UNITED STATES MARINE CORPS
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA 28542

IN REPLY REFER TO

TFACO/ARB
1500
27 June 1983

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MEMORANDUM FROM BASE RANGE OFFICER

To: Chief of Staff
Via: AC/S Training

Subj: Training Incidents involving Air and Artillery Mishaps

Ref: (a) CS verbal request; same subject

1. Purpose. This Memorandum provides information relative to safety incidents aboard this Base involving Air and Artillery.

2. Background. The Base has been the site of several incidents wherein artillery, and in some cases mortars, have fired rounds which missed the Impact Area and landed in the Buffer Zone, or in some instances, even beyond. Additionally, aviation incidents have also occurred, especially those involving the A-6 utilizing RABFAC procedures. This Memorandum, while based on rather incomplete data, however "best available" it may be, is an effort to attempt to describe the situations as best can be determined in which significant mishaps occurred.

3. General. Several factors merit consideration concerning the situation at Camp Lejeune:

a. The ideal situation for Base Design calls for a single, large, common Impact Area: Camp Lejeune has three small non-contigious impact areas, thereby making the likelihood of a mishap significantly higher;

b. Based on imperical observation, only a very small proportion of actual rounds/aerial weapons are actually observed and reported. The on site ground reconnaissance of the G-10 Buffer Zones, particularly to the North (GB Area), reveals large numbers of craters and unexploded ordnance obviously indicating unsafe firing: very few however, appear in the reports (i.e., Range Control records/log books kept by Duty Officers). By definition, rounds fired by the artillery units are calculated to be fired only into the target area, which, inturn, must lie wholly within an authorized Impact Area: therefore, and rounds not contained within the Impact Area must have been erroneously fired.

c. Mortar errors are seldom detected/reported unless they are grossly in error. Further, due to the terrain/visibility situation in the K-2 Impact Area, it is seldom possible to even observe misdirected mortar rounds since there is unlikely to be anyone capable of observing their impact point: hence, the records are completely devoid of any K-2 incidents, and the same is true for N-1/BT-3 since gross errors would fall, normally in the water.

d. Incidents in G-10 firing and bombing are reported in direct proportion to their detection: those that are grossly misfired are (usually) reported, minor errors seldom reported.

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e. The most common serious errors in live fire are:

(1) Charge errors

(2) "100 mil" quadrent elevation (e.g., firing 458‰ or 258‰ instead of the announced "358‰")

(3) RABFAC A-6 aircraft mis-drops

3. Discussion.

a. Attached to the Memorandum is a chronological account of those incidents for which there is some official report/record. Some of the incidents are purely mechanical caused- such as the A-6 misdrop in October 1982 when the aircraft system failed to activate the 'hi-drag' SNAKEYE fins causing the bomb to overfly the computed impact point, and several artillery incidents attributed to premature fuse functioning- however most incidents appear to be either pilot or firing unit errors.

b. Almost all of the artillery/air incidents center around OP's 2 and 3. The probable causes for this situation are as follows:

(1) These are the OP's that offer the best observation into the G-10 Impact Area as well as the GB Buffer Zone;

(2) These OP's lie in a location which places them in the most probable impact area for rounds which are fired 'over' the major target clusters in G-10 when artillery units utilize Gun Positions to the south of G-10. The Slovic case and the most recent ricochet incident are perfect illustrations. Conversely, 'short' rounds misfired with a 100‰ error or less than correct charges tend to fall along this gun-target-observer line in locations where either little likelihood is for direct observation (from the OP's) or damage/injury reports will occur as these rounds impact in the swamps of the GE/GF areas. This in all probability accounts for the preponderence of incidents reported seemingly all caused by 'long' rounds: most probably the same number of 'short' gross errors occur, however are either not observed, nor cause effects which are reported-see Attachment 2 graphics.

