FM 100-38
MCRP 4-5.1
NWP TP 3-02.4.1
ACCPAM 10-752
PACAFPAM 10-752
USAFEPAM 10-752

FM 100-38	US Army Training and Doctrine Command Fort Monroe, Virginia
MCRP 4-5.1	Marine Corps Combat Development Command Quantico, Virginia
NWP TP 3-02.4.1	Naval Doctrine Command Norfolk, Virginia
ACCPAM 10-752	Air Combat Command Langley Air Force Base, Virginia
PACAFPAM 10-752	Pacific Air Forces Hickam Air Force Base, Hawaii
USAFEPAM 10-752	US Air Forces in Europe Ramstein Air Base, Germany

10 July 1996

UXO

Multiservice Procedures for Operations in an Unexploded Ordnance Environment

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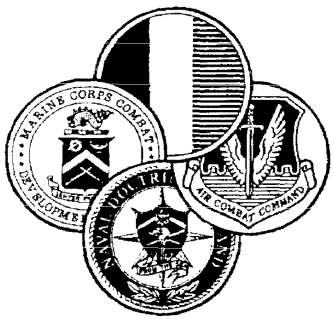
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FOREWORD

This publication has been prepared under our direction for use by our respective commands and other commands as appropriate.

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PREFACE

1. Scope

This unclassified publication is for warfighting personnel at the operational and tactical levels for use during wartime operations. It describes the unexploded submunition hazards to land operations, addresses unexploded ordnance (UXO) planning considerations, and describes the architecture for the reporting and tracking of UXO hazard areas.

2. Purpose

The purpose of this publication is to assist commanders operating in UXO rich environments to achieve an optimum balance between force protection and operational efficiency. The staff functions and responsibilities for planning, tracking, reporting, and clearing UXO are identified to assist commanders and units in achieving missions with minimal disturbance and casualties.

3. Application

The tactics, techniques, and procedures (TTP) described in this publication apply to all elements of a joint force, from individual service and component through the joint force level. This publication uses approved and emerging joint doctrine and terminology as its foundation.The publication identifies methodologies to use existing service command and control systems to report and track unexploded hazards in joint operations areas (JOAs) from service and joint perspectives.

4. Implementation Plan

Participating service command offices of primary responsibility (OPRs) will review this publication, validate the information, and reference and incorporate it in service manuals, regulations, and curricula as follows:

Army. The Army will incorporate the procedures in this publication in US Army training and doctrinal publications as directed by the commander,US Army Training and Doctrine Command. Distribution is in accordance with DA Form 12-11E.

Marine Corps. The marine Corps will incorporate the procedures in this publication in US Marine Corps training and doctrinal publications as directed by the commanding general, US Marine Corps Combat Development Command. Distribution is in accordance with MCPDS.

Navy. The Navy will incorporate these procedures in US Navy training and doctrinal publications as directed by the commander, Naval Doctrine Command. Distribution is in accordance with MILSTRIP Desk Guide and NAVSOP Pub 409.

Combat Air Forces. The Air Combat Command (ACC) will incorporate the procedures in ACC training and doctrinal publications as directed by the commander, ACC. PACAF and USAFE will validate and incorporate appropriate procedures in accordance with applicable major command and other governing directives. ACC, PACAF, and USAFE distribution symbols are "F."

5. User Information

a. The TRADOC-MCCDC-NDC-ACC Air Land Sea Application (ALSA) Center developed this publication with the joint participation of the approving service commands. ALSA will review and update this publication as necessary.

b. We encourage recommended changes for improving this publication. Key your comments to the specific page and paragraph and provide a rationale for each recommendation. Send comments and recommendation directly to—

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c. This publication reflects current joint and service doctrine, command and control organizations, facilities, personnel, responsibilities, and procedures. Changes in service protocol, appropriately reflected in joint and service publications, will likewise be incorporated in revisions to this document.

Appendix A

UXO OBSTACLE NUMBERING

UXO hazard areas are integrated into the standard obstacle numbering system using the procedures described below. Army and Marine Corps use the same numbering system. Army units are used for example only.

a. Obstacle Numbering from Other Echelons. FM 90-7, *Combined Arms Obstacle Integration,* covers obstacle planning (and numbering) from corps through task force (TF) level. A theater Army (TA) or joint task force (JTF) headquarters (HQ) could give an obstacle to subordinate units as specified tasks. The solution is to add other options for the unit type (Character 1) in the 12-character obstacle number. In this case *"T"* for TA or *"J"* for JTF. Thus, the number for a bridge demolition (span) obstacle (planned) designated by 4th Army is T004-**A-BS0l/. Additionally, other joint force HQ can use this system (e.g., a MEF could use *"M").* In this case, the use of a distinctive letter designator for an individual HQ is specified in the OPLAN/OPORD.

b. Encountered Obstacles. Frequently, units in combat environments encounter or identify enemy obstacles, areas affected by UXO (caused by enemy or friendly submunitions), or possibly other things that require tracking as an obstacle. The term encountered obstacle is used to describe these types of obstacles. In these situations the obstacle numbering system can be used with minor modifications. These modifications are made to the obstacle type abbreviation (Characters 8 and 9) and zone, belt, or group designators (Characters 5, 6, and 7).

c. Obstacle Type Abbreviations. Currently the obstacle numbering system has six different letter prefixes (B=bridge demolition, M=conventional minefield, R=road crater, W=wire obstacles, S=scatterable minefields, and A=miscellaneous conventional obstacles). This allows great flexibility for identifying other areas or things that serve as obstacles (i.e., encountered obstacles such as UXO) but do not fit into the categories described above.

(1) Obstacle Type Abbreviation for UXO. The obstacle type abbreviation "UX" is for UXO areas where the specific type is not identified. Use "U" as the prefix and use another letter for the suffix to delineate between different types of UXO (e.g., UM for MLRS, UD for DPICM; see list at end of section).

