



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

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1 Jul 1985

DIVISION ORDER P5100.10

From: Commanding General
To: Distribution List

Subj: Standing Operating Procedures for Safety when Field Firing
81mm Mortar Ammunition (Short Title "81mm Mortar Safety")

Ref: (a) BO P11102.1J
(b) MCO P3570.1
(c) TM 9-1015-200-12
(d) TM 43-0001-28
(e) TM 9-1300-206
(f) FM 23-90
(g) FM 23-91

Encl: (1) Locator Sheet

1. Purpose. To establish uniform procedures for safety when firing 81mm mortar ammunition.

2. Cancellation. DivO P8020.1.

3. Action

a. The Deputy Chief of Staff, Readiness is designated the cognizant staff officer for this SOP.

b. The Director, Division Schools shall fully implement this Order in the course of instruction on the 81mm mortar. Additionally, provide assistance to requesting units with the development and administration of safety examinations.

c. Subordinate units shall issue amplifying instructions as necessary.

d. Commanding officers, officers or NCO's detailed safety duties in connection with firing will read and understand the provisions of this Order.

e. During training exercises where live ordnance is being utilized, all officers and SNCO's will carry the Ammunition Malfunction Data Collection Guide (8025), NAVMAC 10155 (Rev 10-71), NSN 0000-002-2008.

DivO P5100.10

1 Jul 1985

f. Recommendations concerning the contents of this Order are invited. Submit via the appropriate chain of command for evaluation.

4. Certification. Reviewed and approved this date.



H. M. NELSON
Chief of Staff

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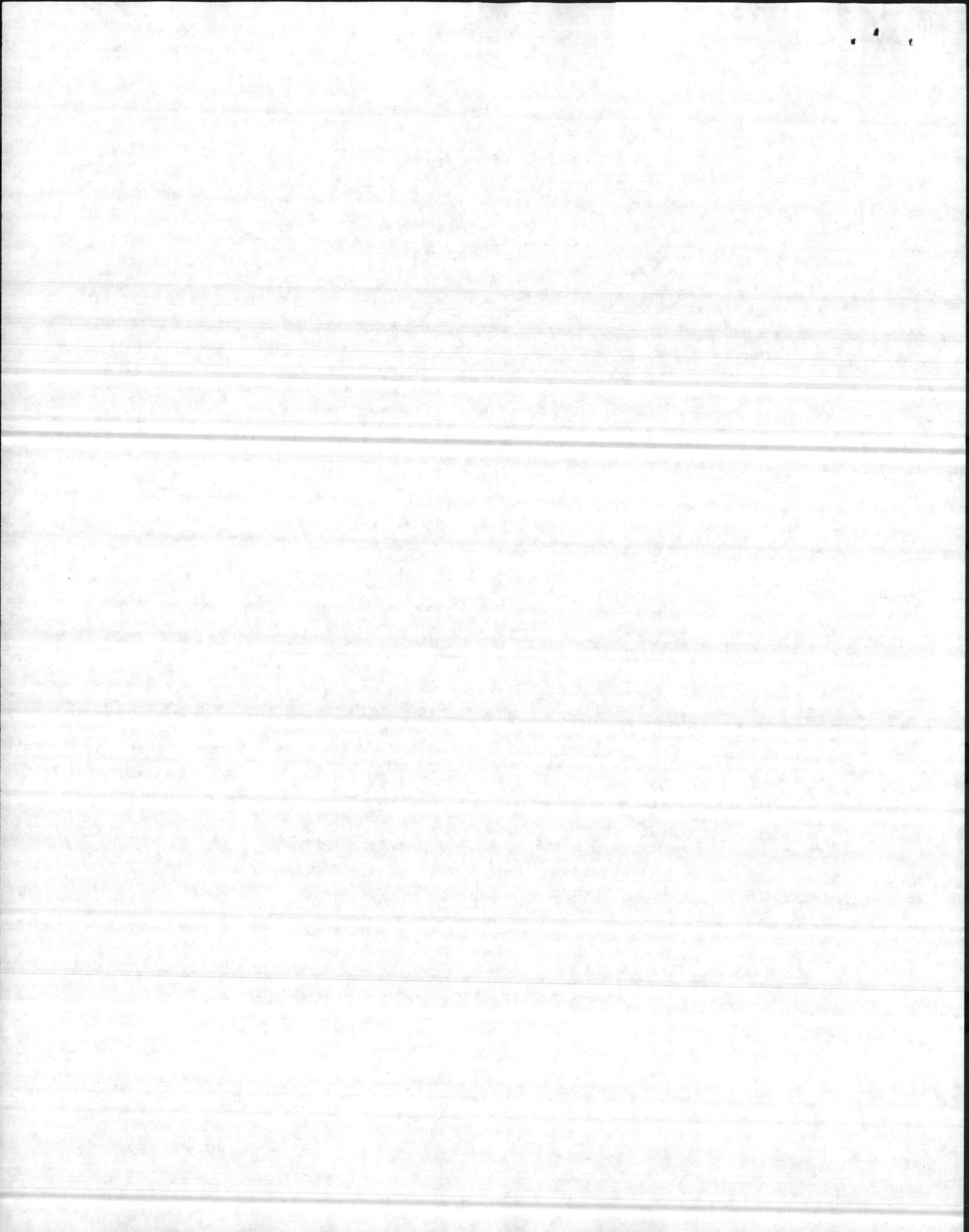
LOCATOR SHEET

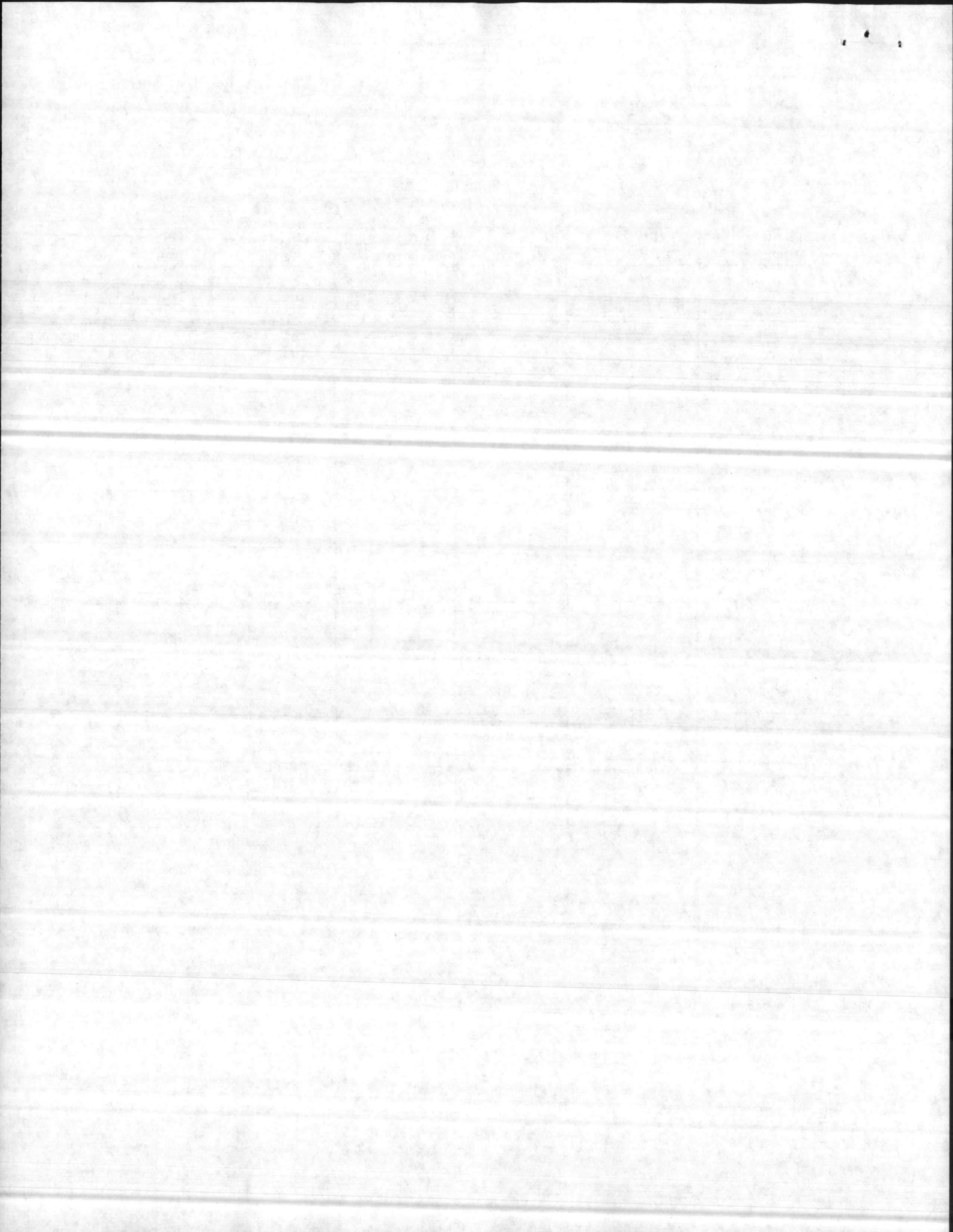
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Location:

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ENCLOSURE (1)





SOP FOR MORTAR SAFETY

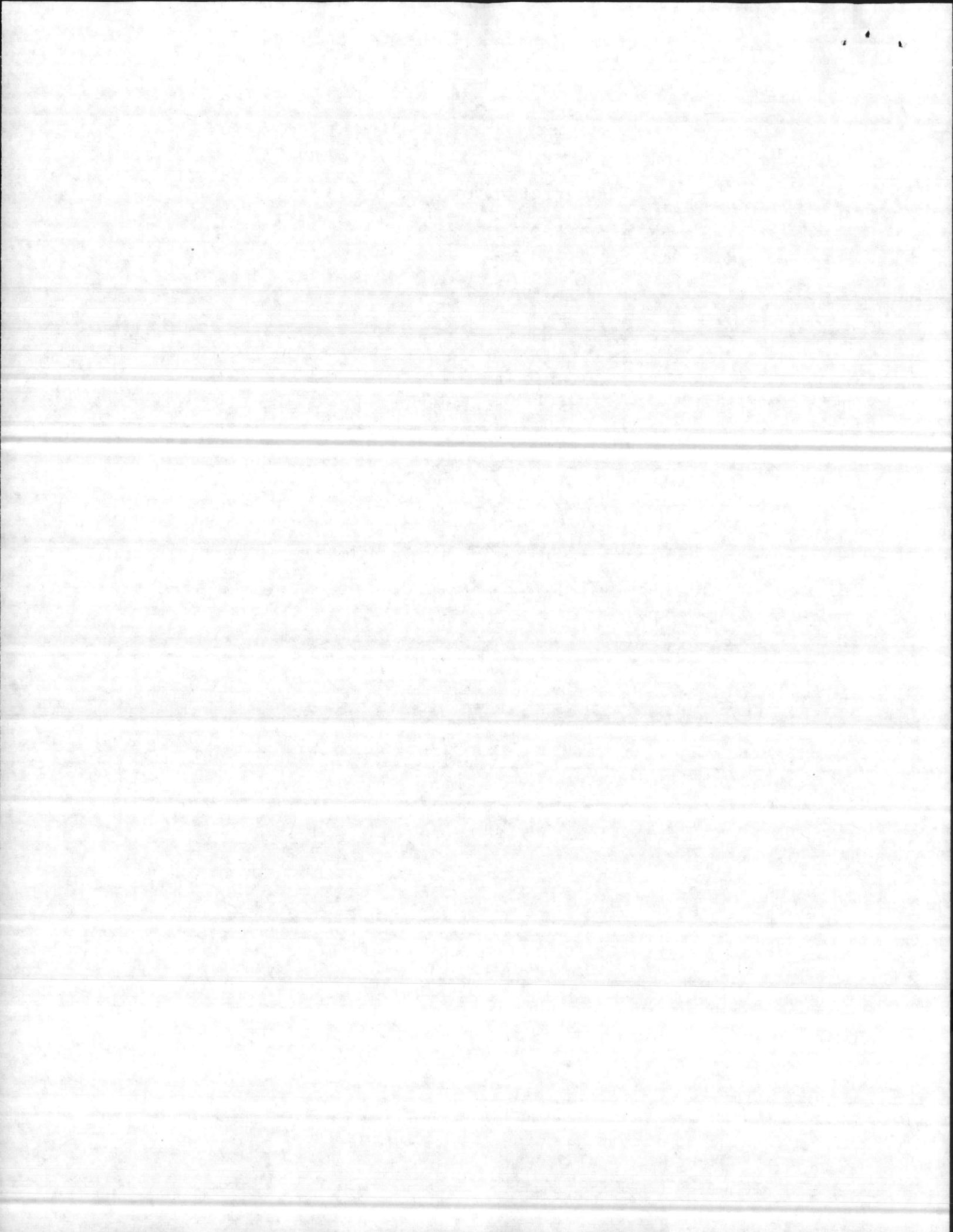
CONTENTS

CHAPTER

- 1 GENERAL INFORMATION
- 2 SAFETY PERSONNEL
- 3 AMMUNITION

APPENDIX

- A SAFETY CARD
- B SAFETY DIAGRAM
- C SURFACE DANGER AREA
- D MEDICAL EVACUATION REQUEST
- E DUD REPORT
- F ACCIDENT/DEFECTIVE AMMUNITION REPORT (PRELIMINARY)
- G DECLINATING THE AIMING CIRCLE