c. Incidents involving heavier ordnance logically causes the most serious incidents, and is correspondingly more likely to be both "noted and reported". Not only is the HE projectile far more lethal, but the effects of the two most common artillery errors (100‰ or charge) are magnified in terms of ballistic range error. Stated another way, a one-charge error in a 105mm howitzer does not translate into nearly as great of a range error as the same one-charge error would produce for a 155/8" weapon since the charges and projectile involved are substantially larger.

d. Incidents reported tend to show a "series effect" and occur in at least two chronological "clusters": it is the opinion of the undersigned that this reflects a tendency that errors increase as the complexity of the exercise increases- probably due to pressures to meet fast moving tactical fire support plans, as well as possibly fatigue of involved personnel. The likelihood for a serious incident

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is probably higher with an increase in complexity of the exercise; additionally, the probability of determining the unit responsible for a mishap is enormously complicated as the number of participating firing units increases, and several incidents investigated were stymied by the inability to positively identify which unit actually fired the round. It may be noted also that during "tactical scenario driven" exercises, the unit may have already received End Of Mission and shifted way before the report of a misfired round is received, and, unless the error was a charge error, eliminates the possibility of determining the gunnery data actually fired on the weapon(s).

e. Aerial Misdeliveries most often involve RABFAC missions. This matter is presently under investigation both here, and now at Camp Pendleton where a very serious RABFAC mission was astray: this area represents what is potentially the most dangerous firing done aboard any base of this, or comparable size.

f. The reported AH-1J(TOW Cobra) incidents were determined to be caused by defective missiles, but illustrate the additional safety problems introduced by non-ballistic ordnance: the artillery COPPERHEAD and other guided projectiles have identical possibilities of going grossly awray, as well as other guided air delivered systems.

4. Outlook. The 10th Marines have re-equipped with a preponderence of medium and heavy artillery weapons, which means that the potential for incidents of a serious nature increases. Additionally, the proposed reorganization of the D/S Battalions returns to the "3 firing batterys with 8 guns each" with each battery having two platoons of four guns each with separate FDC capability. The Platoon Commander, in all probability, will be an inexperienced 2d Lieutenant: should the decision be made to permit the Platoon, vice the Battery, to conduct independent or semi-independent firing, the experience level of artillery firing units will substantially reduce, hence the opportunity for error(s). The undersigned has requested the 10th Marines explore this issue prior to actual re-organization to "3 x 8" scheduled for September 1983.

5. Recommendations. The below recommendations are possible measures which could be taken to either decrease the possibility of errors, or, minimize the potential effects should an error occur. Obviously, no system is feasible which can mitigate in the event of gross error except at the firing unit level:

a. Restrict all RABFAC missions to use of MK-76 Practice Bombs, and close LYMAN Road during all such missions into G-10;

b. Limit artillery units to a minimum elevation of 300M in an effort to reduce/eliminate ricochet by increasing angle of fall for projectiles in the target area;

c. Restrict all TOW Cobra to Inert warheads only; close Lyman Road when delivered in to G-10 from hover point vic OR-5;

d. Require that the minimum level of experience for artillery

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Officer in Charge of Live Firing shall be the Battery Executive Officer, and that he shall at all times be in the battery/platoon position during actual live fire at this installation.

Very respectfully,

A.R. BRUNELLI JR

As Attachment:

1- Significant Known Range Incidents

2- Graphic Illustration

27 Jun 1983

SIGNIFICANT KNOWN RANGE INCIDENTS

10 Feb 79 - "B" Battery 1/10 fired 105mm proj from gun position 23 (919307) fired "Chg 7" instead of "Chg 4". Round never found, likely point was vic GC 917402.

20 Jun 79 - (GP 30) M 4/10 has premature "Close Aboard". 1968 ammo lot. Suspected defective fuse. No injuries.

23 Jun 79 - C 1/10 fires short round from GP-21 which impacts vic 907337 (Suspected premature time fuse).

24 Jun 79 - A 1/10 fires out, round impacts in buffer zone vic GC 913370 (Vic OP-2). Firing position not given.

9 Jul 79 - OP-5 reports artillery short round from GP-21 impacted vic GC 907343. Section chief error: relieved of duties. Unit not reported except as "155mm".