(2) Obstacle Type Abbreviations for Enemy Obstacles. Enemy obstacles are identified by an obstacle type with "E" as the prefix (e.g., EM is an enemy minefield, and ED is an enemy antitank ditch).

(3) Obstacle Type Abbreviations for Other Situations. There may be other applications for modifications of the obstacle type abbreviation (e.g., chemically contaminated areas or natural obstacles that require special tracking).

d. Obstacle Type Abbreviation Detail. Although the letter codes seem to lack detail, the obstacle number is really nothing more than an unique address that allows an obstacle to be identified in a database. This in turn allows database users (engineers, EOD, etc.) to determine the detailed information concerning a specific obstacle and accurately track the employment of submunitions throughout the depth of the battlefield. The obstacle number is the start point to developing further information concerning the UXO (e.g., location, quantity, enemy, or friendly).

e. Zone, Belt, and Group Designators. The primary function of the zone, belt, and group designators for UXO tracking is to identify geographical or relative locations of UXO; moreover, it can further enhance situation awareness and reduce fratricide on the battlefield.

(1) Zone, Belt, and Group versus Unit Identification. A secondary function of the zone, belt, and group designator is to identify the owning (or responsible) unit for the obstacle control measure. The zone, belt, and group designators allow identification of the responsible unit down to company level.

(2) Zone Designators. When coupled with the HQ designation (Characters 1 through 4), the zone designator identifies the owning brigade (a single zone is the responsibility of a single brigade). Thus, a division can distinguish between obstacles reported by its subordinate brigades. ***Note: Corps use the HQ designation to distinguish between obstacles reported by subordinate divisions.***

(3) Belt Designators. When coupled with the HQ designation and the zone designator, the belt designator identifies the owning TF (a single belt is the responsibility of a single TF). Thus a brigade can distinguish between obstacles reported by its subordinate TFs.

(4) Group Designators. When coupled with the HQ designation, the zone designator and the belt designator, the group designator identifies the owning company (a single group is the responsibility of a single company). Thus a TF can distinguish between obstacles reported by its subordinate companies.

f. Unit Identification. One cannot look at an obstacle number at all levels and immediately identify the responsible unit. However, one can immediately identify the exact unit at least one level down (e.g., 12ID will know that it assigned obstacle Zone A to 1st Brigade). Once a unit receives obstacle plans from subordinate units (down to the appropriate level), it will be able to identify units to the same level. Most importantly, the obstacle number is, after all, just an address to detailed data in a database. For example, a minefield fix is emplaced/owned by A/2-2/l/12ID. A second minefield fix is emplaced/owned by B/3-3/l/12ID. The two individual obstacles will have completely unique addresses (obstacle numbers) in the corps obstacle database.

g. Zone, Belt, and Group Designation for Protective Obstacle Numbering. FM 90-7 describes obstacle numbering for protective obstacles using the following procedure: Units assign default obstacle zone, belt, and group designators for protective obstacles. For example, 77th ID assigns W, X, Y, and Z (it is unlikely that the division will ever have enough actual obstacle zones to require these letters) as default obstacle zone designators for subordinate units as follows: W - 1st Brigade, X - 2d Brigade, Y - 3d Brigade, and Z - Division Rear. The 1st Brigade assigns default obstacle belts W1, W2, and W3 to TF 1-2, TF 2-3, and TF 3-4 respectively. TF 1-2 then assigns default obstacle group designators W1A, W1B, W1C, and W1D to its four company/teams (TM B, TM C, CO C, and TM E). Protective obstacles can now be linked directly to specific companies/teams. The first protective minefield that TM B, TF 1-2 emplaces has the obstacle number I077-W1A-MP01X.

h. Zone, Belt, and Group Designation for Encountered Obstacles. The same default zones, belts, and groups used for protective obstacles are used for encountered obstacles. These zone, belt, and group designators do not have a geographical location—instead they identify units. They could, in fact, be designated by SOP or could be designated using different letters/numbers for each operation. What really distinguishes a protective obstacle from an enemy obstacle or from an UXO is the prefix for the obstacle type abbreviation. The following is an example of the use of default zone, belt, and group designators: 7 Armor Division assigns

1st Brigade Zone W. 1st Brigade assigns TF Strike Belt W5. TF Strike assigns Company A Group W5A. Company A, TF Strike, 1st Brigade, 7 Armor Division identifies an area with unknown UXO. This is the first such area identified by the company and is assigned obstacle number A007-W5A-UX01X. The first enemy minefield that this company encounters is A007-W5A-EM01X.

i. Obstacle Status Symbols. Current symbols can show status for planned, being prepared, prepared but not executed, and executed. Other situations may call for other symbols.

(1) Obstacle Status Symbol for Breached Obstacles. Indicating breached obstacles is very simple. The only difference is the substitution of the status symbol "=" for other status symbols. The "=" indicates that the obstacle is breached. For example, the first completed standard turning minefield in obstacle group A007-A1A has the obstacle number A007-A1A-MT01X. If this minefield is breached, the obstacle number is changed to A007-A1A-MT01=. As another example, if Company A, TF Strike breaches the minefield discussed above, the obstacle number is changed to A007-W5A-EM01=.

(2) Obstacle Status Symbol for Other Situations. The following list shows examples of other status symbols. In addition, units may specify other symbology in OPLANs/OPORDs.

