETY TRAINING

4001. CLASS I LASERS. Class I lasers are nonhazardous devices which may be viewed directly or indirectly without any protective devices over extended periods of time.

4002. CLASS II LASERS. Class II lasers are low-risk laser devices which are hazardous only if viewed continuously without protective devices. Class I and II lasers require no special training.

4003. CLASS IIIA LASERS. Class IIIA lasers are moderate risk laser devices which require protective equipment for personnel and specific mechanical safety devices to ensure personnel safety during laser operations. Simple review of the lasers characteristics and hazards is sufficient training.

4004. CLASS IIIB AND IV LASERS. Class IIIB and IV lasers are high risk laser devices which require protective equipment for personnel and extensive mechanical safety devices to ensure personnel and physical safety during laser operations. These lasers require the following formal classroom training:

a. Type of eye protection to be worn (when and where, appropriate optical density for appropriate wavelength and proper periodic inspection).

b. Potential hazards in the target area, maintenance area, etc., types of warning signs to be posted and specific procedures to avoid these hazards.

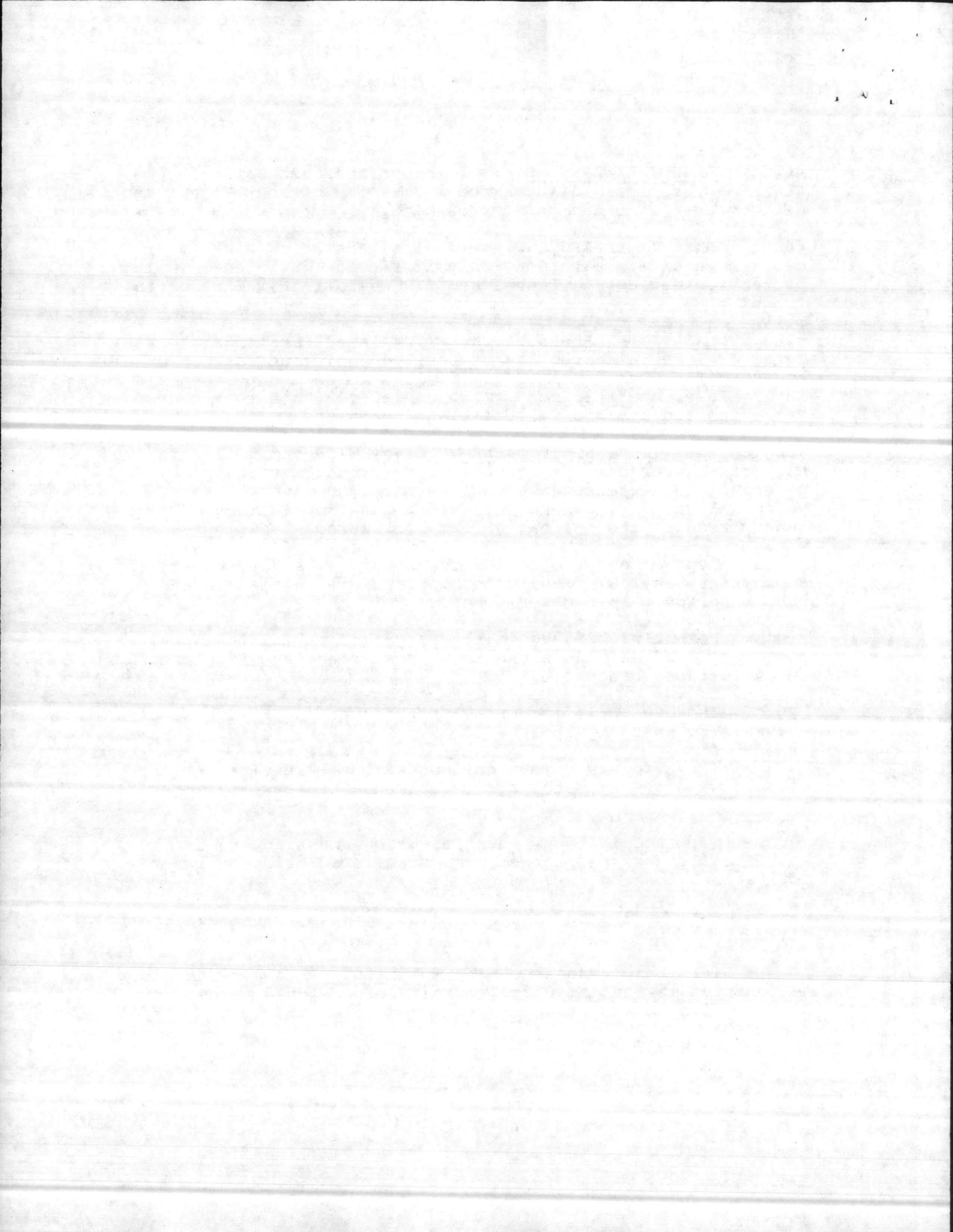
c. Thorough briefing on all range procedures with specific emphasis to ensure that:

(1) Two way communications with all involved ships, aircraft, personnel, etc. are established before laser operations commence.

(2) Acquisition, identification and tracking of the specifically assigned target are established prior to laser activation.

(3) No lasing occurs until cleared by the range control officer.

(4) Lasing shall cease immediately whenever the laser is not pointed in the immediate vicinity of assigned targets or the Range Officer terminating the run.