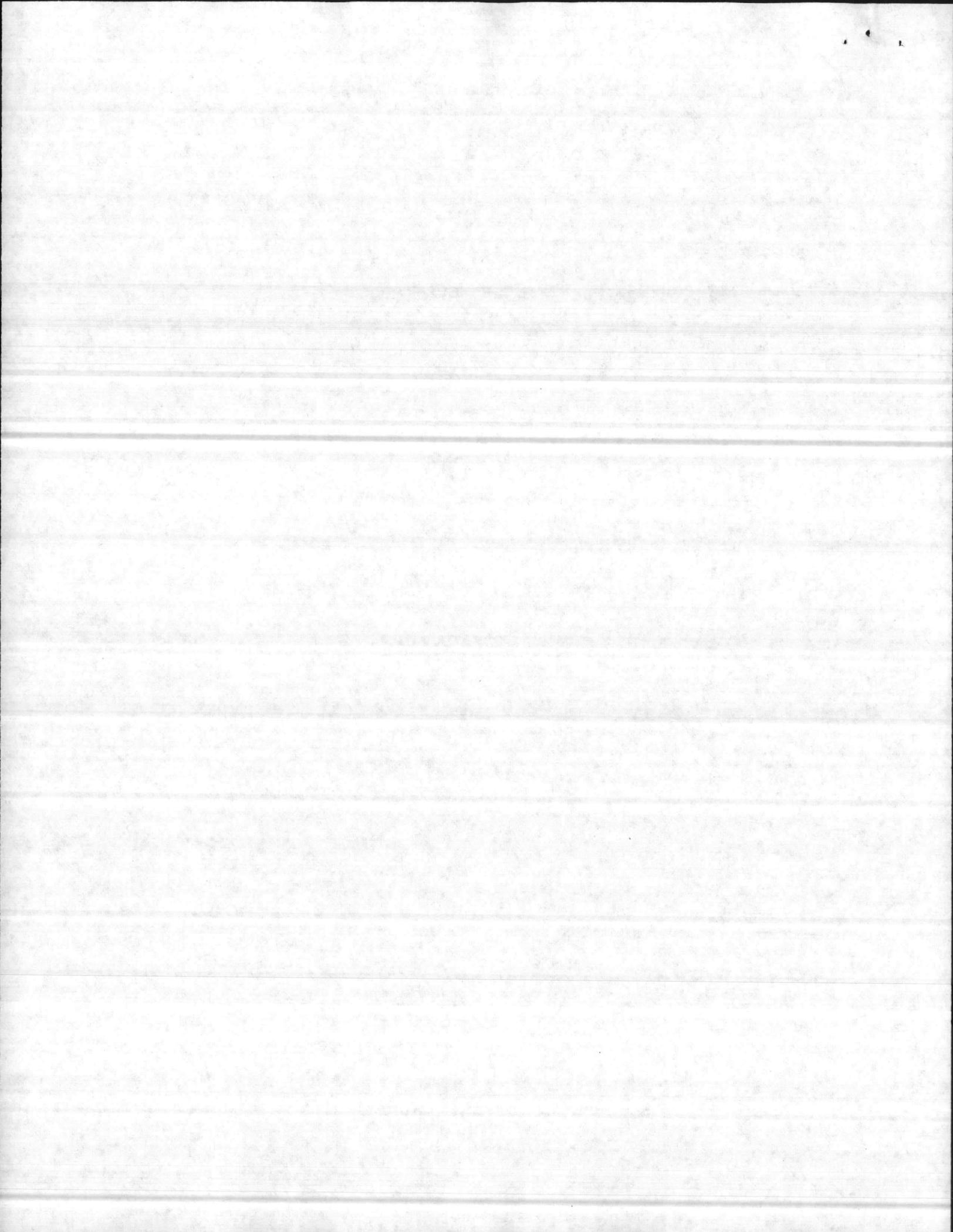


SOP FOR MORTAR SAFETY

CHAPTER 1

GENERAL INFORMATION

	<u>PARAGRAPH</u>	<u>PAGE</u>
PURPOSE.	101	1-3
AUTHORITY FOR USE OF FIRING RANGES/IMPACT AREAS.	102	1-3
POLICY FOR RESERVE ANNUAL TRAINING DUTY (ATD).	103	1-3



SOP FOR MORTAR SAFETY

CHAPTER 1

GENERAL INFORMATION

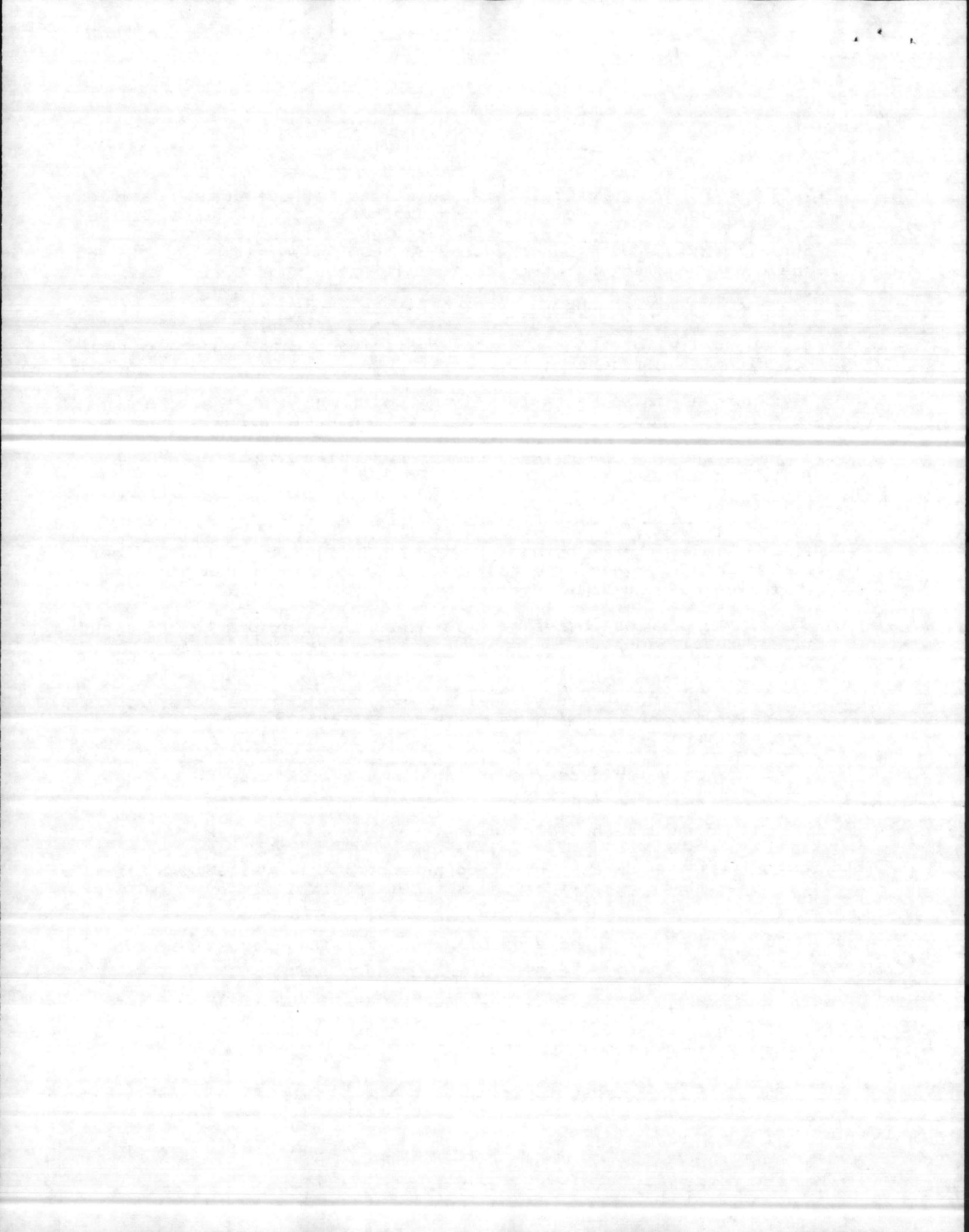
101. PURPOSE. To promulgate regulations for the standardization and safe conduct of mortar firing exercises within the 2d Marine Division at Camp Lejeune, North Carolina. Firing exercises at other locations will be conducted in accordance with this SOP and the range regulations of those facilities being used.

102. AUTHORITY FOR USE OF FIRING RANGES/IMPACT AREAS

1. Authority for the assignment of firing ranges/impact areas is contained in reference (a).
2. Approval of requests for firing positions and ranges is confirmed by publication of weekly firing notices/bulletins.
3. Reference (a) establishes specific regulations which govern available ranges at Camp Lejeune.

103. POLICY FOR RESERVE ANNUAL TRAINING DUTY (ATD)

1. The reserve unit commander will be designated as the Officer-in-Charge of Firing. The host battalion commander has the following responsibilities:
 - a. To provide copies of this Order and appropriate range and safety regulations to the units preparing for live firing exercises.
 - b. To provide safety qualified personnel to the reserve unit or assist in the training and safety qualification of reserve unit personnel, as requested by the OIC of Firing.
2. The reserve unit commander, as the OIC of Firing, has the following responsibilities:
 - a. To ensure this directive is enforced.
 - b. Provide safety qualified personnel, if available. Certification of their qualification is the responsibility of the OIC of Firing.
 - c. Brief all members of his unit on safety requirements contained or referenced in this Order.
 - d. Issue special safety instructions as required.