(a) Suffixes for UXO Obstacle Type Abbreviations:

- Bomb (Air) . . . . . B
- CBU (Air) C
- DPICM . . . . . D
- MLRS . . . . . M
- General X

(b) Sufixes for Enemy Obstacle Type Abbreviations:

- Abatis . . . . . T
- Antitank Ditch . . . . . D
- Bridge Demolition . . . . . B
- Log Obstacle L
- Minefield . . . . . M
- Nonstandard . . . . . N
- Road Crater . . . . . R
- Rubble Obstacle . . . . . E
- Scatterable Mines . . . . . S
- Wire Obstacle . . . . . W

(c) Obstacle Status Symbol for Other Situations:

- Breached . . . . . =
- Unknown . . . . . ?
- Being Cleared . . . . . #

Appendix B

UXO SPOT REPORT

1. Background

The UXO Spot Report is a detailed 2-way reporting system that clarifies UXO hazard area locations, identifies clearance priority, and identifies affected units. The report is used to request help in handing an UXO hazard that influences an unit's mission and is beyond the unit's ability to handle. This report helps commanders set priorities based on the battlefield situation.

2. First-echelon Report

The UXO Spot Report is the first-echelon report that is sent when an UXO is encountered. The report consists of 9 lines and is sent by the fastest means available.

Line 1. Date-Time Group (DTG): DTG item was discovered.

Line 2. Unit and Location: Reporting activity (unit identification code [UIC]) and location (grid of UXO).

Line 3. Contact Method: Radio frequency, call sign, point of contact (POC), and telephone number.

Line 4. Type of Ordnance: Dropped, projected, placed, or thrown. If available, supply the subgroup. Give the size of the hazard area.

Line 5. NBC Contamination: Be as specific as possible.

Line 6. Resources Threatened: Report any equipment, facilities, or other assets that are threatened.

Line 7. Impact on Mission: This describes current tactical situation and how the presence of UXO impacts mission.

Line 8. Protective Measures: Describe any measures you have taken to protect personnel and equipment.

Line 9. Recommended Priority: Recommend a priority for response by EOD or engineers:

Priority	Basis
Immediate	Stops the unit's maneuver and mission capability or threatens critical assets vital to the mission.
Indirect	Slows the unit's maneuver and mission capability or threatens critical assets important to the mission.
Minor	Reduces the unit's maneuver and mission capability or threatens noncritical assets of value.
No Threat	Has little or no effect on the unit's capabilities or assets.

Appendix C

AIRCRAFT CBU LOADS

This appendix lists the maximum CBU canister loads per airframe and the type and amount of submunitions per canister. Consult the ATO for specific aircraft loads.

Aircraft	Type of CBU	Maximum Load
B-52	CBU-52	45 (27 int, 18 ext)
	CBU-58	45 (27 int, 18 ext)
	CBU-71	45 (27 int, 18 ext)
	CBU-87	24 (6 int, 18 ext)
	CBU-89	24 (6 int, 18 ext)
	MK-20	18 external
B-1B	CBU-87	30 int
	CBU-89	30 int
	CBU-97	30 int
F-16	CBU-52,58,71	6 (4 with wing tanks)
	CBU-87,89	6 (4 with wing tanks)
	MK-20	6 (4 with wing tanks)
F-111	CBU-52,59,71	20
	CBU-87,89	8
	MK-20	20
	BL-755	4
F-4G	CBU-52,58,71	15
	CBU-87,89	15
	MK-20	12
	BL-755	6
F-15E	CBU-52,59,71	12 (6 with wing tanks)
	CBU-87,89	12 (6 with wing tanks)
	MK-20	20
A-10	CBU-52,58,71	10 (4 - 6 standard load)
	CBU-87,89	10 (4 - 6 standard load)
	MK-20	10 (4 - 6 standard load)
	BL-755	10 (4 - 6 standard load)
F/A-18	CBU MK-20,99,100	10
	CBU-78	10
F-14	CBU-87,89	4
A-6	CBU MK-20,92,100	28
	CBU-78	28
AV-8	CBU MK-20,99,100	8
	CBU-78	28

Table C-1. US Air Dispensed Submunitions

Weapon	Submunition	Submunition
CBU-7/A	BLU-18	1200
CBU-12/A	BLU-17/B	213
CBU-24/B	BLU-26/B	670
CBU-25/A	BLU-24/B	132
CBU-29/B	BLU-36/B	670
CBU-46/A	BLU-66/B	444
CBU-49/B	BLU-59/B	670
CBU-52/B	BLU-61A/B	217
CBU-55/B	BLU-73/B	3
CBU-58/B	BLU-63/B	650
CBU-59/B	BLU-77/B	717
CBU-60/A	BLU-24/B	264
CBU-63/B	M40	2025
CBU-70/B	BLU-85/B	79
CBU-71/B	BLU-86/B	650
CBU-72/B	BLU-73A/B	3
CBU-75/B	BLU-63/B	1800
CBU-75A/B	BLU-63&86	1420 & 355
CBU-76/B	BLU-61A/B	290
CBU-77/B	BLU-63/B	790
CBU-78/B	BLU-91/B&92/B	45 & 15
CBU-81/A	BLU-49A/B	45
CBU-87/B	BLU-97/B	202
CBU-89/B	BLU-91/B	92
CBU-89/B	BLU-92/B	92
CBU-97	BLU-108/B	10
CBU-98	HB-876LE	24
MK15	M40	2020
MK20	MK118	247
MK22	M38	2020
Source: US Army Materiel Systems Analysis Agency		

Appendix D

SUBMUNITIONS IN ARMY STOCKPILE

This appendix lists the submunition ordnance currently in the US Army stockpile. With the exception of the M80 submunition, the current generation of these submunitions do not have self-destruct fuses.