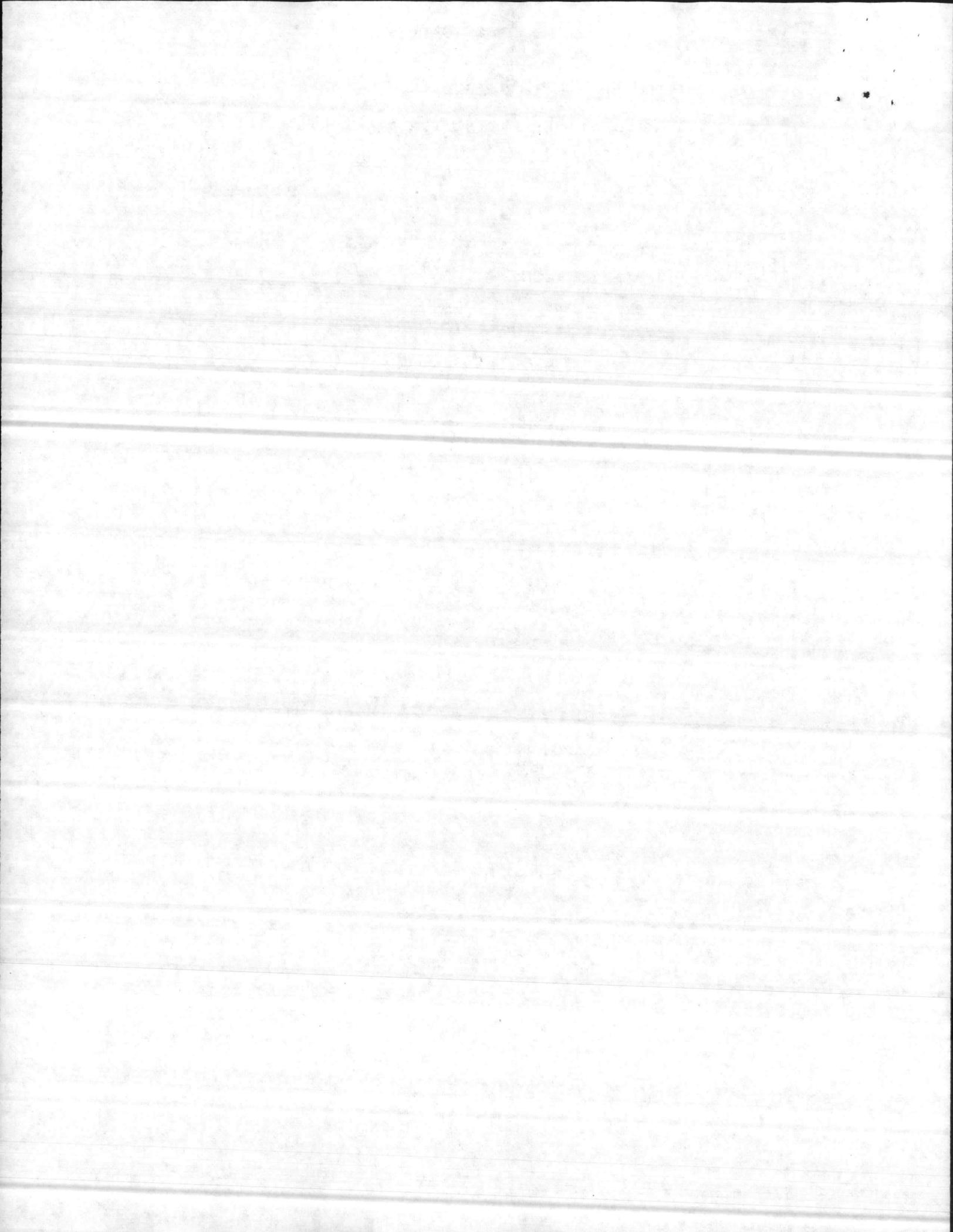


LASER SAFETY

CHAPTER 5

LASER PROTECTIVE GOGGLES

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LASER SAFETY

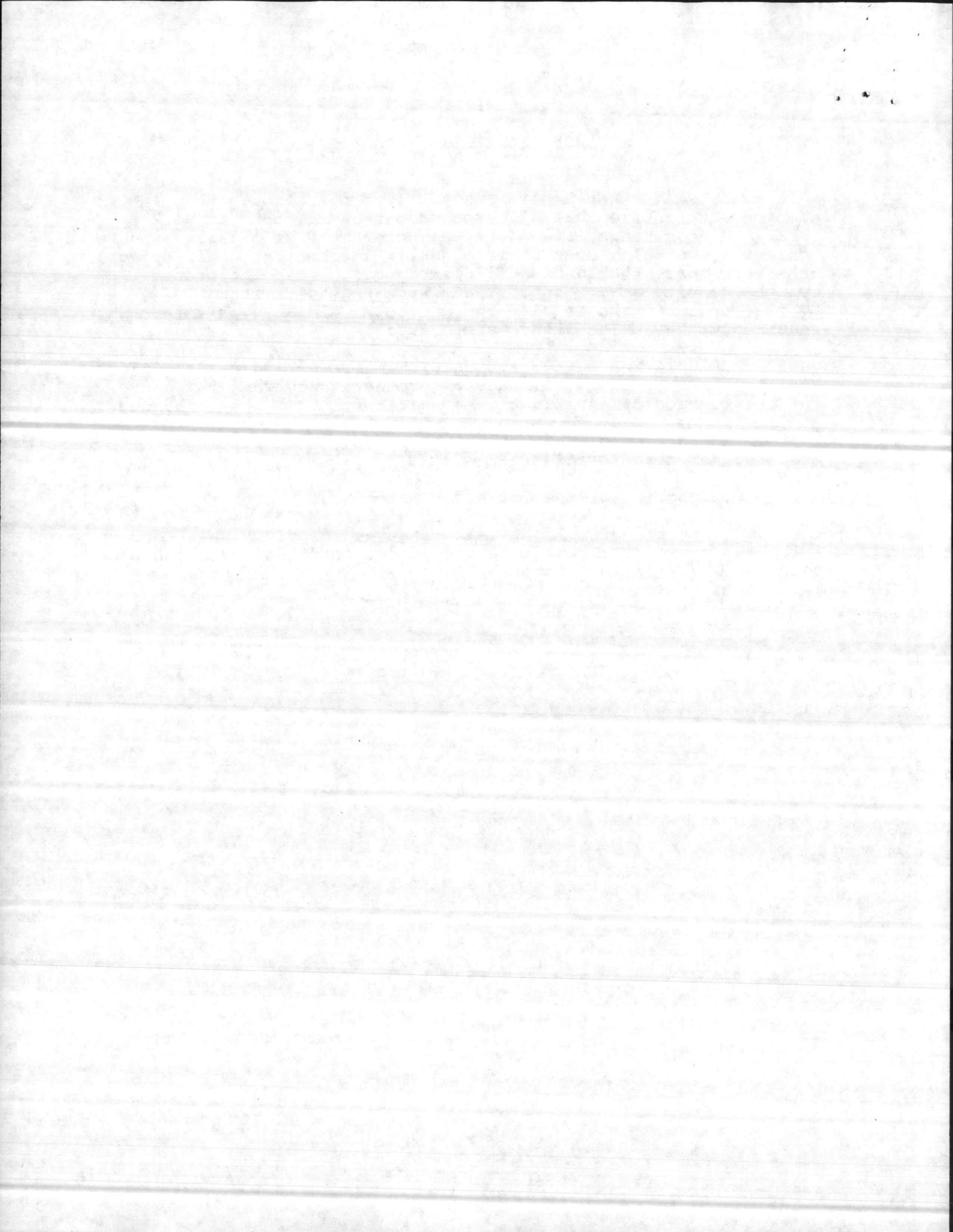
CHAPTER 5

LASER PROTECTIVE GOGGLES

5001. GENERAL. When lasers are put into operation, the using command must ensure that all exposed personnel, both in work areas and down range, are adequately protected from laser radiation. Goggles must be permanently labeled for their optical density. There should be sufficient goggles with the proper optical density at the appropriate wavelengths to issue to all personnel who require one and to handle any visitors required to be in the laser hazard area.

5002. PERIODIC INSPECTION AND MAINTENANCE. Periodic inspections shall be made by using commands of protective eyeware to ensure the maintenance of satisfactory conditions. This shall include:

- a. Inspection of the attenuator material for pitting, cracking and discoloration.
- b. Inspection of the frame for mechanical integrity.
- c. Inspection for light leaks that would permit hazardous intrabeam viewing. Eyeware in suspicious condition should not be used until tested for acceptability.