29 Aug 79 - E 2/10 (GP 28) and D 2/10 (GP 32) placed in check fire after OP reports both an impact and air burst about 800 meters from OP-5

10 Feb 81 - 2 8" artillery V.T. rounds impact vic TWSEAS/OP-5 fired by 5/10. Cause was 100m elevation error on Gun #3.

May 81 - MK 76 bomb vic Lyman Road after missing tgt in G-10.

16 Sep 81 - TOW missile fired into G-10 from AH-1T hovering over OP-5 goes out of control and impacts vic GC 903383 (300m north of Lyman Rd). "Uncommanded, ballistic flight, several others also missed target but landed in buffer zone..." HMA-269 investigates. Suspected faulty missiles.

21 Nov 81 - Defective fuse (VT) goes off approx 200 meters from gun at GP 30. Fuze lot suspended. No damage/injuries. Unit of 10th Mar unknown.

10 Dec 81 - 2d MAW drops MK 76 practice bomb vic OP-2. 1 Marine sustains leg injury. Pilot error.

17 Jun 82 - B 1/10 (GP 17) fires out of safe. Charge error. Rounds landed vic 917371/OP-2.

28 Jun 82 - L 2/10 (GP 32) fires 2 rounds impacting in buffer zone vic 911365. Gunnery error suspected; correct chg

13 Jul 82 - Arty round impacts approx 300 meters south of OP-3. Two arty units hot: B 1/14 (GP 30); C 1/10 (GP 15). Round caused damage to POV driving down Lyman Rd belonging to LCpl MOFFITT (Maint Bn, FSSG). Efforts to determine which unit was responsible. Crater could not be located for analysis due to heavy underbrush/swamp.

Attachment 1

14 Sep 82 - Wpns 1/6 makes 720m plotting error firing 81mm mortars from vic OP-2. Rounds landed vic Sneads Ferry Road/OP-5. No injuries.

[illegible] Sep 82 - F 2/10 fires out of safe 1 round impacts in buffer zone vic 921341. No gun position given.

16 Sep 82 - Plt cdr Wpns 1/6 mortars reports dud arty round landed forward of their position vic OP-2. EOD unable to identify/locate round.

17 Sep 82 - OP-3/D 2/10 reports arty round (WP) in buffer zone vic GC 929362.

17 Sep 82 - OP-5/Wpns 2/6 reports arty round in buffer zone vic GC 893348. EOD and 10th Mar personnel located site of airburst, but could not positively determine the caliber (155 or 105mm).

6 Oct 82 - ("Slovic Case") I 3/10 fired two 155 rounds with charge error from GP 32 which impacted just north Lyman Rd immediately across from OP-2 killing dependent wife in POV and extensive property damage to govt and civ vehicles in OP-2 parking lot.

21 Oct 82 - A-6 RABFAC mission (VMA-332) into G-10 drops inert 500 lb SNAKEYE which impacts OP-2/Lyman Road close to 81mm mortar plt from 1/2. This incident was attributed to malfunction of the solenoid which deploys the high drag bomb fins allowing it to "go clean" and it went approx 1700 meters.

[illegible] Jan 83 - A-6 RABFAC mission misdrops 5-6 MK 76 practice bombs vic OPs 2 and 3. Suspected computer malfunction. No injuries VMA (AW) 331