Table D-1. US Army Submunition Ordnance

System	Projectile	Type Submunition	Submunition Quantity
155mm	M449 ICM	M43A1	60
	M449A1 ICM	M43A1	60
	M864 DPICM	M42/M46	72
	M483A1 DPICM	M42/M46	64/24
8 inch	M404 ICM	M43	104
	M509A1 DPICM	M42/M46	180
105mm	M444 ICM	M39	18
	M915/M916 DPICM	M80*	42
MLRS	M26	M77	644
	M26A1	M77	518
ATACMS		M74	1000
HYDRA 70	M261 MPSM	M73	9
Source: US Army Materiel Systems Analysis Agency			

*Self-destruct Fuse

Appendix E

FOREIGN SUBMUNITIONS

The following tables show typical foreign air and surface launched submunition ordnance. It is not intended to be all inclusive but for information only.

Table E-1. Foreign Air Dispensed Submunitions

Country	System	Type Submunition	Submunition Quantity
Russia	500kg	AT	15
Russia	500kg	APERS	108
Russia	500kg	AT	268
Russia	500kg	FAI	2
Russia	500kg	CP*	12
China	500kg	FAE	3
Poland	500kg	APERS	265

Source: Foreign Science and Technology Center Briefing at HQ TRADOC on 21 Apr 93

*Concrete piercing or cratering

Table E-2. Foreign Surface Launched Submunitions

Country	Delivery	System	Submunition Quantity	Submunition Type
Brazil	Rocket	180mm	20	DPICM
Brazil	Rocket	300mm	64	DPICM
Bulgaria	Artillery	122mm	15	DPICM
China	Mortor	120mm	18	DPICM
China	Artillery	122mm	30	DPICM
China	Artillery	130mm	35	DPICM
China	Artillery	152mm	63	DPICM
China	Artillery	155mm	63	DPICM
China	Artillery	203mm	100	DPICM
China	Rocket	122mm	39	DPICM
China	Rocket	273mm	320	DPICM
CIS	Artillery	152mm	42	DPICM
CIS	Rocket	220mm	30	APERS/AM
CIS	Rocket	300mm	72	APERS/AM
CIS	Rocket	FROG-7	42	APERS/AM
Egypt	Rocket	122mm	98	DPICM
France	Artillery	155mm	63	DPICM
Germany	Artillery	155mm	63	DPICM
Germany	Artillery	155mm	49	DPICM
Greece	Artillery	105mm	24	DPICM
Greece	Mortar	4.2 in	20	DPICM
Greece	Artillery	155mm	49	DPICM
Israel	Artillery	105mm	15	DPICM
Israel	Mortar	120mm	24	DPICM
Israel	Artillery	155mm	63	DPICM
Israel	Artillery	175mm	81	DPICM
Israel	Artillery	203mm	120	DPICM
Israel	Rocket	160mm	104	DPICM
Italy	Rocket	122mm	77	DPICM
Pakistan	Artillery	155mm	88	DPICM
Slovakia	Artillery	152mm	42	DPICM
Slovakia	Rocket	122mm	63	DPICM
S. Africa	Artillery	155mm	56	DPICM
S. Korea	Artillery	105mm	20	DPICM
S. Korea	Artillery	105mm	18	APERS
Spain	Mortar	120mm	15	DPICM
Spain	Mortar	120mm	21	DPICM
Yugoslavia	Artillery	152mm	63	DPICM
Yugoslavia	Rocket	128mm	40	DPICM
Yugoslavia	Rocket	262mm	288	DPICM

Source: Foreign Science and Technology Center Briefing at HQ TRADOC on 21 Apr 93

Glossary

PART I—ABBREVIATIONS AND ACRONYMS

A

ACC	Air Combat Command
ACE	aviation combat element
ACO	airspace control order
ADAM	area denial artillery munition
ADOCS	automated deep operations coordination system
ADE	assistant division engineer
AFATDS	advanced field artillery tactical data system
AFU;MFR	ammunition and fire unit mission fire report
AFFOR	Air Force forces
ALO	air liaison officer
AM	antimateriel
AO	area of operations
AOC	air operations center
APAM	antipersonnel antimateriel
APERS	antipersonnel
ARFOR	Army forces
ARTY	artillery
ASOC	air support operations center
ASP	ammunition supply point
AT	antitank
ATACMS	Army Tactical Missile System
ATCCS	Army Tactical Command and Control System
ATO	air tasking order
ATP	ammunition transfer point

B

BCD	battlefield coordination detachment
BDA	battle damage assessment
BDE	brigade
BLU	bomb live unit
BN	battalion

C

C2	command and control
C3	command, control, and communications
CAG	carrier air wing commander
CAS	close air support
CBU	cluster bomb unit
CCIR	commander's critical information requirements
CIS	Commonwealth of Independent States
CP	command post; concrete piercing or cratering
CS	combat support
CSS	combat service support

CSSE	combat service support element
CTAPS	contingency theater automated planning system
CVBG	carrier battle group
CVIC	carrier air intelligence center
CVW	carrier air wing

D

DA	Department of the Army
DAS	direct air support; deep air support
DASC	direct air support center
div	division
DIVARTY	division artillery
DPICM	dual-purpose improved conventional munition
DTG	date time group

E

e.g.	for example
EN	engineer
EOD	explosive ordnance disposal
ETAC	enlisted tactical air controller

F

FA	field artillery
FAE	fuel air explosive
FAI	fuel air incendiary
FARP	forward arming refueling point
FASCAM	family of scatterable mines
FAX	facsimile
FDC	fire direction center
FFC	force fires coordinator
FFCC	force fires coordination center
FLI	force level information
FLIR	forward looking infrared
FM	Field Manual (USA)
FMFM	Fleet Marine Force Manual
FOL	forward operating location
FS	fire support
FSCL	fire support coordination line
FSCC	fire support coordination center
FSCOORD	fire support coordinator
FSE	fire support element
FSO	fire support officer

G

G-2	Army or Marine Corps component intelligence staff officer (Army division or higher staff, Marine Corps brigade or higher staff)