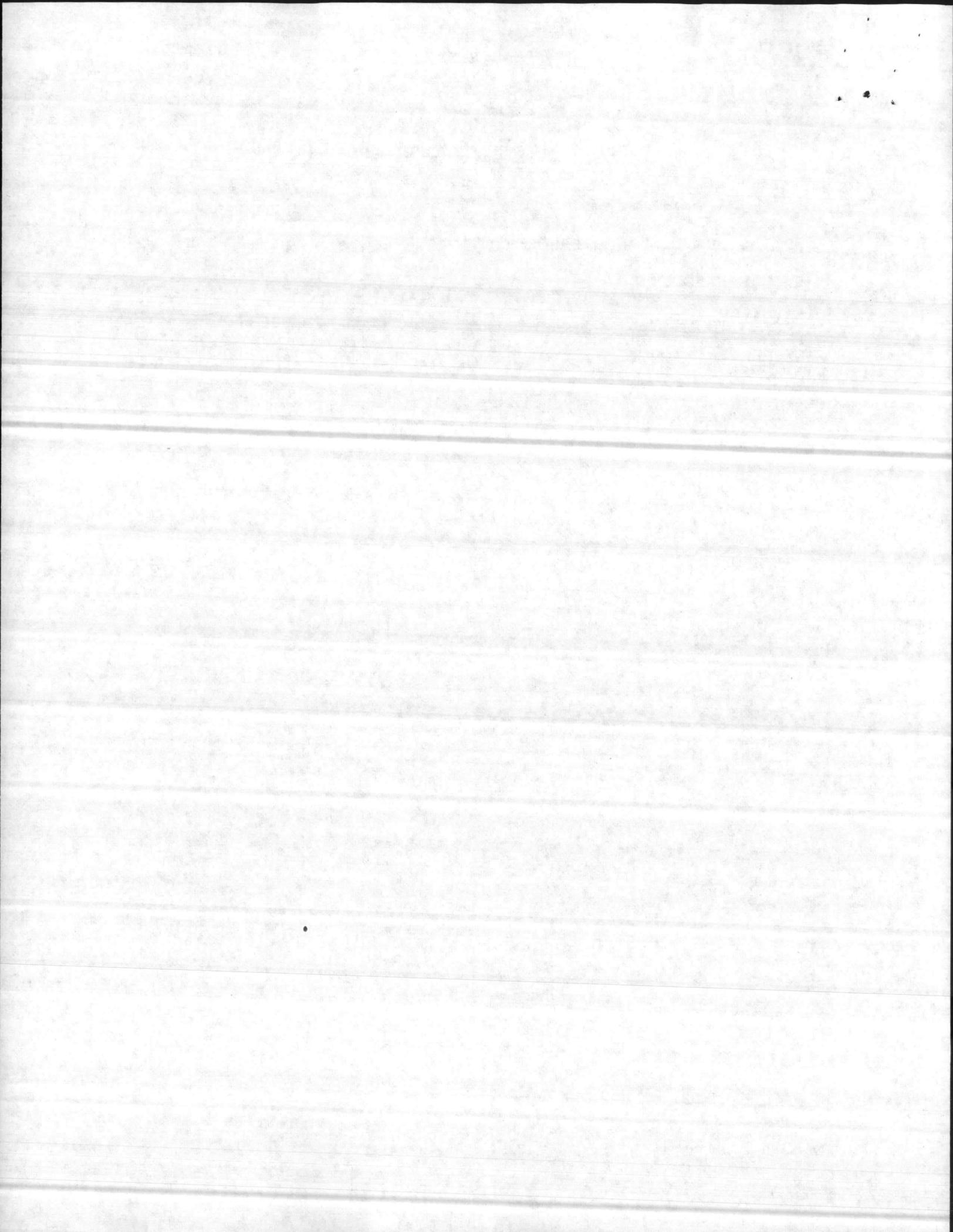


LASER SAFETY

CHAPTER 6

MEDICAL SURVEILLANCE PROGRAM

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LASER SAFETY

CHAPTER 6

SURVEILLANCE PROGRAM

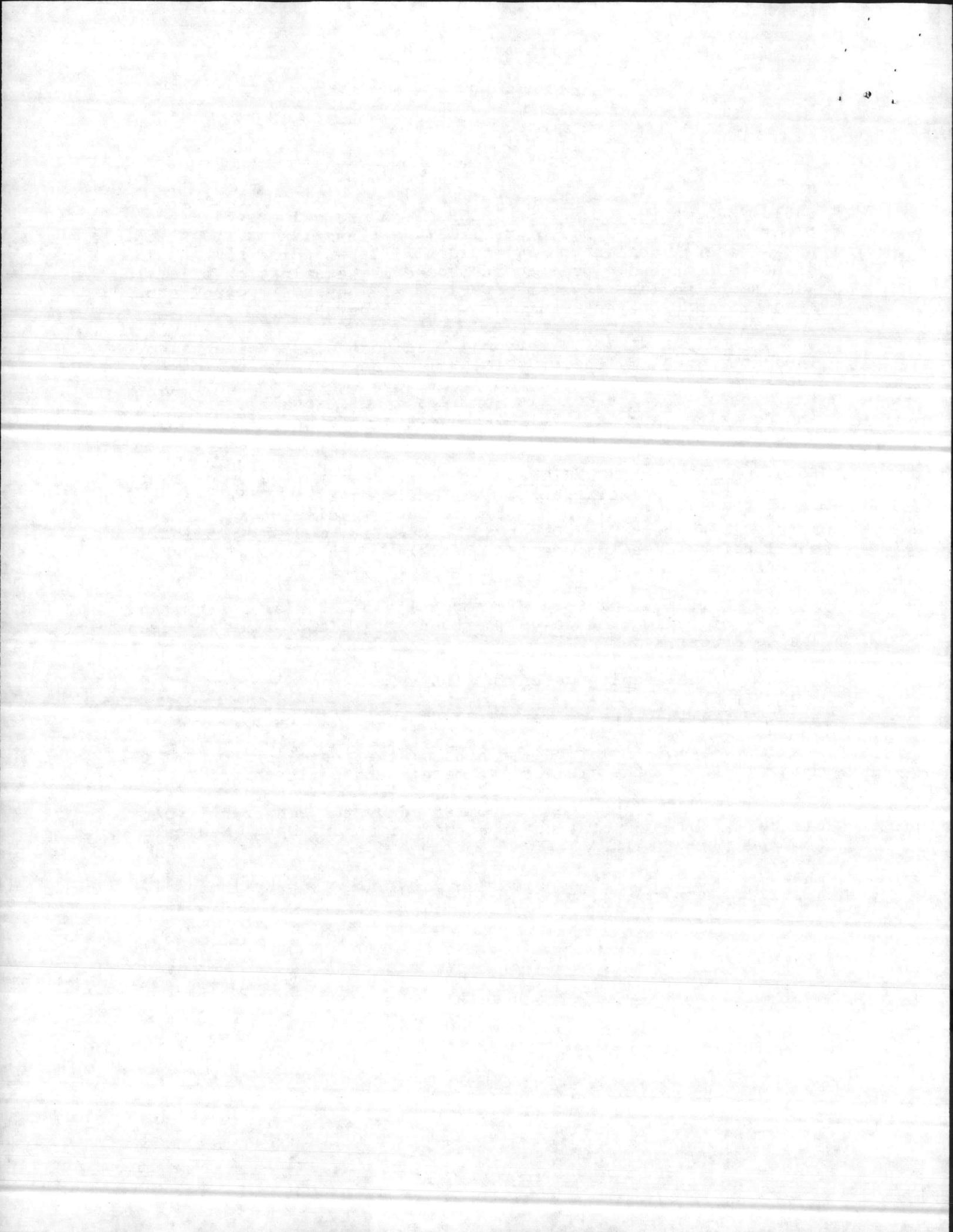
6001. MEDICAL SURVEILLANCE PROGRAM. A medical surveillance program is required for class IIIIB and class IV laser systems. All personnel designated as incidental laser personnel should have a documented visual acuity screening examination prior to assignment to laser systems operations. Laser personnel should have examinations as required by paragraph 6003.