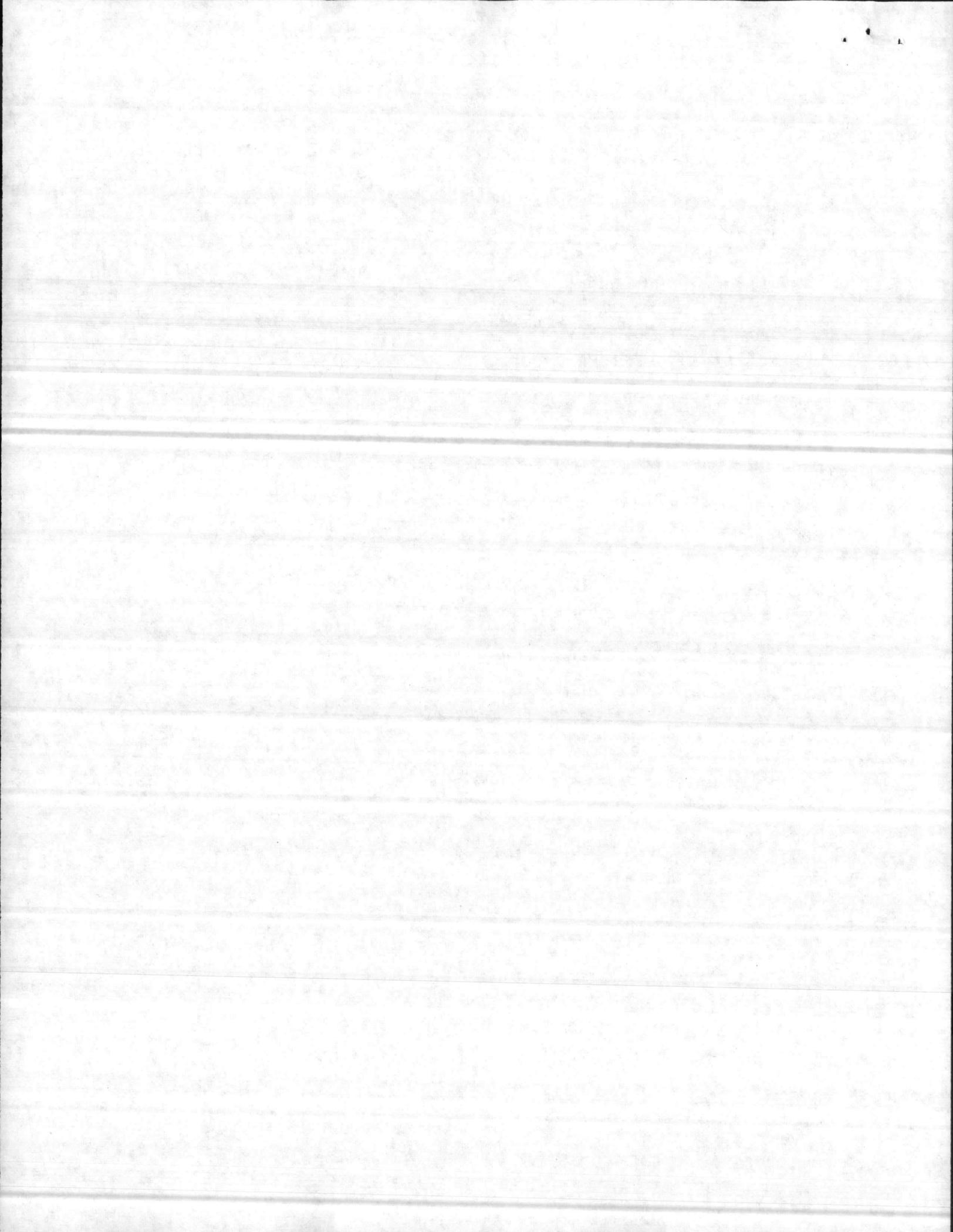


SOP FOR MORTAR SAFETY

CHAPTER 2

SAFETY PERSONNEL

	<u>PARAGRAPH</u>	<u>PAGE</u>
GENERAL.	201	2-3
BATTALION COMMANDER.	202	2-3
OFFICER IN CHARGE OF FIRING.	203	2-3
RANGE SAFETY OFFICER (RSO)	204	2-5
MORTAR SAFETY OFFICER (MSO)	205	2-7
GUN SAFETY NCO, SECTION/SQUAD LEADERS.	206	2-11



SOP FOR MORTAR SAFETY

CHAPTER 2

SAFETY PERSONNEL

201. GENERAL. Safety is a command responsibility. Safety officers must assist commanders in satisfying this responsibility. While all Marines are concerned with safety, safety personnel are charged with specific responsibilities.

202. BATTALION COMMANDER. The Battalion Commander will:

1. Appoint in writing the following qualified safety personnel:

- a. OIC of Firing
- b. Range Safety Officer for each impact area (as required)
- c. Mortar Safety Officer
- d. Gun Safety NCO, when required.

2. Ensure that safety cards prepared by firing units are in accordance with Appendix A and within the prescribed safety boundaries for the range being utilized.

3. Prepare and administer safety examinations to Mortar Safety Officers and Section/Squad Leaders/Gun Safety NCO's. Exams will, at a minimum, cover this Order and the 81mm Mortar.

203. OFFICER IN CHARGE OF FIRING

1. Reference (b) defines the OIC of Firing as "The officer in command of troops conducting firing on, or utilizing, a specific range facility." For this command, the OIC of Firing is the officer who will ensure that all of the responsibilities set forth in this Order are properly executed.

2. The OIC of Firing is responsible for:

a. The overall conduct of firing in compliance with this Order.

b. Maintaining copies of reference (a) and this Order in the firing position at Camp Lejeune.

c. Establishing prescribed communications applicable to the range control facility and ensuring that radio checks are initiated every 30 minutes. If the communications fail, firing will be suspended.

d. Ascertaining that qualified safety officers are assigned. He is responsible for their conduct during firing.

SOP FOR MORTAR SAFETY

e. Ensuring that the Mortar Safety Officer possesses the safety cards that are applicable to the exercise.

f. Ensuring that the Mortar Safety Officer and the mortar platoon operations chief have checked with each other to ensure utilization of the same safety card.

g. Ensuring that firing does not commence until rounds can be observed in the impact area and until all safety measures are in effect. The OIC of Firing will issue positive clearance to commence firing to the firing unit only after obtaining range clearance through the range control facility.

h. Following a registration, modify safety diagrams before firing is continued.

i. Instruct and post one air sentry in the firing position who will have no other duty than to observe for aircraft flying near the gun-target line. The use of the corpsman as an air sentry is not permitted.

j. Assigning road guards at firing position entrances when required for safe firing. Night firing conditions must be carefully considered.

k. Requiring personnel within 50 meters of the gun line to wear a kelvar helmet, ear plugs, and upper body armor.

l. Marking the firing position/OP during daylight hours with a red flag, and during hours of darkness with a red flashing light.

m. Ensure that all weapons are bore-sighted prior to firing each day.

n. Notifying the range control facility when secured from the firing point.

o. Establishing an LZ at the firing position for VIP visits and possible medical evacuations, and marking the LZ with air panels.

p. Requiring the FDC to construct the safety diagram on the firing charts/plotting boards in red pencil.

q. Coordinating, as advised by the range control officer, with adjacent units to ensure safe conduct of firing.

r. Suspending the exercise in the event of serious injury or death.

s. Providing M-2 aiming circle(s), appropriate TM's and FM's, and a copy of this Order to the Mortar Safety Officer.

SOP FOR MORTAR SAFETY

t. Preparing the appropriate safety card in accordance with the format contained in Appendix A and preparing the safety overlay of the surface danger zone in accordance with Appendix C. (Safety overlays of the surface danger area are not required when firing from established positions at Camp Lejeune.) Submitting the safety overlays (when required) and all safety cards to the Battalion S-3 for review and appropriate approving signatures.

u. Responsible for inspecting ammunition prior to issuing and firing for serviceability.

v. For writing and submitting, within (24) hours, an expenditure report to Division Ordnance.

204. RANGE SAFETY OFFICER (RSO)

1. The RSO is a commissioned officer or warrant officer appointed in writing by the battalion commander of the firing unit. When qualified commissioned officers are not available to serve as the RSO, qualified staff noncommissioned officers may be appointed in writing by the battalion commander of the firing unit.

2. The RSO will report to the Range Control Officer (Building 1) 24 hours prior to commencement of the exercise if operating at Camp Lejeune. For weekend live fire exercises, the RSO will report to the Range Control Officer by 1630 the Friday preceding the weekend. Additionally, he will:

a. Assume responsibility for the scheduled range and related air space for the OIC of Firing.

b. Receive a briefing on conditions or events that may effect range utilization.

c. Obtain safety equipment specified for the particular range.

d. Certify to the Range Control Officer that reference (a), as it pertains to firing, has been read, is understood and will be implemented.

3. The RSO will be responsible only to the OIC of Firing in the execution of his duties.

4. The RSO will be physically present at an observation post and will maintain a clear view of the impact area.

5. The RSO will occupy the designated OP one hour prior to the scheduled commencement of firing and establish communications with range control and the firing unit. He will have in his possession the following items:

SOP FOR MORTAR SAFETY

- a. One red flag visibly displayed.
- b. One red flashing light, which will be visibly displayed during hours of darkness to warn air and ground traffic.
- c. Two AN/PRC 77 radios with complete accessories.
- d. One RC292 antenna (when required for good communication).
- e. Double issue of radio batteries for the duration of the field firing exercise.
- f. Field telephones as prescribed by range control instructions.
- g. One copy of this Order plus any special written instructions which may be issued.
- h. Map with impact area overlay.
- i. Binoculars.
- j. Compass.
- k. Flashlight.

6. The RSO will ensure before firing commences that a corpsman is with the main body of the firing unit and remains at that location until relieved or until the exercise is terminated. In the event of an injury or other event which requires the departure of the corpsman away from the firing unit, the OIC of Firing will immediately contact his controlling headquarters, and the RSO will place the firing unit in check-firing until such time as a corpsman is again present with the firing unit.

7. The RSO will conduct a visual sweep of the impact area prior to firing, and, when satisfied that the impact area is clear, request clearance to fire from the Range Control Officer.

8. The RSO will instruct the post range guards if assigned by range control and ensure that the guards are in position with the required personal and communications equipment.

9. The RSO will order "CHECK FIRING" if aircraft are approaching the gun-target line, if personnel enter the impact area or buffer zone, or in the event of erratic firing which produces rounds outside of the safety limits.

10. When notified by the OIC Firing that the exercise has terminated, the RSO will report this to the range control agency and request to secure from the radio net and location.

SOP FOR MORTAR SAFETY

11. Should an emergency arise as a result of death or injury, the RSO will immediately contact the Range Control Officer and submit the information contained in the Medical Evacuation Request (Appendix D).

12. Whenever visibility in the impact area precludes RSO observation of impacting mortar rounds, "CHECK FIRING" will be sounded. All missions will be observed.

13. The RSO will designate a landing zone for emergency air evacuation.

14. The RSO will ensure that all persons on the OP abide by safety regulations.

15. The RSO may act as a forward observer provided phone and radio communications are available for him to carry out his duties as the Range Safety Officer.

205. MORTAR SAFETY OFFICER (MSO)

1. The Mortar Safety Officer will be a commissioned officer or warrant officer appointed in writing by the battalion commander of the firing unit, and will be responsible only to the OIC of Firing for enforcing all safety measures at the firing point. When qualified commissioned officers are not available to serve as the MSO, qualified staff noncommissioned officers may be appointed in writing by the battalion commander of the firing unit.

2. Duties Before Firing

a. The MSO will read, understand, and comply with this Order and its references prior to the firing date.

b. Procure the following equipment:

(1) Declinated aiming circle (Appendix G).

(2) Safety card.

(3) Map of the area.

(4) Applicable tabular firing tables.

c. Verify that the safety card applies to the unit's exercise, date and time, and that it bears required signatures.

d. Verify that the mortar platoon/section is located at the proper position.

e. Prepare a safety diagram in accordance with Appendix B of this Order.