G-3	Army or Marine Corps component operations staff officer (Army division or higher staff, Marine Corps brigade or higher staff)
GCE	ground combat element
GLO	ground liaison officer
GS	general support
H	
HMMWV	high mobility multipurpose wheeled vehicle
HNS	host nation support
HQ	headquarters
I	
ICM	improved conventional munition
i.e.	that is
IEW	intelligence and electronic warfare
INFLTREP	in-flight report
INTREP	intelligence report
IPB	intelligence preparation of the battlespace
J	
J-3	Operations Directorate of a joint staff
J-5	Plans Directorate of a joint staff
JAOC	joint air operations center
JFACC	joint force air component commander
JFC	joint force commander
JFSOCC	joint forces special operations component commander
JINTACCS	Joint Interoperability of Tactical Command and Control Systems
JIPTL	joint integrated prioritized target list
JMCIS	Joint Maritime Command Information System
JOA	joint operations area
JRAC	joint rear area coordinator
JTCB	joint targeting coordination board
JTF	joint task force
K	
kg	kilogram
L	
LAV	light armored vehicle
LCC	land component commander
M	
MAAP	master air attack plan
MAGTF	Marine air ground task force
MARFOR	Marine forces

MCCDC	Marine Corps Combat Development Command
MCFSS	Marine Corps Fire Support System
MCRP	Marine Corps Reference Publication
MCS	maneuver control system
MDS	Mission Distribution System
MEA	munitions effectiveness assessment
MEDEVAC	medical evacuation
MEF	Marine expeditionary force
METT-T	mission, enemy, terrain and weather, troops and support available, time available
MFR	mission fire report
MISREP	mission report
MICLIC	mine-clearing line charge
MLRS	multiple launch rocket system
mm	millimeter
MSE	mobile subscriber equipment
MSR	main supply route

N

NBC	nuclear, biological and chemical
NDC	Naval Doctrine Command
NFA	no fire area
noms	nominations
NWP TP	Naval Warfare Publication Test Publication

O

O&I	operations and intelligence
OAS	offensive air support
OPLAN	operation plan
OPORD	operation order
OPTEMPO	operational tempo
OTC	officer in tactical command

P

PAC	Pacific Air Forces
PACAFPAM	Pacific Air Forces Pamphlet
POC	point of contact

R

R&S	reconnaissance and surveillance
RAAM	remote antiarmor mine
RAAP	rapid application of airpower
RAOC	rear area operations center
REGT	regiment
RFA	restrictive fire area

ROC	rear operations center
ROE	rules of engagement
ROM	refuel on the move
ROZ	restricted operating zone

S

S3	battalion or brigade operations staff officer (Army; Marine Corps battalion or regiment)
SOF	special operations forces
SOLE	special operations liaison element
SOP	standing operating procedures
SPINS	special instructions
SRC	survival recovery center
STACCS	standard theater army command and control system
SQDN	squadron

T

TA	Theater Army
TACC	tactical air command center
TACFIRE	tactical fire direction system
TADC	tactical air direction center
TAOC	tactical air operations center
TARPS	Tactical Air Reconnaissance Pod System
TF	task force
TLAM	Tomahawk land attack missile
TLAM-D	Tomahawk land attack missile, version D
TOC	tactical operations center
TTP	tactics, techniques, and procedures

U

UIC	unit identification code
US	United States
USAF	United States Air Force
USAFE	United States Air Forces Europe
UXO	unexploded ordnance

V

via	by way of
vs	versus

W

WOC	wing operations center
WCCS	Wing Command and Control System

mine. 1. In land mine warfare, an explosive or other material, normally encased, designed to destroy or damage ground vehicles, boats, or aircraft, or designed to wound, kill, or otherwise incapacitate personnel. It may be detonated by the action of its victim, by the passage of time, or by controlled means. 2. In naval mine warfare, an explosive device laid in the water with the intention of damaging or sinking ships or of deterring shipping form entering an area. The term does not include devices attached to the bottoms of ships or to harbor installations by personnel operating underwater, nor does it include devices which explode immediately of expiration of a predetermined time after laying. (*Joint Pub 1-02*)

unexploded explosive ordnance. Explosive ordnance which has been primed, fused, or otherwise prepared for action and which has been fired, dropped, launched, projected or placed in such a manner as to constitute a hazard to operations, installations, personnel or material and remains unexploded either by malfunction or design or for any other cause.

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Chapter I

SUBMUNITION UNEXPLODED ORDNANCE (UXO) HAZARDS

1. Background

a. Saturation of unexploded submunitions has become a characteristic of the modern battlefield. The potential for fratricide from UXO is increasing. It applies throughout the battlefield (e.g., special operations forces [SOF]) in deep operations, maneuver forces in close operations, and the movement of forces and support operations within the rear area). Commanders must consider risks to soldiers, sailors, airmen, and marines from UXO and integrate UXO into their antifratricide planning. This tactics, techniques, and procedures (TTP) publication provides the methodologies for planning, implementing, and executing procedures to protect forces from unexploded submunitions.

b. United States (US) or allied casualties produced by friendly unexploded submunitions maybe classified as fratricide. Locations where unexploded submunitions have been or may be encountered require accurate tracking to assist commanders in reducing the potential for fratricide. Currently no system exists to accurately track unexploded submunitions to facilitate surface movement and maneuver. This publication addresses the impact of UXO on operations at the operational level and below and describes TTP to assist leaders at all levels in reducing the hazards of UXO. This chapter establishes the scope of the UXO problem and focuses on the potential effects of UXO on all surface forces throughout the battlefield (including SOF).

c. Joint Publication 1-02 defines unexploded explosive ordnance as *"explosive ordnance which has been primed, fused, or otherwise prepared for action, and which has been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel or material and remains unexploded either by malfunction or design or for any other cause."* Although ground forces are concerned with all unexploded ordnance, the greatest potential for fratricide comes from unexploded submunitions. For this reason, the scope of this publication focuses on unexploded submunition hazards. However, if the situation warrants, the tracking process described in later chapters can be used to track all potential UXO hazards. While US weapon system examples are used in this publication, most foreign militaries possess similar systems. Appendices D-E list types and quantities of US and foreign submunitions ordnance. Family of scatterable mines (FASCAM) operations are beyond the scope of this publication.