6002. MEDICAL SAFETY. Personnel designated as incidental or laser personnel by their Regimental or separate Battalion LSSO's, shall be required to wear the proper eye protection when engaged in force-on-force tactical exercises. Additionally, any incidental personnel involved in work downrange, i.e., moving targets, shall wear approved eye protection.

6003. MEDICAL EXAMINATIONS. Prior to designation or commencement of tasks directly related to laser operations or maintenance; or if any individual is exposed to laser radiation and an eye injury is suspected or observed, a complete medical examination shall be performed as soon as possible. The examination shall consist of:

- a. A medical history with emphasis on ocular systems and history of medication usage (particularly potentially photosensitizing drugs).
- b. Visual acuity determinations.
- c. Examinations of various structures of the eye.
- d. Polaroid color photographs of the posterior pole of the funds including the area of the macula and optic nerve.
- e. Any other protocol recommended by the cognizant medical officer or by consultation with the Commander, Naval Medical Command (MEDCOM-21).

6004. REFERENCE. The medical surveillance program is in accordance with reference (c).

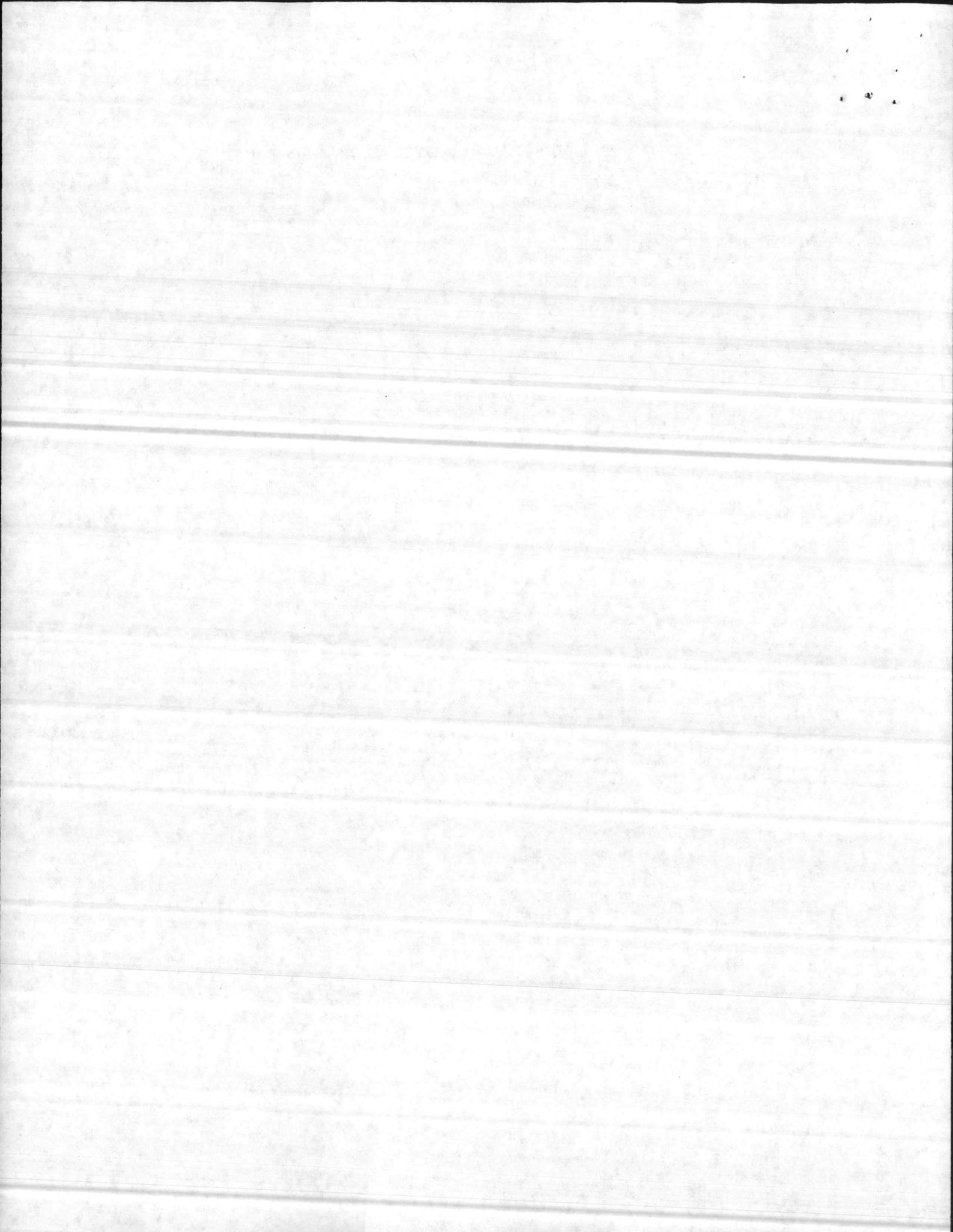


LASER SAFETY