SOP FOR MORTAR SAFETY

f. Verify that each weapon is properly bore-sighted.

g. Verify that aiming posts are properly emplaced.

h. Verify the lay of the mortar platoon/section. With the aiming circle used to lay the platoon, or using another declinated aiming circle, the MSO will set up the instrument at least 20 meters from the original aiming circle position along a line approximately perpendicular to line of sight between the primary circle and the mortar sights. The MSO will orient it on the azimuth of lay, and require each weapon to refer to the safety circle. To take into account the human difference in centering the magnetic needle and the magnetic variation, a maximum variation of 10 mils will be allowed between the safety officer's instrument reading and the referred reading of the mortars. This variation must be the same for all mortars, plus or minus 2 mils. Once this has been accomplished, the MSO will walk behind the gun line and visually verify the lay of each gun with a declinated M-2 compass. Under no circumstances will a weapon be safety checked unless its aiming posts are emplaced. Because laying and verifying the lay of the mortar platoon by azimuth involves the use of the magnetic needle of the aiming circle, the instrument must be set up where it is free from magnetic attractions. The minimum distances that should be observed are:

Power lines and electronic equipment	150 Meters
Railroad tracks, artillery, mortars, tanks and vehicles	75 Meters
Barbed wire, personal weapons, and small metallic objects	10 Meters

i. Compute the minimum elevation necessary to achieve the maximum range line and the maximum elevation necessary to achieve the minimum range line for each charge authorized. Compare these values with the minimum mask clearance for each mortar's sector of fire. Resolve any differences in the direction of safety.

j. Verify that the ammunition to be fired is the type specified on the safety card.

k. Ensure that the following personnel are aware of the safe firing data and each has taken the appropriate action:

<u>PERSONNEL</u>	<u>ACTION</u>
1. Platoon Cmdr	Informed Sec/Sqd Ldrs/Safety NCO's and issued a prepared safety diagram to each
2. Ops Chief	Plotted safety limits on charts in red pencil

(All safety diagrams must be signed by the OIC of Firing)

SOP FOR MORTAR SAFETY

1. Verify that the safety diagrams given to the Squad Leaders/Safety NCO's are correct and understood.

m. Verify that all squad leaders assigned to the mortars are certified by the company commander as safety qualified squad leaders or that a gun safety NCO has been assigned to the squad.

n. Verify that the air sentry is posted.

o. Inform the platoon commander and operations chief that:

(1) No tube will be moved after a round is fired until the FDC issues another fire command or sends "END OF MISSION". The only exception will be for methods of fire which exceed one round.

(2) In the event of an erratic round, the command, "CHECK FIRING, TO THE REAR OF THE GUN FALL IN", will be given and the following actions taken:

(a) Immediately, the crews on each gun will fall in to the rear of the pit.

(b) No weapon, ammunition or section equipment will be touched.

(c) The FDC will immediately check the firing data announced and recorded.

(d) The OIC of Firing will be informed, and no other action taken unless directed by the OIC of Firing or the Range Control Officer.

p. Ensure the range flag or red light, as appropriate, is displayed in the firing position.

q. Verify that a corpsman and safety vehicle are present in the firing position.

r. Ensure that each tube is dry prior to commencement of firing.

s. Do not permit firing when a stable firing platform cannot be established or maintained.

t. Do not permit firing over the heads of troops or over named/numbered roads as specified in reference (b).

3. Duties During Firing. During firing, the Mortar Safety Officer will:

a. Position himself where all weapons can be observed, watching for unsafe conditions.

SOP FOR MORTAR SAFETY

b. Ensure that gun safety NCO's or safety qualified squad leaders discharge all their duties outlined in paragraph 206 below.

c. Ensure that, after a registration, firing does not resume until the registration corrections are correctly applied to every safety diagram.

d. Report accidents and malfunctions of ammunition to the OIC of Firing.

e. Ensure that only safe data is set on the weapons.

f. Check for careless handling of ammunition. Require all unused charges to be placed in the appropriate powder pit.

g. Supervise action in the removal of misfires.

h. Allow no open fires within 100 meters of any ammunition and allow no smoking within 50 feet of the gun line, ammunition, or powder pits.

4. Duties After Firing

a. The following instructions apply to the retrograde of unused powder increments.

(1) The unused powders will be repackaged in original closed containers, or in containers of fire retardant materials. Containers made from easily ignited material will not be used. In no case will exposed prop charges be transported.

(2) Trucks transporting explosive material (unused powder increments) to ASP (MLQ-50) shall meet the requirements set forth in Chapter 6 of reference (e). No more than two persons will ride in the cab, and the operator will be licensed to transport explosive ordnance.

b. The OIC of Firing may decide that the immediate destruction of the unused powder increments is necessary for the protection of life and property. If the OIC of Firing so decides, the MSO will ensure:

(1) No flammable material, to include grass, will be within 100 feet of the burning site.

(2) Powder charges will be spread out in a single layer and will not exceed 6 inches in width and 3 inches in depth.

(3) If the burning area must be on a road, establish road guards.

(4) Fire fighting equipment (water and pioneer tools) must be at the burning site, together with sufficient personnel to extinguish a small fire.

SOP FOR MORTAR SAFETY

(5) Ignite power charges by using a train of power grains, safety fuze, or electric blasting cap controlled from a distance which assures safety to Marines should the total quantity of explosives detonate. The ignition train and the propelling charges must be arranged so that both burn in the direction from which the wind is blowing.

(6) Do not use the site for subsequent burning until it has had time to cool.

c. The MSO will obtain permission from the OIC of Firing before departing the mortar position.

206. GUN SAFETY NCO, SECTION/SQUAD LEADERS

1. General

a. All section and squad leaders will successfully complete the appropriate safety tests for the 81mm mortar and will be certified as qualified in their training records by the company commander. In the event that qualified section/squad leaders are not available, then a gun safety NCO will be appointed. The squad leader, or, when assigned, the gun safety NCO, will be responsible for enforcing safety regulations within the mortar position as set forth in this Order. When a gun safety NCO is assigned, he will be responsible only to the Mortar Safety Officer and will not be assigned any other duties in the position.

b. The squad leaders/gun safety NCO's must read and understand this Order prior to taking the written safety examination. At a minimum, the examination will test his ability to perform the duties described in this Order. A grade of 100% is required to pass; therefore, units should devise several series of examinations. Each individual will take the safety test semiannually, noted in their training record.

2. Duties Before Firing. Prior to firing, the safety qualified squad leader, or when assigned, the gun safety NCO will:

a. Obtain and familiarize himself with the appropriate mortar FM's and TM's together with a copy of this Order.

b. Have in his possession a copy of the approved safety diagram bearing the signature of the OIC of Firing.

c. Assist the MSO in making his prefire checks.

d. Give referred readings from the mortar to the safety circle during the MSO's verification of the mortars lay for direction.

e. Ensure that the mortar squad personnel have been informed of and understand:

SOP FOR MORTAR SAFETY

- (1) The ammunition authorized.
- (2) The safety (deflection) limits, minimum/maximum charges, and elevation limits.

f. Inspect ammunition for general condition prior to loading.

(1) Components must be free of defects, dirt, and grease.

(2) Powder charges must be intact and dry.

(3) Fuzes must be securely affixed to projectiles.

(4) Ensure the moisture resistant seal on container or jungle wrap is not broken until the round is to be fired.

(5) Ensure the ammunition is protected as set forth in Chapter 3 of this Order.

g. Ensure that no more than five rounds are readied for firing at one time. The OIC of Firing can make an exception to this if involved in a demonstration or formal readiness evaluation.

h. Ensure that two powder pits per mortar section are established. One pit will be used for mission in progress and the other for end-of-mission storage. The mission in progress storage may be maintained in the mortar pit; however, upon completion of the fire mission, the excess increments will be placed in the end-of-mission pit located at least 15 meters to the rear of the mortar.

3. Duties During Firing. During firing, the safety qualified squad leader, or when assigned, the gun safety NCO will:

a. Before loading a round, ensure that the charge, projectile/fuze, deflection, and elevation announced are safe and in accordance with the safety diagram.

b. Ensure that personnel are not permitted to smoke within 50 feet of the gun line, ammunition, or powder pits.

c. Be observant of unsafe conditions such as:

(1) Improper opening or handling of ammunition.

(2) Failure to swab the bore after every 10 rounds or at the end of each mission.

(3) Placing improper deflection and elevation on sight (100 mil errors are common on the M53 series sight).

SOP FOR MORTAR SAFETY

(4) Failure to level mortar for deflection and elevation.

(5) Failure to correct sight picture.

(6) Failure to remove safety wire.

d. Know all of the safety measures pertaining to ammunition in Chapter 3 of this Order.

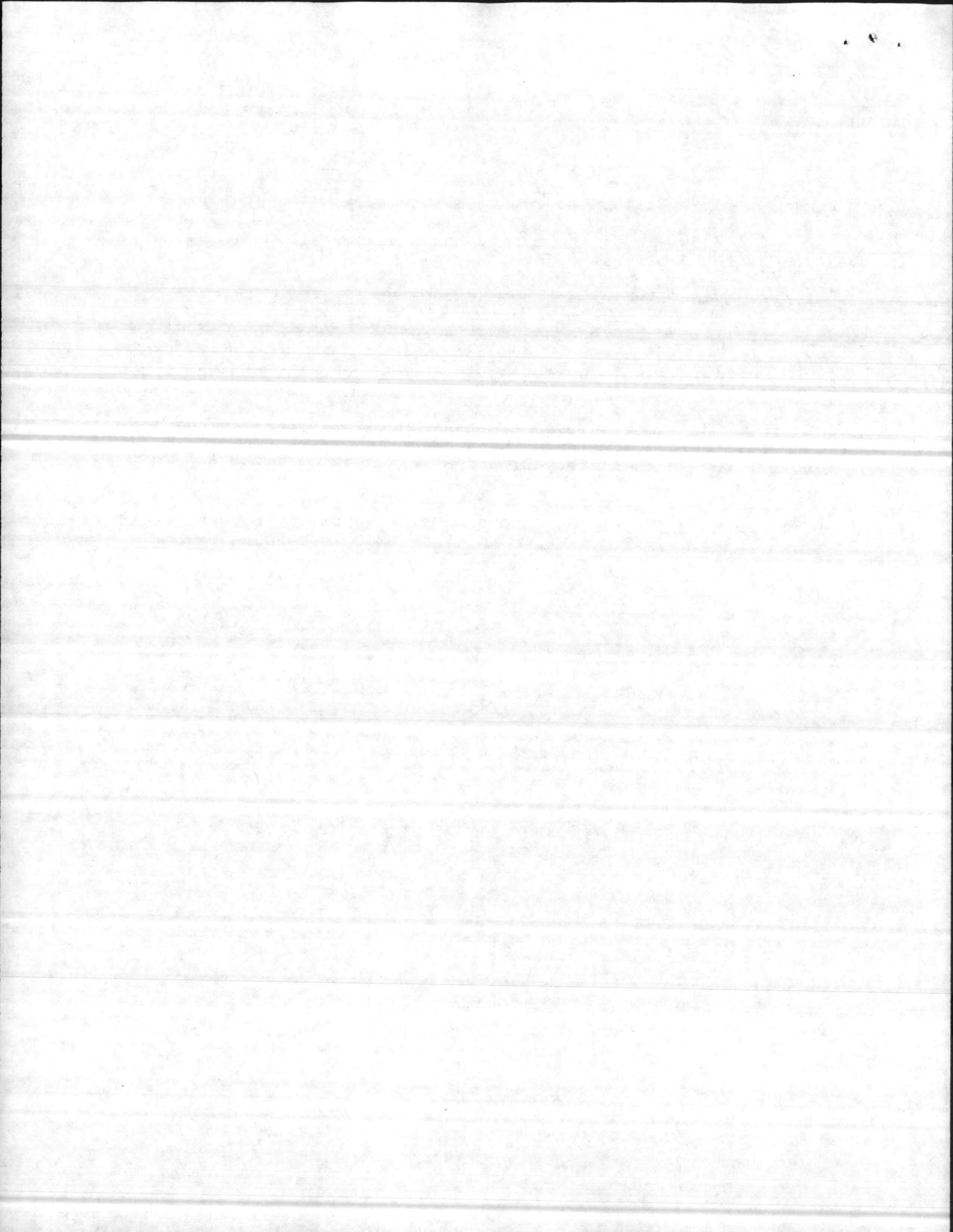
e. Visually inspect to ensure that:

(1) The proper charge is cut.