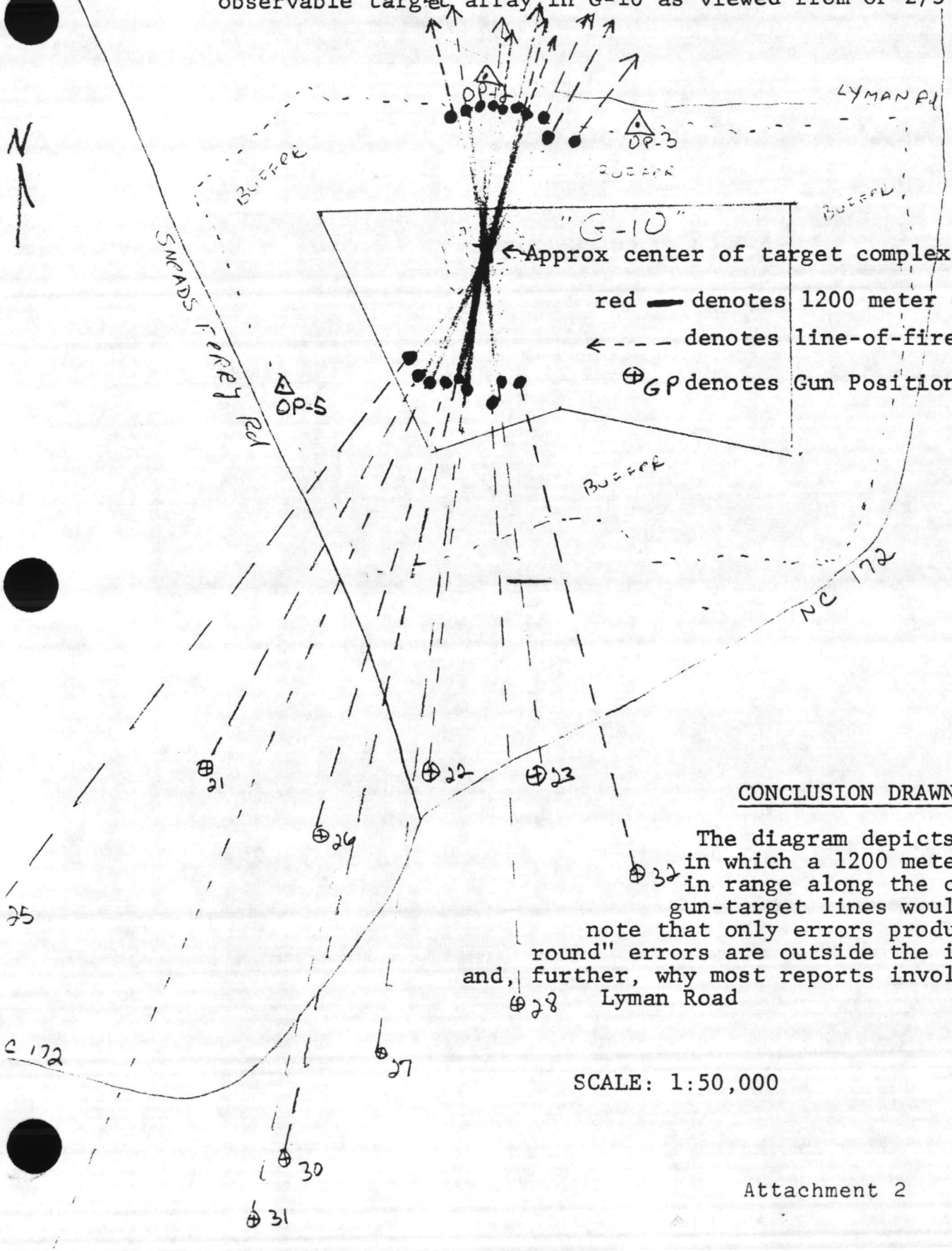
3 May 83 - During "Exercise Solid Shield 83" Navy A-6 from VA-75 (Carrier Based) misdrops 4 MK 76 bombs vic Lyman Road under investigation COMCARGRU-8.

5 May 83 - G 3/10 firing from GP-21. FO Team at OP-3 reports rounds exploding vic G-10, seconds later a piece of low velocity shrapnel lands approx 5 feet from LCpl BUTCHER (at OP-3) Best estimate is that the rounds were correctly fired into G-10 and shrapnel was <u>not</u> caused by misfired rounds.

22 Jun 83 - "T" 5/10 (GP 32) fires 155mm round which is observed to impact and ricochet vic OP-2 across Lyman Road. Crater analysis performed, round cannot be located. Gunnery data appears correct: Possible double richocet. Under investigation.