CHAPTER 7

ACCIDENT INVESTIGATION/REPORTING PROCEDURES

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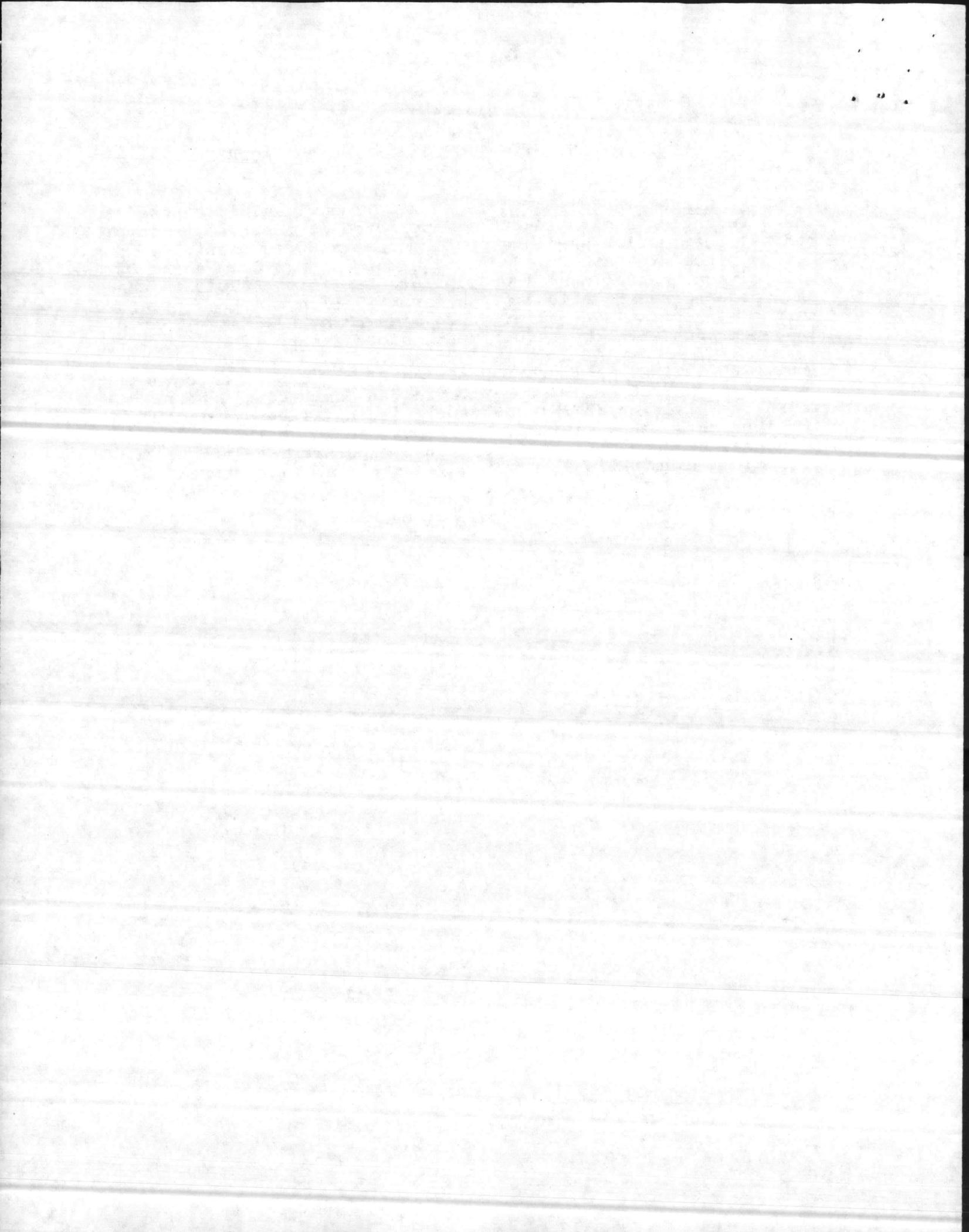
LASER SAFETY

CHAPTER 7

ACCIDENT INVESTIGATION/REPORTING PROCEDURES

7001. ACCIDENT INVESTIGATION. When an individual is exposed to laser radiation and an injury is suspected or observed, a complete medical examination shall be performed as soon as possible. Examination procedures are covered in Chapter 6. The Commanding Officer will direct the Regimental or separate Battalion LSSO's to conduct an accident investigation. This investigation will be forwarded to the appropriate installation commander (Attn: Range Control) in accordance with the requirements of reference (f).

7002. REPORTING. A letter report shall be submitted to the Commander, NAVMEDCOM (MEDCOM-21) via the Commanding General, 2d Marine Division (ATTN: Surgeon) within fifteen (15) days of the incident. As a minimum, the report shall contain a list of personnel exposed, an estimate of the exposure received, a copy of medical examinations performed, and a narrative summary of events leading to the incident.

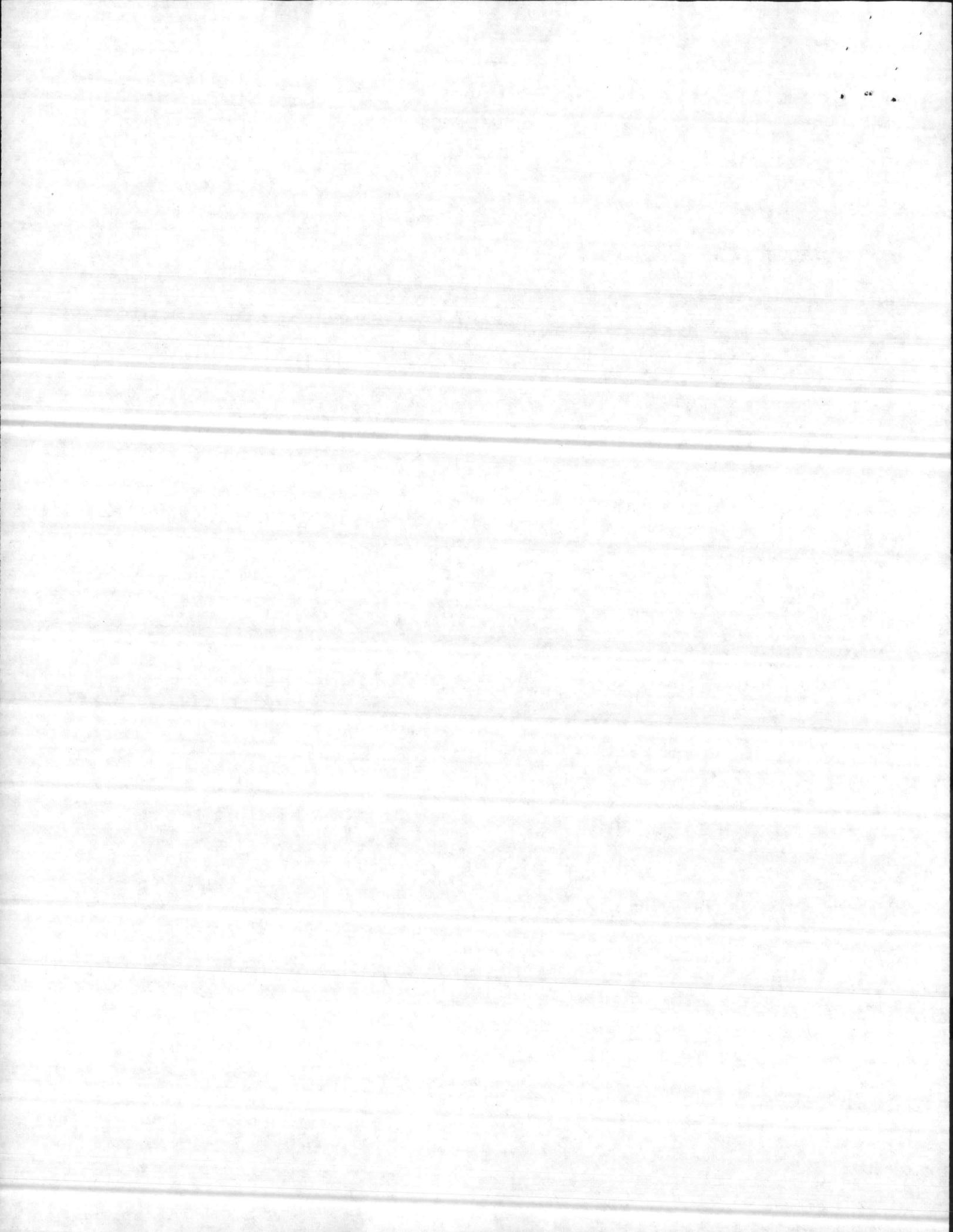


LASER SAFETY

CHAPTER 8

RECORDS

	<u>PARAGRAPH</u>	<u>PAGE</u>
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LASER SAFETY