(2) The fuze setting is safe, accurate, and the fuze is cut in the correct direction.

(3) Time fuzes set but not used are reset to "S". Do not reset proximity fuzes which have been set for PD functioning. Do not remove the safety wire from the fuze until just before use.

4. Duties After Firing. Upon completion of firing, the squad leader/gun safety NCO will assist the MSO in burning powder.

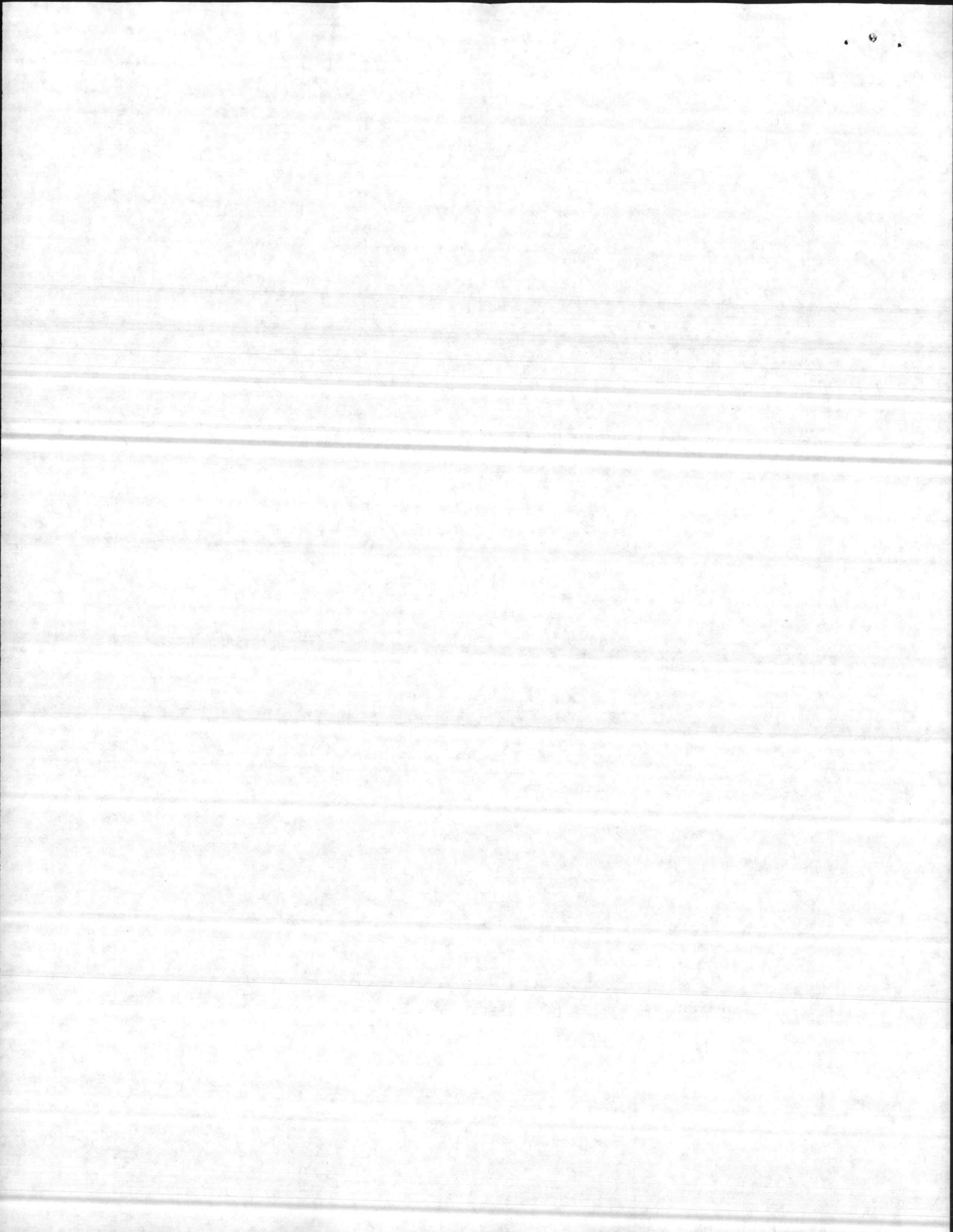


SOP FOR MORTAR SAFETY

CHAPTER 3

AMMUNITION

	<u>PARAGRAPH</u>	<u>PAGE</u>
GENERAL	301	3-3
PRECAUTIONS IN FIRING	302	3-3
PREPARATIONS FOR FIRING	303	3-5
AMMUNITION MAINTENANCE	304	3-9
ACCIDENTS AND DEFECTIVE AMMUNITION	305	3-10
DUDS	306	3-10



SOP FOR MORTAR SAFETY

CHAPTER 3

AMMUNITION

301. GENERAL. The guidance set forth in this chapter is designed to highlight significant safety precautions when firing ammunition employing the 81mm cannons M29 and M29A1. The instructions contained herein are not all-inclusive. All safety personnel, to include sections handling ammunition, must be familiar with references (c), (d), and (e).

302. PRECAUTIONS IN FIRING

1. Seldom encountered are the conditions described below when units are firing authorized, properly maintained ammunition in properly maintained and operational weapons. To avoid injury to personnel and damage to equipment, however, the Safety Officer must understand the nature of these conditions and be familiar with preventive and corrective procedures.

a. Misfire. A misfire is the failure of a round to fire after the round is dropped into the tube. A misfire in itself is not dangerous; however, it cannot be immediately distinguished from a hangfire. Treat misfires and hangfires, therefore, until otherwise determined. Any of the following may cause failure:

- (1) Defective primer.
- (2) Defective ignition cartridge.
- (3) Defective, damaged, or loose firing pin.
- (4) Firing pin fouled or obstructed by extraneous material.
- (5) Fouled bore.
- (6) Excessive oil or water in bore.
- (7) Misaligned fin assembly.
- (8) Foreign material.
- (9) Excessive paint on round.

b. Hangfire. A hangfire is a delay in the functioning of a propelling charge at the time of firing. It cannot be immediately distinguished from a misfire.

c. Cook-off. A cook-off is a functioning of any or all of the ignition train of a round chambered in a hot weapon. If the primer or the propelling charge cooks-off, the cartridge may be

SOP FOR MORTAR

propelled from the weapon with normal velocity even without the firing pin striking the primer. A bursting charge explosive train cook-off can injure personnel and destroy the weapon.

2. After a failure to fire, observe the following precautions until the round has been removed from the weapon:

a. All personnel except for the gunner and the assistant gunner move to a safe distance to the rear of the mortar. While the assistant gunner holds down the bipod legs from behind the muzzle, the gunner kicks the base of the barrel several times with his heel in an attempt to dislodge the round. If the round fires, the mortar is re-laid and firing is continued.

b. If the round is not fired, the gunner and assistant gunner join the crew and wait at least one minute before removing the round, to avoid a possible accident resulting from a delayed action of the propelling charge. The gunner tests the barrel for heat after the one minute wait and if the barrel is cool enough for handling, removes the round as described below. If the barrel is hot, apply water on the outside of the barrel until it is cool. If no water is available, stand clear of the mortar until the barrel is cool.

c. After the barrel cools, the gunner removes the sight and depresses the barrel to the minimum elevation. The assistant gunner braces the right leg of the bipod by placing his left leg in front of it. The gunner rotates the barrel until it is unlocked from the baseplate. The assistant gunner then places his right hand, palm up, under the barrel near the muzzle, and his left hand, palm down, on the top of the barrel. He places the thumbs of both hands alongside the forefingers, being careful to keep every part of either hand away from the muzzle.

d. The gunner lifts the base of the barrel until it is horizontal. Under no circumstances will he lower the base of the barrel below a horizontal position before the round has been removed. As soon as the barrel is in the horizontal position, and not before, the assistant gunner places the thumb of each hand over the muzzle. The assistant gunner stops the round with his thumbs. He then carefully removes the round and passes it to the first ammunition handler who inspects it to determine the cause of the misfire. If the primer of the ignition cartridge is dented, he replaces the safety wire and places the round in a marked, safe location (determined by terrain) for disposition by EOD personnel. If the primer is undented, the round may be used again. CAUTION: If the round has remained in the tube for 20 minutes or longer because of a hot barrel, replace the safety wire and place the round in a marked, safe location for disposal by EOD personnel.

e. The gunner shakes the barrel to dislodge any remnants from the last round fired, then locks the barrel, and has the bore swabbed.

SOP FOR MORTAR SAFETY

f. If the procedure in (d), above, fails to remove the misfire, keep the barrel in a horizontal position, remove it from the bipod, and lay it on the ground in a horizontal position until it can be turned over to ordnance for disposal.

303. PREPARATION FOR FIRING

1. Cartridges fuzed with PD fuzes M524A5 and M524A6.

a. The delayed arming feature of these fuzes provides positive safety for use in any weather. However, it does not eliminate the cautions normally associated with mortar use. Accordingly, do not fire cartridges utilizing these fuzes in the immediate vicinity of any object which might deflect, obstruct, or damage the cartridge.

b. The pull and/or safety wire(s) may fracture when removed from the fuze. Inspect for portions remaining in the fuze. If it is determined that portions of the wire(s) remain in the fuze, do not fire the cartridge as a dud may result on impact. Reinsert wire that has not fractured and segregate the cartridge in a marked container indicating malfunction.

c. If the plunger safety pin (upper pin) cannot be reinserted, the fuze may be armed. Do not fire an armed fuze as it will prematurely detonate. Handle it with extreme care. Depression of the striker (fuze point) or any movement of the round which would cause the plunger to move forward may cause detonation of the round. If a round suspected of having an armed fuze must be handled, hold the round vertically with the striker assembly up.

d. Do not fire PD fuze M524A6 at charge 0 with HE cartridge M374 or WP cartridge M375, as the dud rate will be higher than with other authorized fuze/cartridge combinations.

2. Cartridges fuzed with PD fuze M525 series or M526 series.

a. Ensure that the pull wire, safety wire, and attached connecting cord are securely installed on the fuze and that the bore-riding safety pin is secure in the fuze body.

b. Immediately prior to loading the cartridge into the weapon, grasp safety wire end of connecting cord and remove the safety wire from the fuze body. Grasp pull wire end of connecting cord and remove the pull wire from head assembly.

c. If upon the removal of the safety and pull wires a buzzing noise is heard, do not fire the cartridge. Although the fuze is still unarmed and safe to handle, provided the bore-riding pin is in position, the cartridge is unsuitable for firing. Reinsert the safety wire and segregate the cartridge in a marked container indicating a malfunction.

SOP FOR MORTAR SAFETY

d. If the fuze ejects the bore-riding pin upon removal of the pull and safety wires, the fuze may or may not be armed, depending on whether the mechanical timer has functioned. Because prior functioning of the mechanical timer cannot be determined, and the fuze may be fully armed, proceed as follows:

(1) If it is possible to see a clear hole where the bore-riding pin was previously installed, the mechanical timer has not functioned and the fuze is unarmed. Reinsert the pull wire in the head assembly and segregate the cartridge in a marked container indicating malfunction.

(2) If a clear hole cannot be seen where the bore-riding pin was previously installed, or if the position of the slider prevents the reinsertion of the bore-riding safety pin further than 1/4 inch into the hole, the mechanical timer has functioned and the fuze is armed. Take extreme care to assure the striker is protected. Approximately mark and segregate the cartridge for removal by FOD personnel.