2. Hazards

Both surface and air-delivered ordnance produce unexploded submunitions. Several factors, such as the delivery technique, age of submunition, ambient air temperature, and type of impact medium, influence the reliability of submunitions. The actual hazard area produced depends on the type of ordnance and the density of the UXO.

a. Surface Delivery Systems. The Army and Marine Corps employ a variety of rockets, missiles, and cannon artillery. Each system is capable of delivering improved conventional munitions (ICMs) that contain submunitions. A typical Army heavy division is equipped with 9 Multiple Launched Rocket Systems (MLRSs) and 72 tubes of cannon artillery. Cannon artillery basic load is generally 60-70 percent dual-purpose, improved conventional munition (DPICM), while 100 percent of the MLRS and Army Tactical Missile System (ATACMS) basic loads are submunitions. Thus every MLRS and ATACMS fire mission and over half of the fire missions executed by cannon artillery

produces UXO hazard areas. Additionally, the Tomahawk land attack missile. Version D (TLAM-D), is the submunition version of the Tomahawk missile and has the potential to produce similar UXO hazard areas.

(1) MLRS Unexploded Submunition Hazards. MLRS submunition function reliability requirement is no less than 95 percent. With a 95 percent submunition function reliability, 1 MLRS rocket (with 644 submunitions) could produce up to 38 unexploded submunitions. A typical fire mission of 36 MLRS rockets could produce an average of 1368 unexploded submunitions. The numbers of submunitions that fail to properly function and the submunitions' dispersion determine the actual density of the hazard area.

(2) Cannon Artillery. Cannon artillery employs the same submunitions as MLRS. The difference is the number of submunitions per round. A battalion-2 (24 cannon firing 2 rounds each for a total of 48 rounds) with a 95 percent submunition reliability produces, on average, 212 unexploded submunitions.

b. Air Delivery Systems. There is no set air delivery mission profile. Most airframes are capable of delivering a variety of submunitions. The UXO hazard area depends on the submunition, mission profile, target type, and number of sorties. Air Force and naval air power employ cluster bomb units (CBUs) containing submunitions that produce UXO hazard areas similar to MLRS/ cannon artillery submunitions. Air delivered canisters contain varying amounts of CBUs (see Appendix C). One CBU-58 or three CBU-87/CBU-52 contain approximately the same number of submunitions as one MLRS rocket. AB-52 dropping a full load of 45 CBUs (each CBU-58/CBU-71 contains 650 submunitions) may produce an UXO hazard area that is significantly more dense than an MLRS UXO hazard area. A typical F-16 flying close air support (CAS) against a point target may drop two CBUs per aircraft per run, thus producing a very low-density UXO hazard area. Again, the type and number of canisters dropped will determine the density of the UXO hazard area.

3. UXO Impact on Forces

UXO affects operational and tactical planning and execution of operations. Types of munitions employed, self-destruct times, and submunition densities must be evaluated regarding the forces that deal with them. Variables affecting the degree of risk include, but not limited to, the types of submunitions employed; protection available to US personnel (e.g., armored vehicles versus dismounted infantry); mission of the affected force; and terrain and climatic conditions within affected operational areas. Planners must consider the risks of UXO for any mission, regardless of the unit.

a. Operational Impacts of UXO. Planners need to consider the types of submunitions, where they are/were employed, and their potential impact on future operations. Without careful planning, maintaining the operational tempo will be difficult in an UXO environment. Planners must allocate additional time for the operation if a deliberate breach or bypass of UXO hazard areas is required. Additionally, planners should consider—

(1) Tracking and reporting requirements.

(2) Task organization/additional force requirements (e.g., requirement for additional engineer or explosive ordnance disposal assets).

(3) Reconnaissance requirements.

(4) Breaching requirements.

(5) Maneuver requirements (restrictions on avenues/axis of attack).

(6) UXO hazard area marking requirements.

(7) Civil-military operations requirements (impact on civilian population).

b. Tactical Impacts of UXO. UXO inhibits maneuver by potentially restricting use of

terrain, increasing reconnaissance requirements, and reducing momentum (speed of maneuver and rates of march). UXO also inhibits night movement, increases risk to combat support (CS)/combat service support (CSS) elements, ties up engineers or other forces clearing/marking lanes, and reduces available firepower because of increased loss of personnel and equipment.

c. Armored/Mechanized Forces. Armored and mechanized forces consist of tracked and wheeled vehicles. Commanders must consider the force as a whole when planning operations. Chance of significant damage to armored, light armored vehicles (LAV), and other wheeled armored vehicles is relatively low. The primary damage occurs where the track or wheel contacts the submunition. Depending on the type of submunition, a mobility kill could occur. There is little possibility of casualties from crossing UXO hazard areas as long as the crews stay mounted. Armored and mechanized commanders must also consider the increased risk to their organic wheeled vehicles and dismounted forces when operating in UXO environments. High mobility multipurpose wheeled vehicles (HMMWVs) and other "*soft skin*" vehicles accompanying and supporting combat elements are at greater risk. Anytime crews must dismount their vehicles, they are increasing their risk.

d. Dismounted Forces. Dismounted forces face the greatest danger of death or injury from UXO. Unexploded ordnance is a significant obstacle to dismounted forces. Dismounted forces require detailed knowledge of the types and locations of submunitions employed.