CHAPTER 8

RECORDS

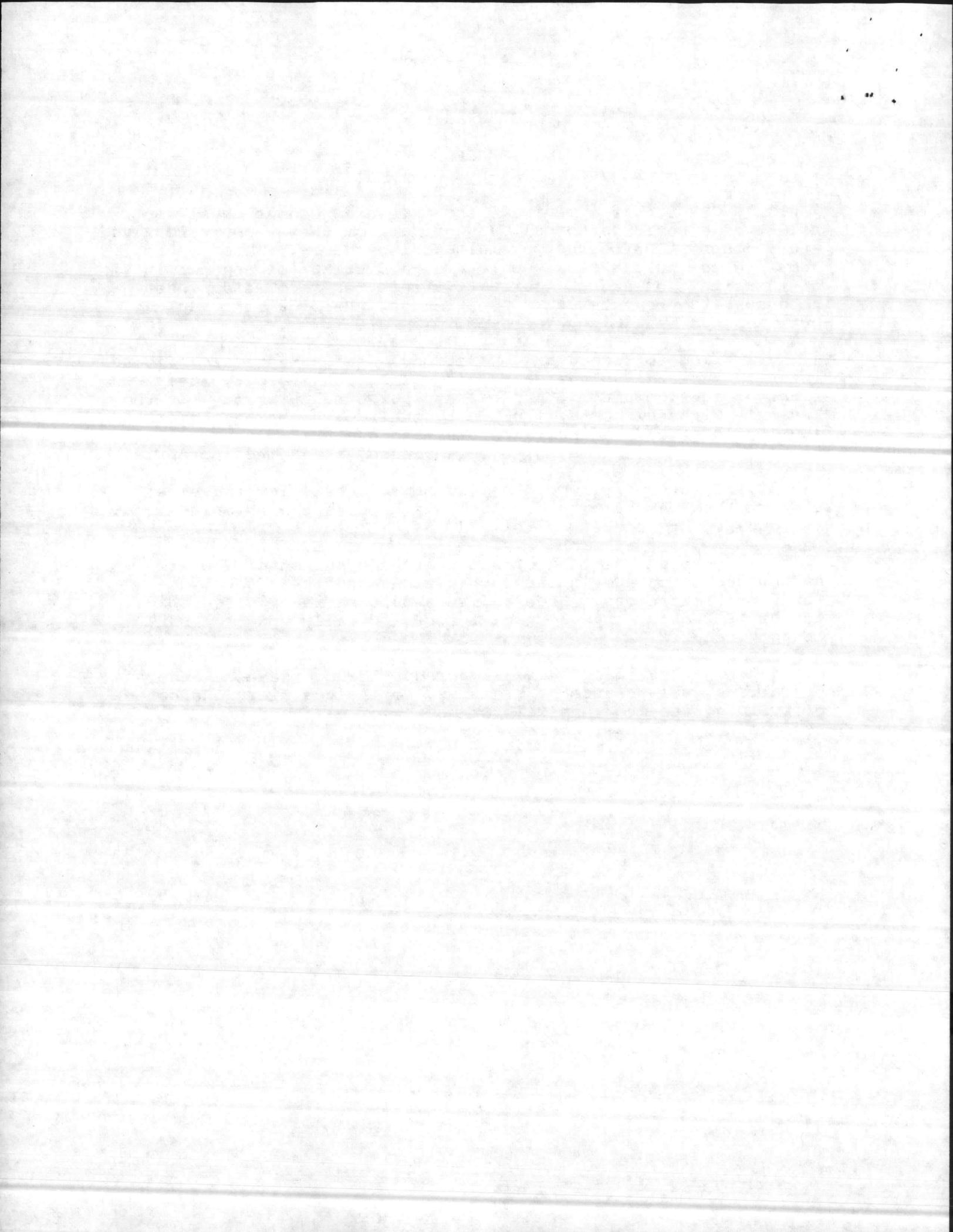
8001. RECORDS. At a minimum, the exposure records shall contain a list of exposed personnel, an estimate of the exposure received, and a description of the physiological symptoms. This report should also include as an enclosure, a description and examination of the situation and the corrective measures/recommendations necessary to prevent future occurrences. Records will include, but need not be limited to:

a. A log to record all operational, maintenance or training laser firings to include date, time, location, target, laser range officer, operator, purpose and personnel present. If the laser is fired airborne, include type aircraft, Bureau Number (BUNO), location/heading, altitude, and designated target. Additional documentation may also be included, as deemed appropriate.

b. An inventory record of all command held laser devices along with a Description and Analysis Report will be maintained, as required by references (b) and (d).

c. A current listing of all units and personnel who are authorized to engage in laser operations and their specific function/limitations. Such a list should be readily accessible to the LSSO, and range control and periodically updated when changes occur.

d. Training records of all personnel who engage in laser operations, maintenance or training, to include times and dates of training received, as well as copies of designations and assignments for laser operations.



LASER SAFETY

LASER ANNUAL INVENTORY REPORT FORMAT

From:
To: Commanding General, 2d Marine Division, FMF (Attn: Div Safety)
Subj: Exempt LASER Inventory Report for FY-____
Ref: (a) NAVELEXINST 5100.12

1. In accordance with the reference, the following annual report is submitted for FY-____:

- a. LASER Type _____
- b. Manufacturer _____
- c. Part Number _____ (if available)
- d. Contact Number _____ (if available)
- e. Number of LASERS _____
- f. National Stock Number _____ (if available)
- g. Exempt Qualification (check applicable boxes)
Combat Training _____
Classified _____

2. STATUS

- a. Number of LASERS:

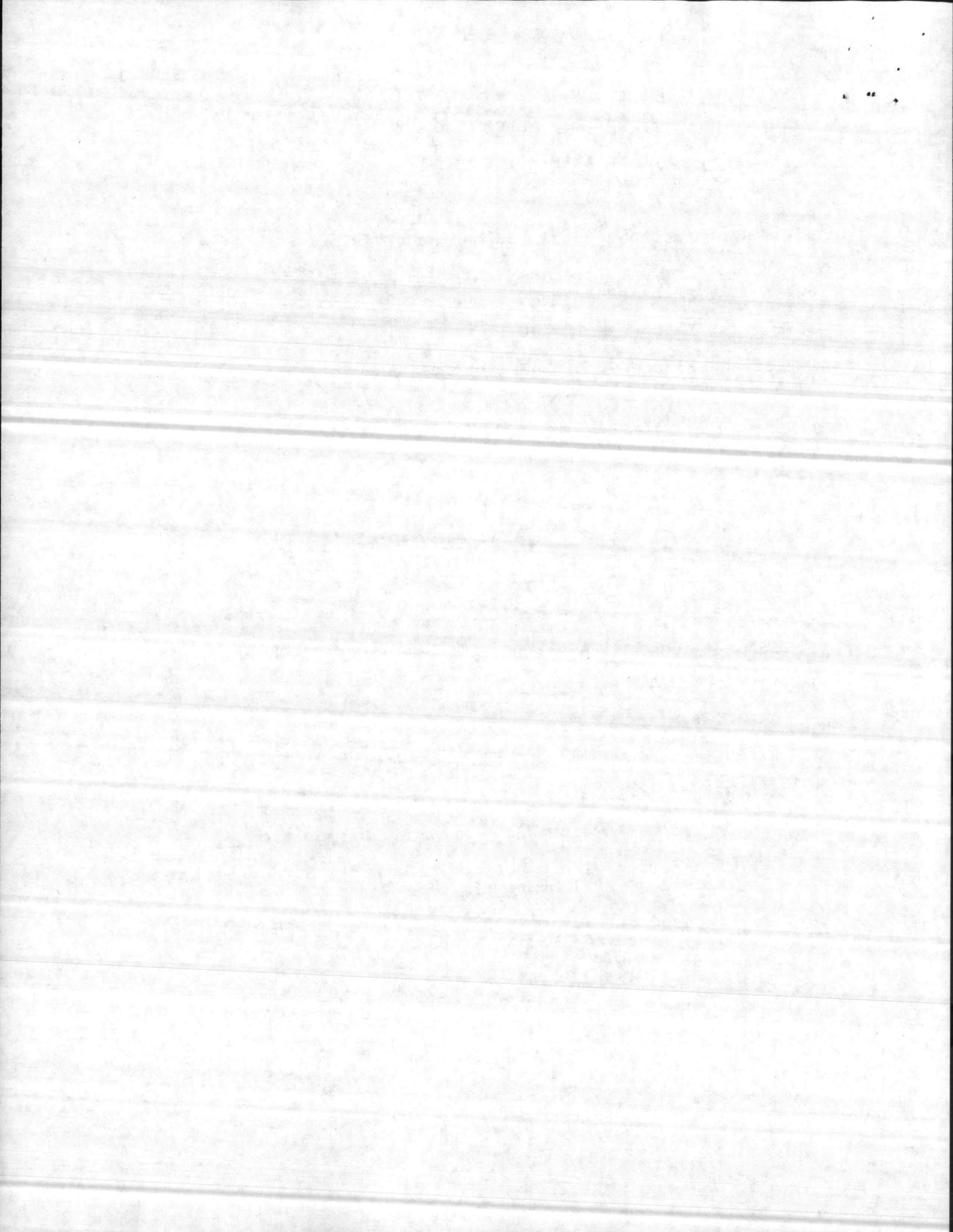
In use ___ In storage ___ Awaiting Disposition ___

Transferred within DOD to ___ Date ___ ASD approval date ___
(Provide Serial Numbers)

Disposed outside of DOD to ___ Date ___ ASD approval
date ___ (Provide Serial Numbers)

//SIGNATURE//

ENCLOSURE (1)



LASER SAFETY

LASER RANGE FIRING LOG

COMMAND _____ DATE _____ RANGE _____

LASER SYSTEM _____ LASER SERIAL NUMBER _____

LEFT LIMIT _____ RIGHT LIMIT _____
(AZIMUTHS) (AZIMUTHS)

MAX. RANGE AUTHORIZED _____ MIN. RANGE AUTHORIZED _____

TIME CLEARED FOR USE _____ TIME SECURED FROM USE _____

LASER SAFETY OFFICER _____ RANK _____ UNIT _____

OPERATOR #1 NAME _____ RANK _____ TIME USED FROM _____ TO _____

OPERATOR #2 NAME _____ RANK _____ TIME USED FROM _____ TO _____

OPERATOR #3 NAME _____ RANK _____ TIME USED FROM _____ TO _____

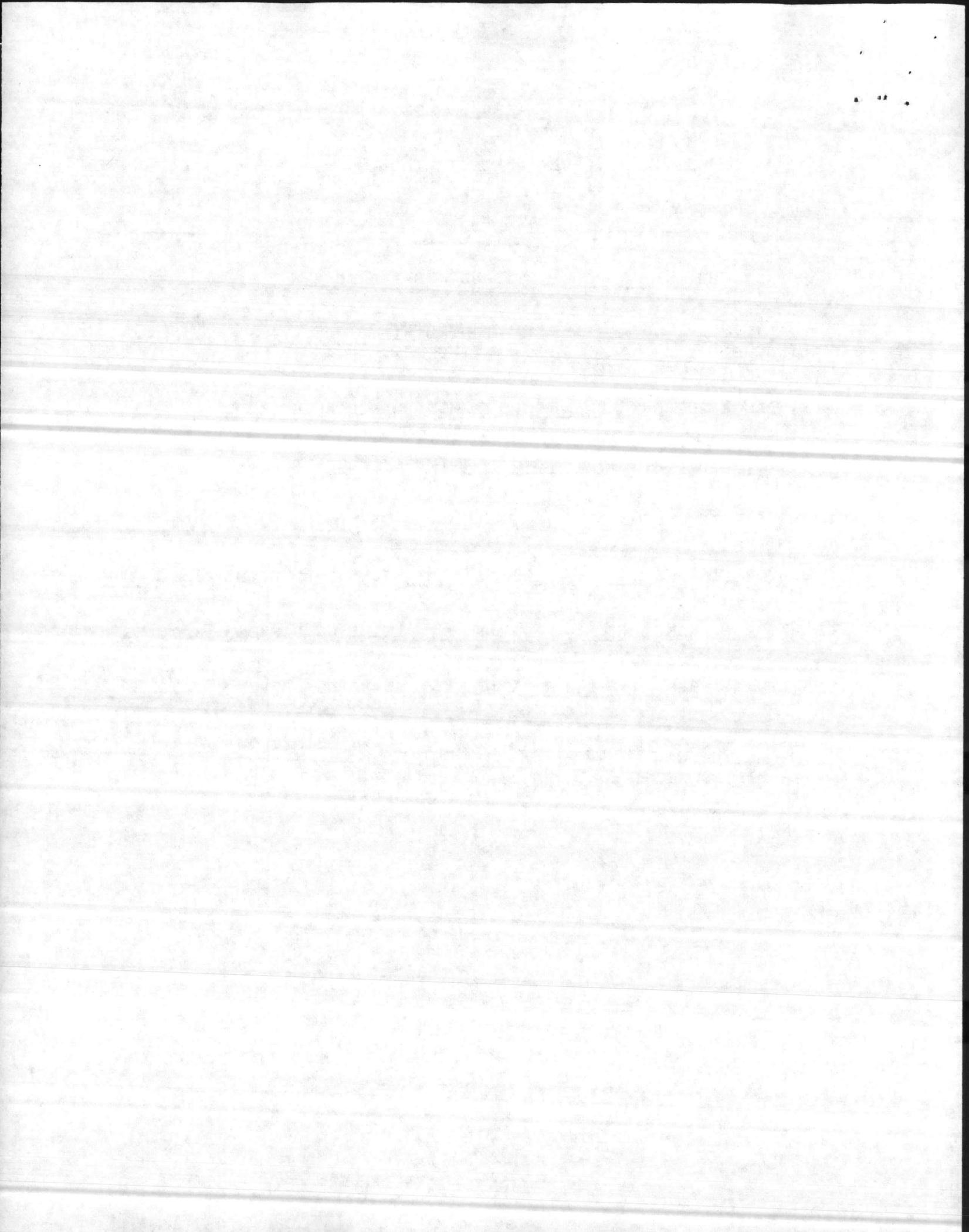
OPERATOR #4 NAME _____ RANK _____ TIME USED FROM _____ TO _____