3. Cartridges fuzed with proximity (VT) fuzes.

a. Do not approach proximity fuzed short rounds which are duds for at least 30 minutes. After the 30 minute waiting period, carefully approach the dud, which is still dangerous, and mark its location for removal or destruction in place by EOD personnel. Do not disturb the round.

b. When firing 10 or more of these cartridges at the maximum charge, restrict the rate of fire to no more than 12 rounds per minute. Expect occasional short rounds impacting down to about 70% of the range when firing HE cartridge M374 or WP cartridge M375.

c. Do not fire proximity fuzes in heavy rain, sleet, or snow.

d. Use VT fuze M517 with cartridge M362 series only.

e. Fuze M532 incorporates a device which makes it possible to convert the fuze to ID action. Once the fuze has been set for PD action, it cannot be reset for the proximity mode.

4. Cartridge limitations.

a. Do not fire illuminating cartridge M301A2 or M301A1 with less than two propellant increment charges (charge 2).

b. Do not fire illuminating cartridge M301A3 with less than three propellant charges (charge 3).

c. When firing 10 or more HE cartridge M374 or M374A2 with charge 9, do not exceed a maximum rate of fire of 12 rounds per minute.

SOP FOR MORTAR SAFETY

d. When firing 10 or more WP cartridge M375, M375A1, or M375A2 with charge 9, do not exceed a maximum rate of fire of 12 rounds per minute.

5. Other precautions in firing.

- a. Do not lift or handle cartridges by the fuze pull wire.
- b. Do not remove the safety wire from the fuze until just before use.
- c. Make certain the safety wire has been removed from the fuze before setting or firing.
- d. Ensure the fuze is properly seated on the cartridge.
- e. Ensure the ammunition is free of sand, mud, moisture, frost, ice, grease, or other foreign matter before loading the weapon.
- f. Protect propelling charges from the elements.
- g. Ensure there is no water or oil in the tube.
- h. Check to ensure the proper number of increments prior to firing.
- i. Exercise care when loading or unloading to avoid striking the fuze or primer.
- j. Keep unused propellant increments in a covered container to protect against accidental ignition.
- k. Check fin assembly for tightness.
- l. Check primer cap for a tight fit.
- m. Observe all firing limitations listed on data cards and in applicable firing tables and TM's.
- n. Do not grasp the cartridge around the propelling charges when removing the round from its container.

6. Unpacking 81mm Mortar Ammunition. Do not use axes, crowbars, E-tools, or other implements which may damage inner pack or ammunition. Follow these procedures:

- a. Examine ammunition box markings to determine identification. Do not fire ammunition which cannot be identified by Lot Number.

SOP FOR MORTAR SAFETY

b. Remove all packing to include the U-shaped packing stop. Do not, however, remove packing support from the fin and boom assembly until immediately prior to setting the propelling charge.

c. Inspect rounds for foreign matter and damage. Slight rust is not cause for unserviceability.

d. Do not remove the safety wire or safety pin from fuzes until the cartridge is ready for firing.

7. Fuzing

a. Fuze removal.

(1) Place the cartridge on its side. Protect the primer and fin assembly with the container cover from which the round was removed.

(2) Defuze in accordance with reference (c).

(3) Inspect the cavity and projectile for damage. Remove loose material from cavity. If any high explosive is found adhering to the threaded portion of the projectile throat, mark and segregate the round for disposition by qualified ammunition personnel.

b. Fuze assembly.

(1) When tightening the fuze to the projectile, do not hammer on the fuze wrench. Do not use an extension handle on the fuze wrench. Do not stake the fuze to the projectile under any circumstances. Shocks transmitted to fuzes during assembly may increase percentage of malfunctions.

(2) Do not fire a round unless the fuze is fully seated. Rounds fired with improperly seated fuzes may result in premature functioning, causing death or injury to personnel and extensive damage to equipment.

(3) Ensure fuze assembly is accomplished in accordance with reference (c).

8. Propelling Charges. To assemble a complete round for firing, use the propelling charge packed with the cartridge. Propelling charges are not interchangeable. Do not substitute one model for another.

9. Fuze Setting.

a. PD fuzes, time fuzes with SQ elements and proximity fuzes may prematurely detonate when fired during extremely heavy rainfall. Rainfall necessary to cause malfunctioning is comparable

SOP FOR MORTAR SAFETY

to heavy downpours which occur during summer thunderstorms. In such situations, firing of the 81mm Mortar will be suspended.

b. Before setting T or TSQ, refer to the appropriate firing table for required time setting.

c. Do not attempt to reset a proximity fuze which has been set for PD action. The PD setting is irreversible, since it breaks the shear pin and disables the proximity element.

d. Ensure that the proper fuze setting procedures and tools are utilized as set forth in Chapter 4 of reference (c).

304. AMMUNITION MAINTENANCE

1. General Precautions

a. Handle explosive ammunition and components containing explosives with utmost care. Do not drag, throw, tumble, or strike packaged or unpackaged ammunition or related components. Explosive elements in primers and fuzes are sensitive to shock.

b. Do not expose ammunition and components containing explosives to extreme temperatures (references (c) and (d) apply). Do not expose to direct sunlight, flame, or other sources of heat.

c. Do not expose ammunition and components containing explosives to rain, excessive humidity, or ground moisture; otherwise, short rounds may result.

2. Storage Sites

a. When ammunition must be stored in the field, select a site free of power lines, electric cables, and readily ignitable and flammable materials. Sites should not be adjacent to reservoirs, water mains, or sewer lines. Sites should be level and well drained.

b. Provisions for Storage.

(1) Use heavy, well supported dunnage to keep bottom tier of stack off the ground and to prevent it from sinking into the ground.

(2) Allow 6 inches of space beneath the pile for air circulation. Dig suitable trenches to prevent water from flowing under the pile.

(3) Provide nonflammable or fire-resistant covers (for example, tarpaulin) for all ammunition. Maintain an air space of approximately 18 inches between the cover and ammunition. Keep cover at least 6 inches from pile on ends and at sides to permit circulation of air.

SOP FOR MORTAR SAFETY

- (4) Store white phosphorous rounds nose up.
- (5) Store ammunition containers with top side up.

305. ACCIDENTS AND DEFECTIVE AMMUNITION

1. In the event of an accident or discovery of defective ammunition the OIC of Firing will take the following action:

a. Execute his duties in the manner described in Chapter 2 of this Order.

b. Notify the parent unit Headquarters (S-3).

c. If applicable, utilize the Medical Evacuation Request (Appendix D) and Dud Report (Appendix E) together with the Preliminary Accident/Defective Ammunition Report (Appendix F).

d. Within 24 hours of the accident/malfunction submit the details of the incident to his unit S-4 in accordance with reference (e).

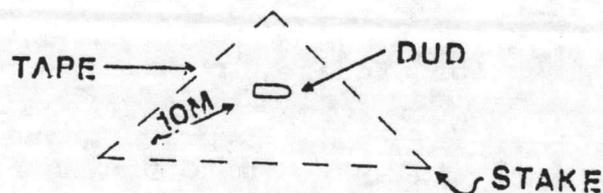
2. The parent unit S-3 will immediately advise the Battalion Commander and inform the S-4 of the situation.

3. The S-4 will ensure that an initial report is sent via the chain of command to the Division Ordnance Officer and will monitor the subsequent detailed report submitted in accordance with reference (e).

306. DUDS

1. Artillery, naval gunfire, mortar and aerial duds will be reported to this Headquarters (Div Ord) upon discovery.

2. Artillery and naval gunfire duds will be marked as shown below:



3. Aerial duds will not be marked. A sentry will be positioned 150 meters from the dud along the normal ground approach.

4. Reporting duds. Use the format in Appendix E to this Order.

5. Under no circumstances will duds be handled, removed or destroyed by personnel other than EOD.

SOP FOR MORTAR SAFETY

APPENDIX A
SAFETY CARD

OIC of Firing _____ Range Safety Officer _____

Mortar Safety Officer _____

Unit _____ Date and Times _____
(Inclusive)

Weapon _____ Proj _____ Fuze _____

Firing Point _____ (10 Meters)

Impact Area _____

Grid Azimuth of Lay _____ (100 m)

Left Limit Azimuth _____ (10 m)

Right Limit Azimuth _____ (10 m)

Minimum Range _____ (100 Meters)

Maximum Range _____ (100 Meters)

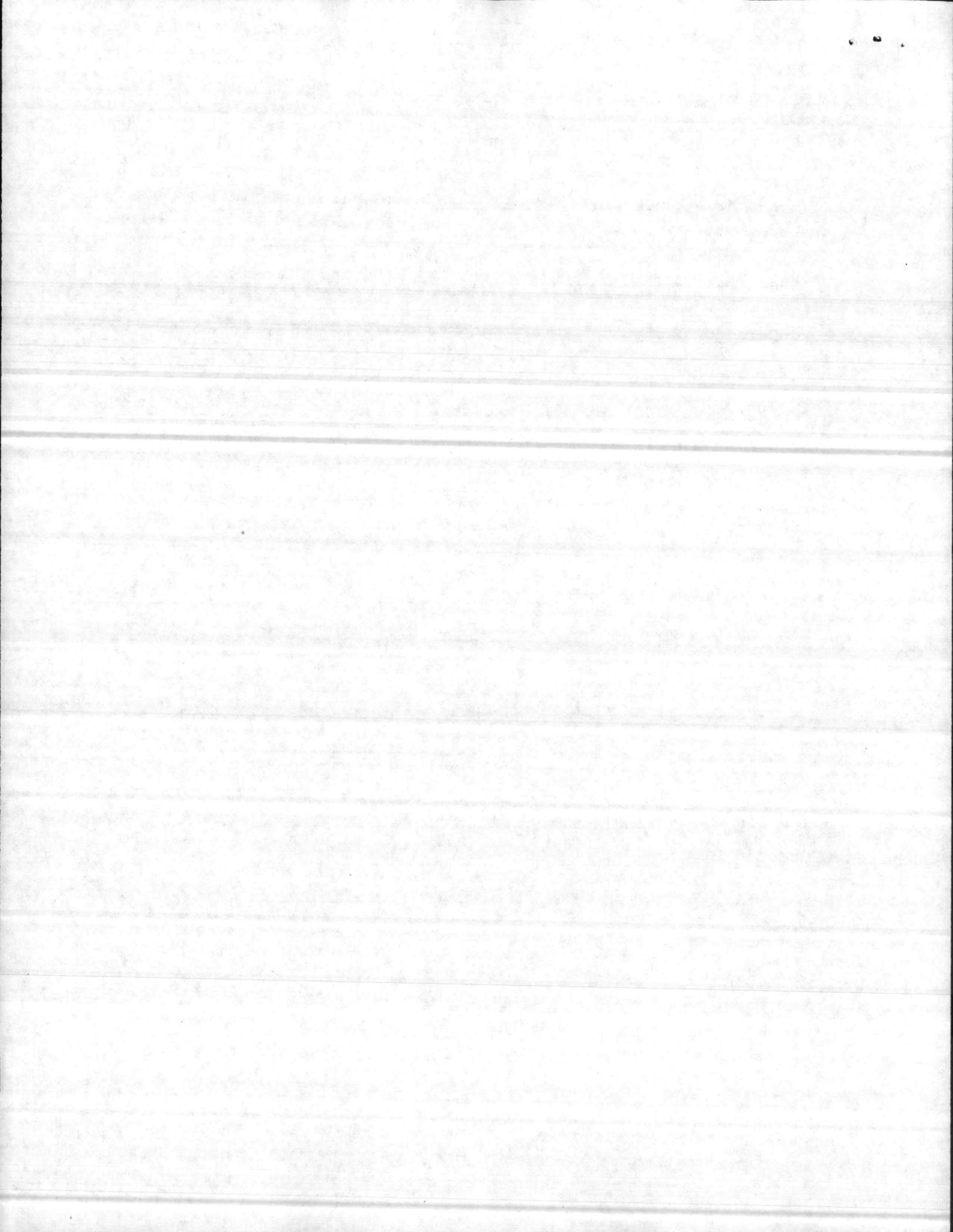
Minimum Charge _____ Maximum Charge _____