e. Wheeled Vehicles. Personnel being transported by wheeled vehicles face nearly the same risk to UXO as dismounted forces. The protection afforded by wheeled vehicles is negligible. Wheeled vehicles are vulnerable to damage from UXO. Chance of catastrophic destruction is slight; however, contact with UXO normally results in disabled wheeled vehicles. Maintenance evacuation may be required depending on the type vehicle and where the damage occurred.

f. Air Assault and Aviation Forces. Air assault and aviation forces are also at risk to UXO. Aircraft in defilade, flying nap-of-the-earth, or in ground effect are vulnerable to submunitions. US Rockeye and Soviet PTAB submunitions incorporate piezoelectric crystals that can react to aircraft in ground effect. Antipersonnel and antimateriel (APAM) and M42/M46 grenades are also sensitive enough to function as a result of rotor wash. It is imperative aviation units know the location of employed submunitions and conduct thorough reconnaissance of the area before conducting operations or occupying assembly areas and forward arming refueling points (FARPs).

g. Amphibious Landing Craft. UXO has the potential to significantly damage certain types of landing craft and in some cases result in casualties of embarked personnel.

4. UXO Hazard Quantified

This section compares the UXO hazard area encounter probability with a minefield encounter probability. The probability of encounter is roughly equal for a minefield and an UXO hazard area of equal density (Figures I-1 and I-2). The minefield is more lethal as every mine is designed to detonate by some action, where the unexploded submunition results from a malfunction and may or may not detonate upon contact. They may also detonate without contact because of climatic changes, corrosion, etc., Figures I-3 and I-4 illustrate the expected damage/ casualties for various densities of UXO hazard areas. Comparing Figure I-1 with Figures I-3 and I-4 gives a potential impact on the mission.

a. Figure I-2 illustrates the vehicle probability of encountering a single unexploded submunition versus the hazard area UXO density. The UXO probability of encounter is very similar to that of a minefield; however, the lethality of the UXO hazard area is lower.

b. Figures I-3 and I-4 show the expected damage and casualty rates for various densities of DPICM and bomb live unit (BLU) 97 UXO hazard areas. These charts represent one vehicle/person passing through a one-half kilometer deep UXO hazard area. The probabilities shown are per vehicle/ person. To calculate the expected number of casualties, multiply the number of vehicles/ persons (or passage lanes) by the probability of encounter. The X-axis (mines per meter front) is a linear density expression of the average number of mines within a 1 meter path through the minefield's depth. The vehicle and tank probabilities differ because of the differences in width and the area in contact with the ground (track versus tire width). Each chart is based on Army Materiel Systems Analysis Activity Studies that show 40 percent of the duds on the ground are hazardous and for each encounter with an unexploded submunition there is a 13 percent probability of detonation. The probability lines within the graphs reflect 13 percent probability of detonation per encounter. Thus, even though an unexploded submunition is run over, kicked, stepped on, or otherwise disturbed, and did not detonate, it is not safe. Handling the unexploded submunition may eventually result in arming and subsequent detonation. Troops moving through a hazard area must be fully familiar with the hazards of the submunitions they will encounter.