GRAPHIC ILLUSTRATION OF REASON REPORTED ARTILLERY INCIDENTS INVOLVE
ALMOST EXCLUSIVELY OP'S 2 and 3/LYMAN ROAD

ASSUMPTION: That an error is made which produces a 1200 meter short/over rd from the Gun Positions depicted; further, that the data for the weapons is calculated for a point in the center of the major observable target array in G-10 as viewed from OP-2/3



CONCLUSION DRAWN

The diagram depicts the area in which a 1200 meter error in range along the common gun-target lines would impact: note that only errors producing "long round" errors are outside the impact area, and, further, why most reports involve OP 2-3/ Lyman Road

SCALE: 1:50,000

Attachment 2

TFACO/ARB
5 Jul 1983

MEMORANDUM FOR COMMANDING GENERAL

From: Base Range Officer
Via: (1) AC/S Training
(2) C/S

Subj: Graphic Illustration of Incidents

Ref: (a) My Memo of 27 June 83; same subj
(b) CG's request of 29 June 83 for additional information

Encl: (1) Graphic plotting of Air Incidents
(2) Graphiw plotting of Artillery/Mortar Incidents

1. Purpose. To provide additional information concerning the incidents described in reference (a) IAW reference (b).

2. Information.

a. Enclosure (1) is a depiction of the known air incidents on the Camp Lejeune Special Map; for convenience, the description of the incidents are reproduced thereon.

b. Enclosure (1) is similar, except the description of each incident is contained on the second page to make the map easier to read. The pink numbers correspond to the impact point with each number keyed to the attached description; the yellow denotes the firing position/gun position for the same numbered incident in those cases that the position was reported, or in some cases, could be determined.

3. Additional Comments. As can be seen in Enclosure (2), incidents tend to occur when firing from artillery positions south of G-10. One factor contributing to this is simply that these firing positions are considered by the units as the most attractive positions in terms of ease of access, size of usable position, and suitable areas for the motor pool/FDC and other battery functions. It may be noted that a problem with these positions (less 29,30) is that if the 155mm unit fires "white bag" propellent, long rounds can and do occur; however, the preferred shorter range "green bag" propellents are in limited supply in their training allowances, and use of "green bag" would significantly reduce the opportunity for long rounds due to change errors. The 10th Marines Safety Supervisor and the undersigned have discussed this problem, and they are looking into the possibility of obtaining a greater number of "green bag" charges- possibly even via some sort of an exchange with Ft. Bragg units on a 1-for-1 exchange. The expansion of our Restricted Airspace permitting positions in the southern Verona Loop area into G-10 should significantly enhance the safety situation, in that not only are these "white bag" positions, but the line of fire would tend along the diagonal bias into G-10, as contrasted to the situation from GP's 30,32,28,17,18, 26, 23 and 34 that fire into the G-10 Impact Area along a line of fire that offers the minimum depth of impact area.