Special Instructions:

Prepared By: _____

Checked By: _____

Battalion Commander: _____



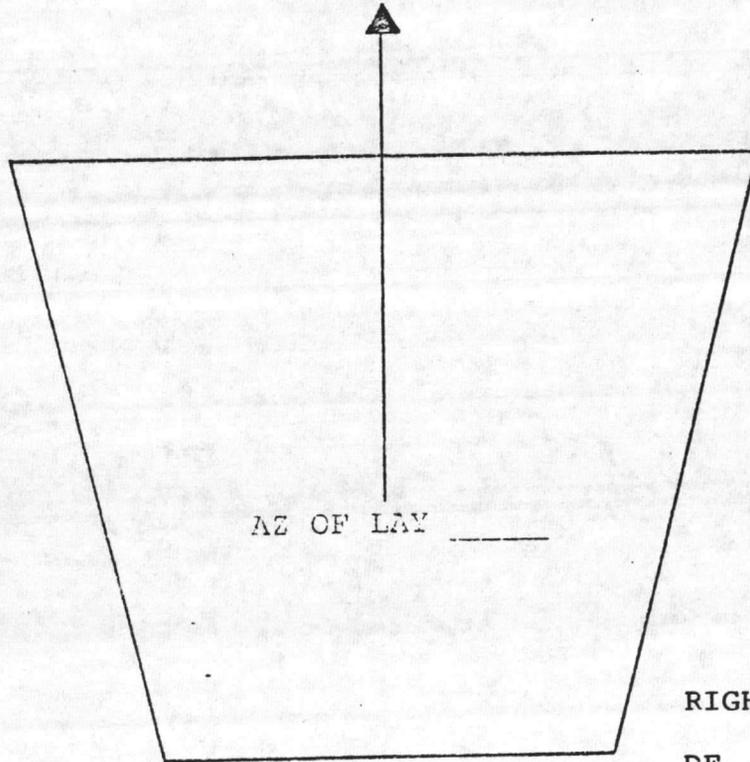
SOP FOR MORTAR SAFETY

APPENDIX B

SAFETY DIAGRAM (TARGET AREA)

CHG ELEV

_____	_____
_____	_____
_____	_____



LEFT LIMIT

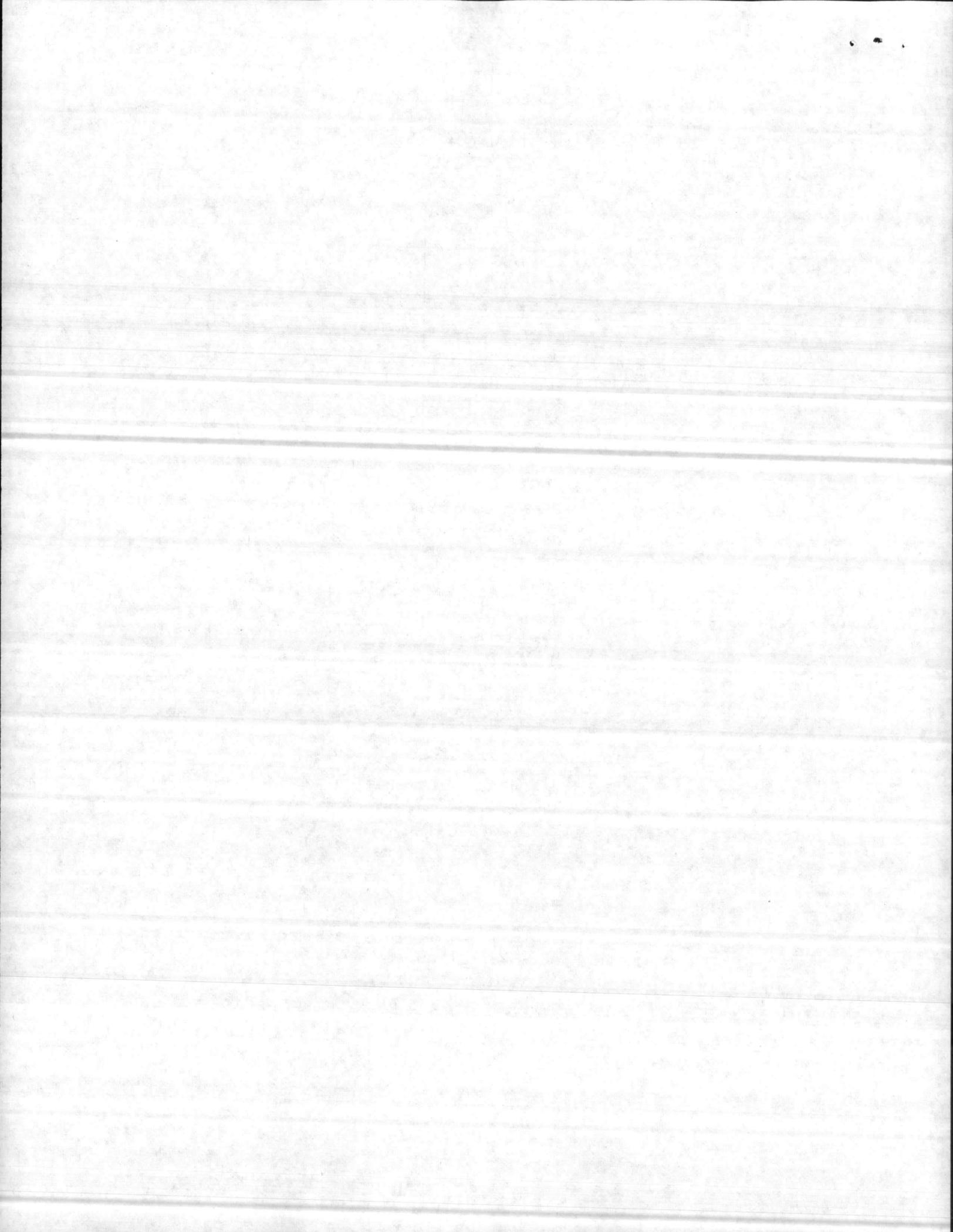
DF _____

RIGHT LIMIT

DF _____

CHG MIN ELEV MIN TIME VT FZ

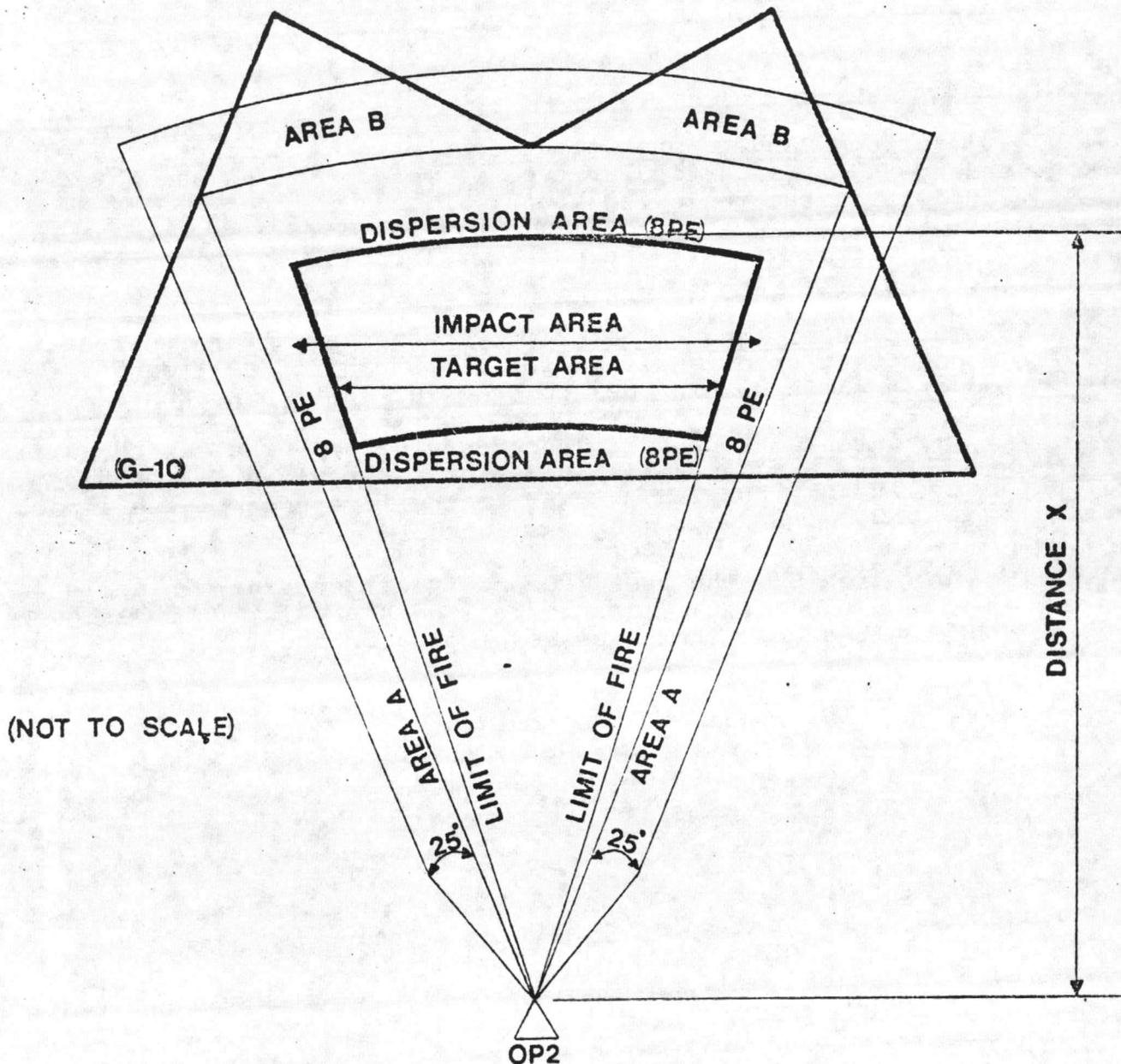
_____	_____	_____
_____	_____	_____
_____	_____	_____



SOP FOR MORTAR SAFETY

APPENDIX C

SURFACE DANGER AREA FOR 81mm MORTAR



(NOT TO SCALE)

(OP USED AS AN EXAMPLE, COULD BE ANY FIRING POINT.)

1. The elevation limits must be modified to take into account the distance (X) to the minimum and maximum limits of the impact area. Prior to registration, the target must be selected in the central portion of the impact area. After registration, registration corrections must be applied to deflection and elevation limits.

SOP FOR MORTAR SAFETY

2. Dimensions of Areas A and B may be reduced by 50 percent when firing illumination cartridges.

Caliber	Dimensions of Areas in Meters	
	A	B
81mm	350	400

DEFINITIONS:

1. Surface Danger Zone. That segment of the range area which is endangered by a particular type of weapon firing and which consists of the following areas:

a. Target Area. The point or location to which the weapon is to be fired.

b. Impact Area. The primary danger area for indirect fire weapons that is established for the impact of all rounds. The impact area is within the approved surface danger zone.

c. Area A. The area (secondary danger area) which parallels the impact area laterally and which is provided to contain fragments from items exploding on the fire edge of the impact area.

d. Area B. The area (secondary danger area) which is on the downrange side of the impact area and Area A. It is designed to contain fragments from items exploding on the far edge of the impact area.