WAS A FILTER REQUIRED YES NO

WHICH FILTER WAS USED

SAMPLE FORMAT LASER RANGE FIRING LOG

ENCLOSURE (2)



LASER SAFETY

LASER SAFETY INSPECTION CHECKLIST

		<u>YES/NO</u>
	Does the command have Class III or IV LASERS or military exempt LASERS?	___/___
REFERENCE	If yes, continue with the following:	
NAVELEXINST 5100.12 Encl (4)	Has a LASER hazard control program been established?	
NAVELEXINST 5100.12 Encl (4)	Has a LASER Systems Safety Officer (LSSO) been designated in writing and does he have direct access to the CO?	___/___
NAVELEXINST 5100.12 Encl (4)	Does the LSSO have sufficient technical competence and authority to approve or disapprove the local use of LASERS?	___/___
NAVELEXINST 5100.12 Encl (5)	Has the LSSO received a minimum of 20 hours of formal classroom training in LASER radiation? (LASER Safety School or equivalent)	___/___
NAVELEXINST 5100.12 Encl (4)	Has a local LASER Safety Organization or Committee been established to assist the LSSO in discharging his responsibilities? (If warranted by the magnitude of the Potential hazard in local operations)	___/___
NAVELEXINST 5100.12 Encl (4)	Has each local LASER user been approved or submitted for safety approval to higher authority by the LSSO?	___/___
NAVELEXINST 5100.12 Encl (4)	Does the LSSO maintain a list of all LASERS and their locations?	___/___
NAVELEXINST 5100.12 Encl (4)	Is a list of Class IIIB and IV LASERS and Military Exempt LASERS submitted annually to NAVELEXSYSCOM? (Due 15 October)	___/___

ENCLOSURE (3)

DivO 5100.3
22 May 1985

NAVELEXINST 5100.12
Encl (4) Have local LASER safety regulations been established including standing operating procedures for indoor maintenance and outdoor operational LASER operations? ___/___

NAVELEXINST 5100.12
Encl (4) Have safety responsibilities been written for LASER or LASER System Operations which include normal operational procedures, emergency procedures and documentation of all LASER firing? ___/___

NAVELEXINST 5100.12
Encl (4) Are all local LASER Ranges surveyed at least annually for safety? ___/___

NAVELEXINST 5100.12
Encl (4) Are warning systems and signs placed in appropriate locations to protect all personnel from LASER radiation? ___/___

NAVELEXINST 5100.12
Encl (5) 2.e Has a LASER protective goggles program been established? Are they properly labeled and periodically inspected and evaluated? ___/___

NAVELEXINST 5100.12
Encl (5) Have all personnel in areas with LASERS been informed by formal classroom training about the potential hazards associated with accidental exposure to LASERS? ___/___

NAVELEXINST 5100.12
Encl (4) Are local LASER radiation accidents and incidents investigated with appropriate recommendations and corrective actions initiated? ___/___

NAVMEDCOM INST 6470.
2.5 d&e Is medical evaluation performed and an incident report submitted via the chain of command to COMNAVMEDCOM (MEDCOM 21) within 30 days of the incident with a copy to NAVELEXSYSCOM (ELEX 7034)? ___/___

Medical Surveillance

NAVMEDCOM INST 6470.
2.5.b Has the LSSO determined and designated incidental and LASER personnel?
NOTE: Incidental personnel - Those

ENCLOSURE (3)

22 May 1985

whose work make it possible but unlikely for them to be exposed to LASER energy sufficient to damage eyes or skin. (e.g., range personnel)

LASER personnel - those who operate laser devices. ___/___

NAVELEXINST
5100.12
Encl (4)

Has the LSSO submitted records of personnel exposed to LASER emissions to the medical officer for medical surveillance? ___/___

NAVMEDCOM
INST 6470.
2.5.b

Are all personnel designated either as Incidental or LASER Personnel enrolled in the appropriate medical surveillance program? ___/___

NAVMEDCOM
INST 6470.
2.5.b

Are the required examinations performed prior to participation in and upon termination of LASER work and following any suspected LASER injury? ___/___

NAVMEDCOM
INST 6470.
2 Encl (2)

Have incidental personnel received eye examinations for visual acuity? ___/___

NAVMEDCOM
INST 6470.
2 Encl (2)

Do LASER personnel receive visual acuity determinations and eye examinations based on the wave length of LASER radiation? Is a medical history taken? ___/___

NAVMEDCOM
INST 6470.
2.5.b

Are there any military exempt LASERS? (Those designed for combat, combat training or classified) ___/___

If yes

SECNAVINST
5100.14A
7.c(1)

Have all military exempt LASERS in use been reviewed and approved safe by the NAVY LASER Safety Review Board? (Contact NAVELEXSYSCOM (ELEX 7034)). ___/___

SECNAVINST
5100.14A
7.b(2)

Is the required caution label affixed to all military exempt LASERS? ___/___

SECNAVINST
5100.14A
7.c(3)

Is an inventory and record of the status of all exempted LASER products maintained? ___/___

ENCLOSURE (3)

DivO 5100.3
22 May 1985

SECNAVINST
5100.14A
7.c

Is a report on military exempt LASERS provided to NAVELEXSYSCOM by 15 October of each year?

—/—

SECNAVINST
5100.14A
7.c(5)

Is approval received from the Deputy Assistant Secretary of Defense for Equal Opportunity and Safety Policy, via COMNAVELEXSYSCOM, prior to the transfer or disposal of any military exempt LASER?

—/—

ENCLOSURE (3)

LASER MAINTENANCE SAFETY PRECAUTIONS

1. LASER hazard warning signs shall be posted on all entrances to LASER maintenance areas in accordance with reference (b), so as to minimize the risk of accidental exposure. The LASER units and test benches shall be marked with warning signs as well.
2. All personnel engaged in essential duties concerned with LASER firing shall wear approved, eye protection during firing. Non-essential personnel shall leave the LASER area during firing.
3. All functional entrances to bench and boresight LASER firing areas shall be interlocked so that opening such a door will stop LASER emission.
4. Equipment interlocks shall be maintained in operating condition at all times. In the event required and approved maintenance procedures can only be performed by circumventing some interlock feature, that procedure will be performed only under the supervision of a designated LASER Safety Supervisor, with prior approval of a qualified LASER Systems Safety Officer or qualified Maintenance Officer. In all such cases, a documented quality assurance inspection shall be performed at the completion of that work to ensure that proper interlock operation has been restored.
5. Appropriate and adequate LASER safety radiation containment procedures and devices shall be in effect whenever any LASER is fired. Examples of containment devices are lens covers, diffusers, shields, and enclosures.
6. The LASER test area shall be kept clear of all specular reflectors or diffuse surfaces with a high coefficient of reflection.
7. During LASER operations, the minimum amount of personnel (normally two) shall be present.
8. Where practical, a countdown procedure shall be followed prior to LASER firings.

ENCLOSURE (4)