Very respectfully

Lt. Col Sams

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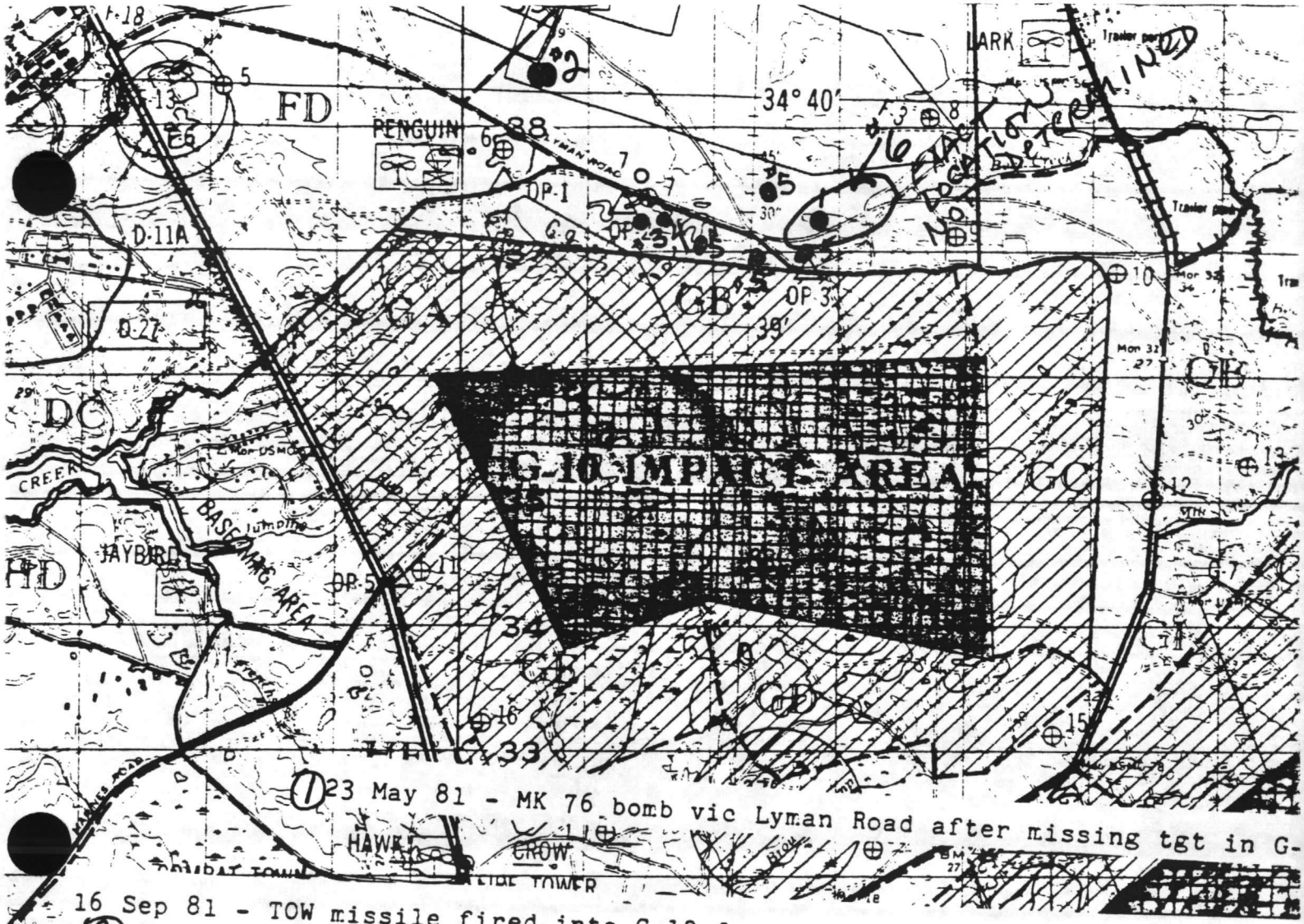