SOP FOR MORTAR SAFETY

APPENDIX D

MEDICAL EVACUATION REQUEST

CALL SIGN: _____

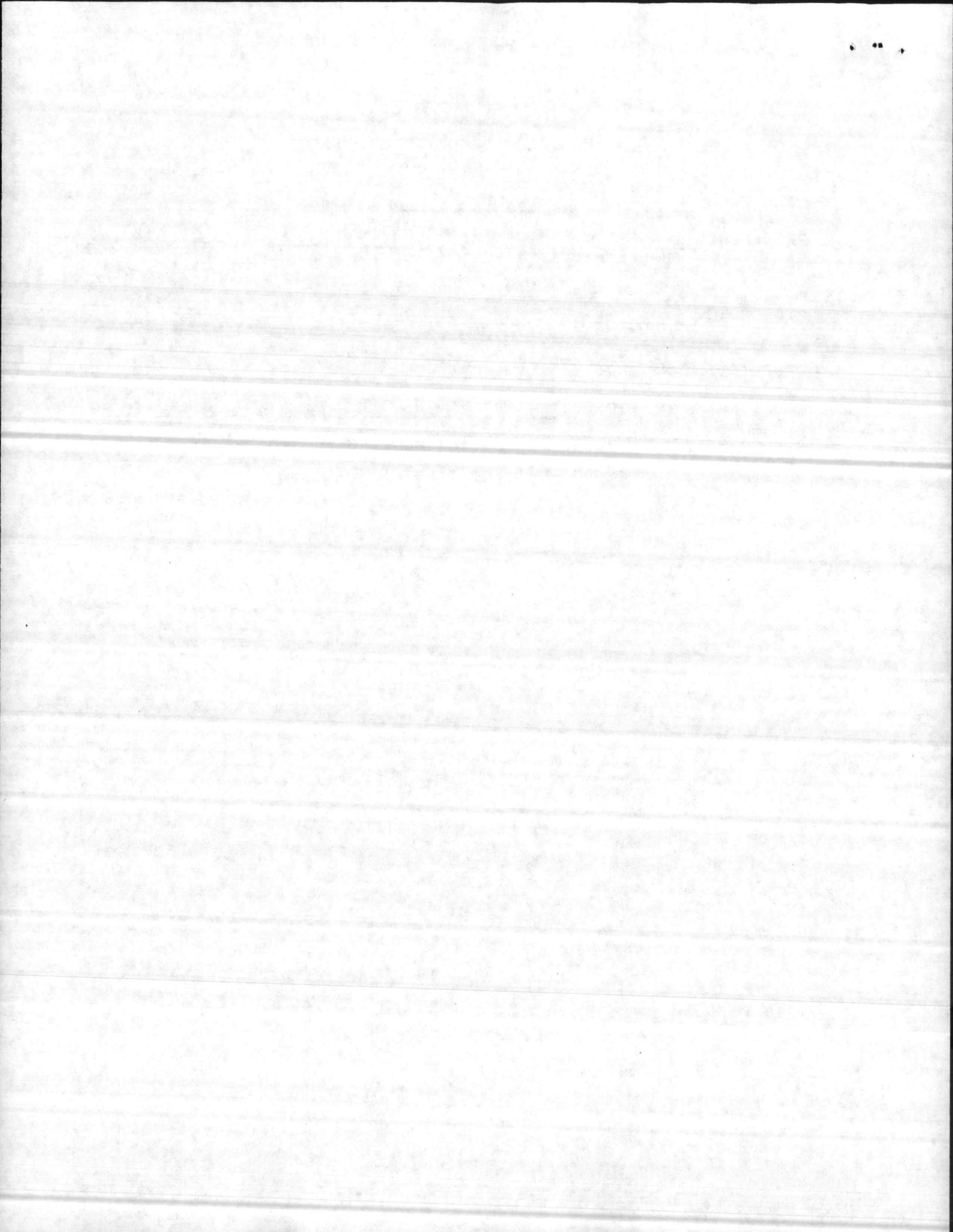
PRECEDENCE: _____
(Routine/Priority/Immediate)

MISSION: _____
(MEDEVAC)

DESCRIPTION OF INJURY: _____

COORDINATES OF PICKUP: _____

Notify S-3 of the unit requesting MEDEVAC as soon as the helicopter departs.

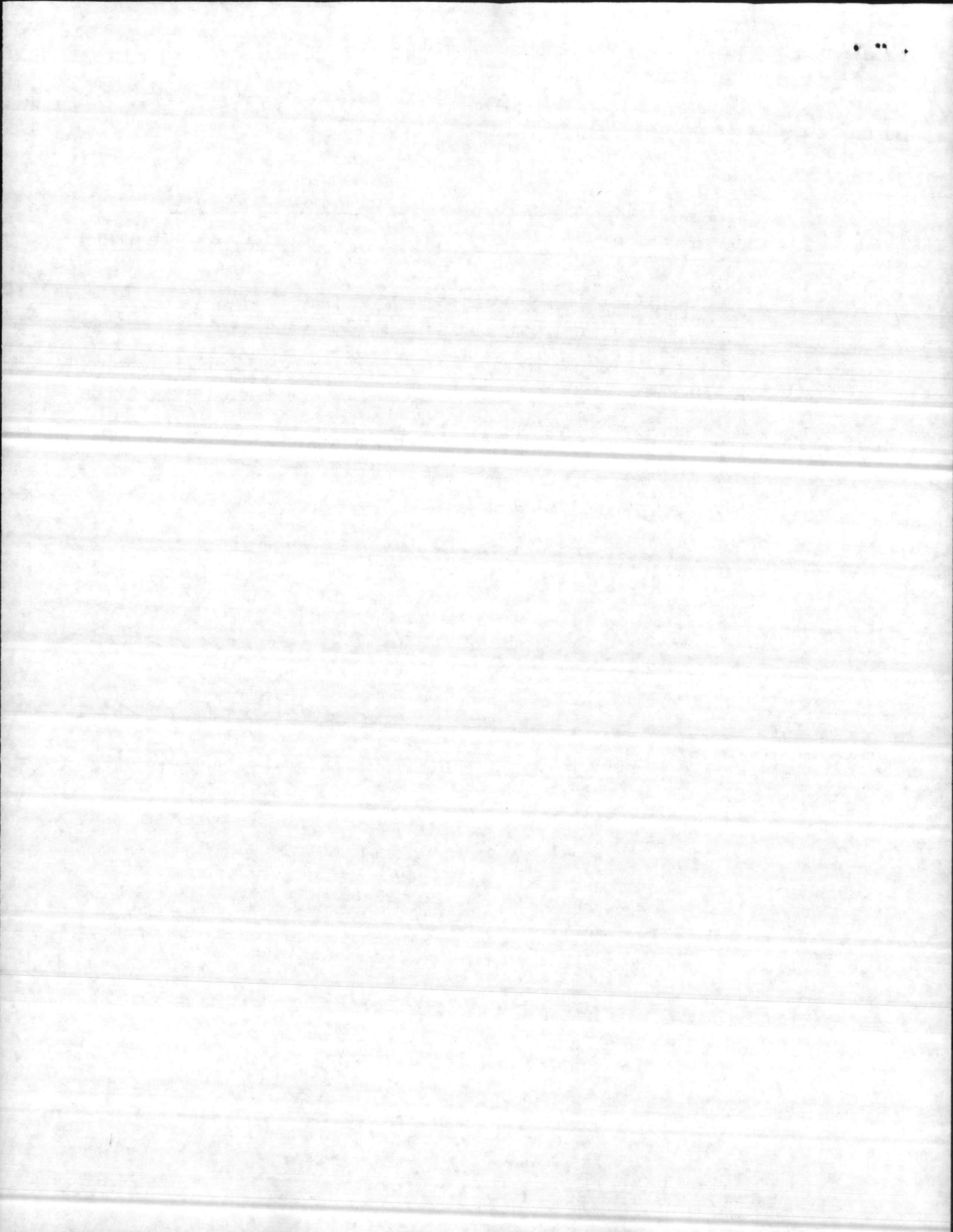


SOP FOR MORTAR SAFETY

APPENDIX E

DUD REPORT

1. DTG _____
2. LOCATION OF DUD _____ GRID _____
3. TYPE OF WEAPON _____
4. TYPE OF ROUND _____
5. NUMBER OF DUDS _____
6. HOW MARKED? _____
7. PERSON SUBMITTING REPORT _____ GRADE _____
TELEPHONE _____ UNIT _____
8. PERSON WHO KNOWS LOCATION OF DUD _____
GRADE _____ TELEPHONE _____ UNIT _____



SOP FOR MORTAR SAFETY

APPENDIX F

ACCIDENT/DEFECTIVE AMMUNITION REPORT (PRELIMINARY)

1. This report will be sent as soon as possible after the accident.

- a. Nomenclature and lot number of item or complete round.
- b. Fuze lot.
- c. Appearance of item prior to use.
- d. Brief description of malfunction.
- e. Extent of injury to personnel or damage to property.
- f. Number of rounds of defective lot fired prior to malfunction.
- g. Number of rounds of defective lot remaining on hand.
- h. Action taken regarding withdrawal of ammunition from use.

SOP FOR MORTAR SAFETY

APPENDIX G

DECLINATING THE AIMING CIRCLE

1. To determine the declination constant for each instrument and to keep this declination constant current, certain rules have been prescribed outlining how often and under what circumstances the aiming circles should be declinated. The aiming circle must be declinated.

a. After an electrical storm or any time the instrument has received severe shock, e.g., if it is dropped from the bed of a truck to the ground. The magnetic needle is a delicately balanced mechanism, and any shock may cause a significant change in the declination constant for the instrument.

b. Any time the aiming circle is moved 25 miles or more from the area in which it was last declinated. Because of local magnetic attractions, any move of the aiming circle may result in an appreciable change in the relationship of grid north and magnetic north as measured by the instrument.

c. A minimum of once every 30 days to determine if any changes in the declination have occurred because of the annual shift of magnetic north or because of accidents involving the instrument that may not have been reported. If a radical change is observed, the instrument should be declinated again within a few days to determine if the observed change is a result of a magnetic storm or is a real change in the characteristics of the instrument.

d. When it is initially received and any time it is returned from ordnance repair. Variations in the declination constant at different times of the day are not significant enough to warrant declinating at any specific time.

2. When a declination station is available, declinate the aiming circle as follows:

a. Set up and level the aiming circle.

b. With the upper motion, set the known azimuth to the azimuth mark on the scales of the instrument. Then, with the lower motion, sight on the first azimuth mark.

c. Release the magnetic needle. With the upper (recording) motion, center the needle.

d. Read the declination constant directly from the scales (to the nearest 0.5 mil).

SOP FOR MORTAR SAFETY

e. Relevel the aiming circle, if necessary, and using the second azimuth mark if it is available, repeat the above steps. (If a second azimuth mark is not available, use the first azimuth mark again).

f. Compare the two declination constants determined. If they agree within 2 mils, determine the mean, express it to the nearest whole mil using standard artillery expression, and record the mean and the date on the notation pad. If the two values differ by more than 2 mils, repeat the entire process.

3. In a rapidly moving situation, time may not permit the establishment of a declination station by artillery battalion surveyors. Under such circumstances a declination station can be established by simultaneous observation or by observation of Polaris (FM 6-50).

4. A third method of declinating, if an accurate position can be determined, is to scale a grid azimuth to two distant points. The following procedures are used:

a. Place the aiming circle over the selected point and level the instrument.

b. Select two distant points that can be identified on a map and scale the direction to them from the occupied point.

c. Using the direction scaled from the map declinate the aiming circle by the procedures previously discussed.

d. Compare the two values determined. They must agree within 10 mils.

e. If the values determined agree within 10 mils, determine the mean and record it on the notation pad. If the values do not agree with 10 mils, repeat the entire procedure. A declination constant determined by simultaneous observation or from a map should be verified as soon as possible.

5. At Camp Lejeune, North Carolina the declination station is located at grid 893342 (across from OP 5). The station is bounded on the west by Marines Road and on the east by Snead's Ferry Road.