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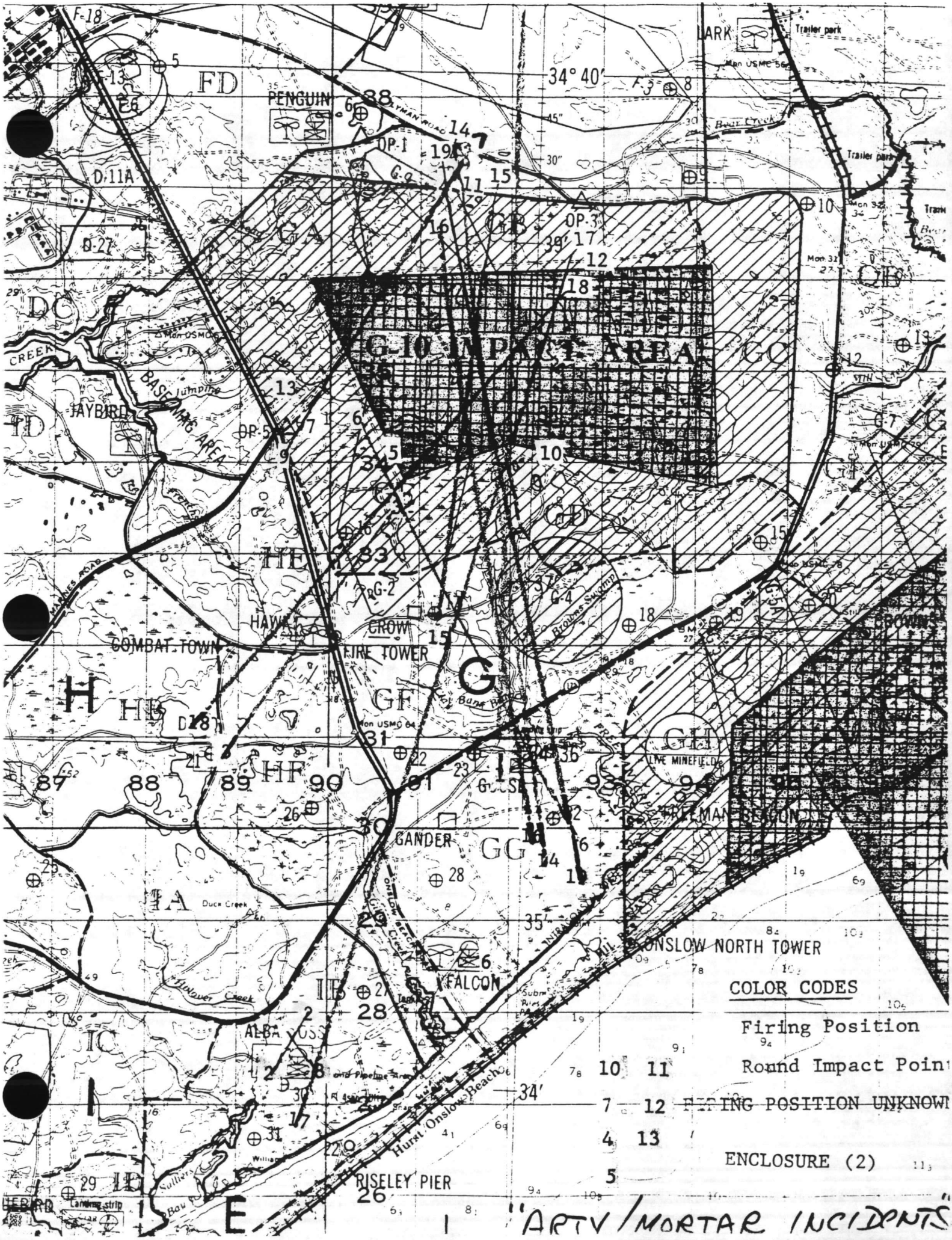
"AIR INCIDENTS"

ENCLOSURE (1)


G-10 IMPACT AREA
COLOR CODES
Firing Position
Round Impact Point
7 12 FIRING POSITION UNKNOWN
4 13
5
ENCLOSURE (2)
"ARTY/MORTAR INCIDENTS"
ONSLOW NORTH TOWER
FALCON
RISELEY PIER
COMBAT TOWN
CROW
FIRE TOWER
GANDER
PENGUIN
JAYBIRD
LARK
OP-1
OP-3
OP-5
G-2
G-4
G-7
G-9
Trailer park
Duck Creek
Hurst Onslow Beach
Landing strip
Tank
Mon USMC 64
Mon USMC 56
Mon USMC 30
Mon USMC 8
Mon 32
Mon 31
34° 40'
34'
35'
36'

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19. 22 Jun 83 - "I" 5/10 (GP 32) fires 155mm round which is observed to impact and ricochet vic OP-2 across Lyman Road. Crater analysis performed, round cannot be located. Gunnery data appears correct: Possible double richocet. Under investigation.