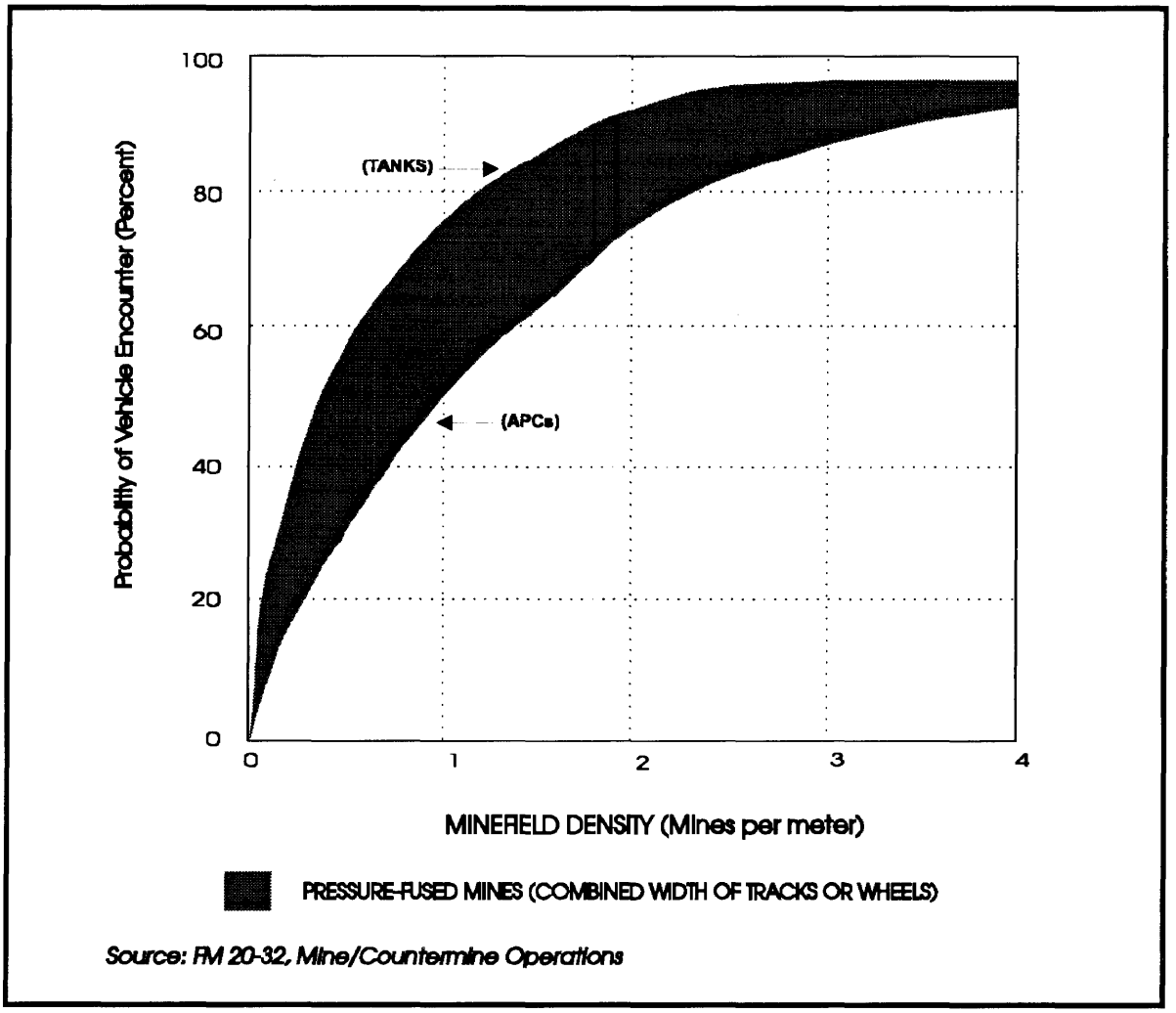
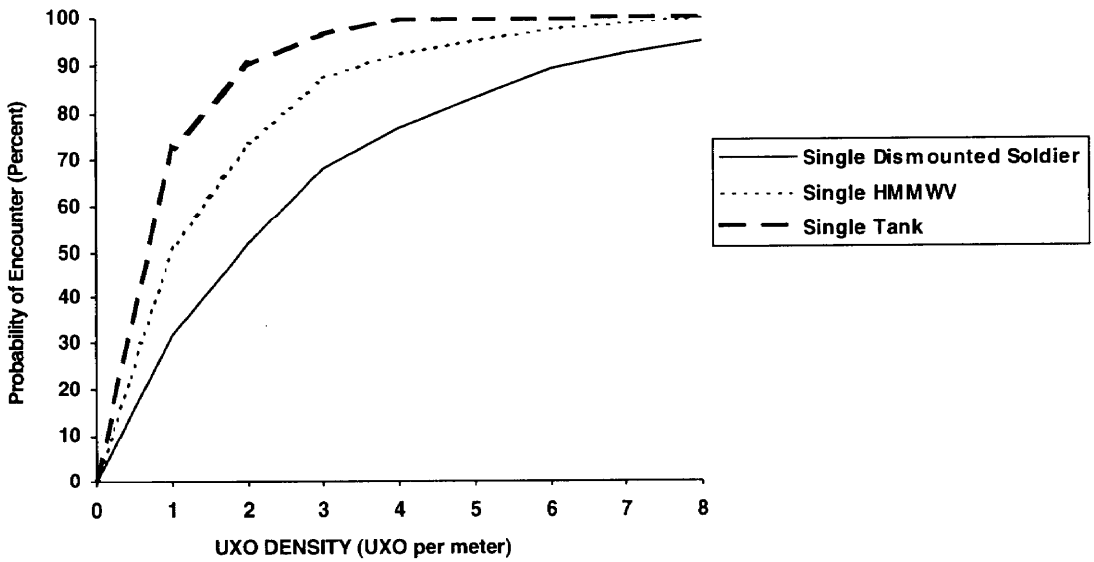
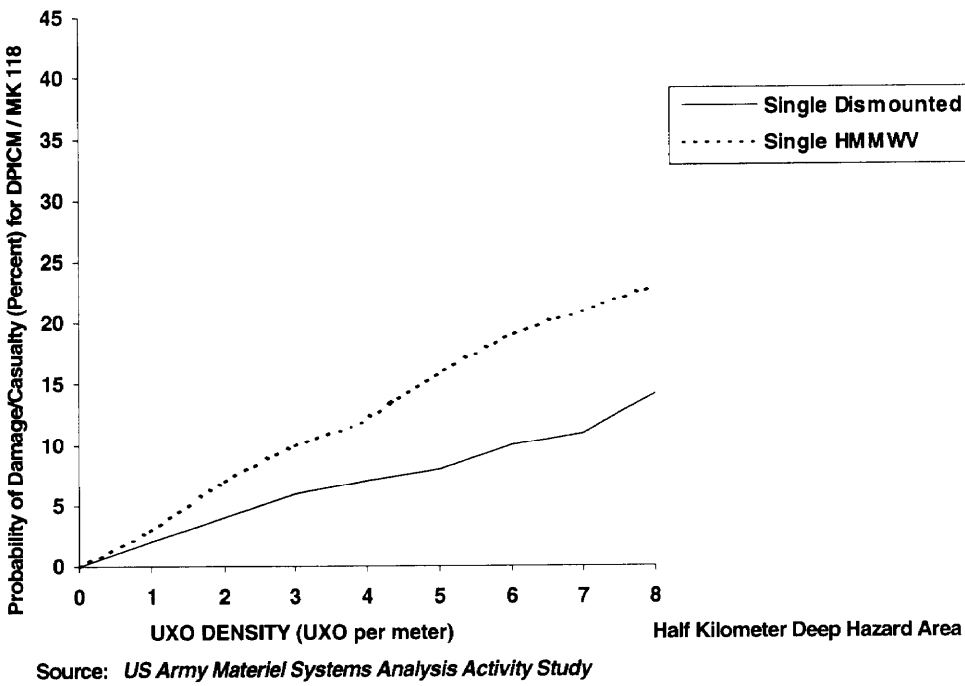


Figure I-1. Vehicle Mine Encounter Probability Versus Minefield Density



Source: *US Army Materiel Systems Analysis Activity Study*

Figure I-2. Vehicle Submunition Encounter Probability Versus UXO Density



Source: *US Army Materiel Systems Analysis Activity Study*

Figure I-3. UXO Expected Damage/Casualties Versus DPICM UXO Hazard Area Density

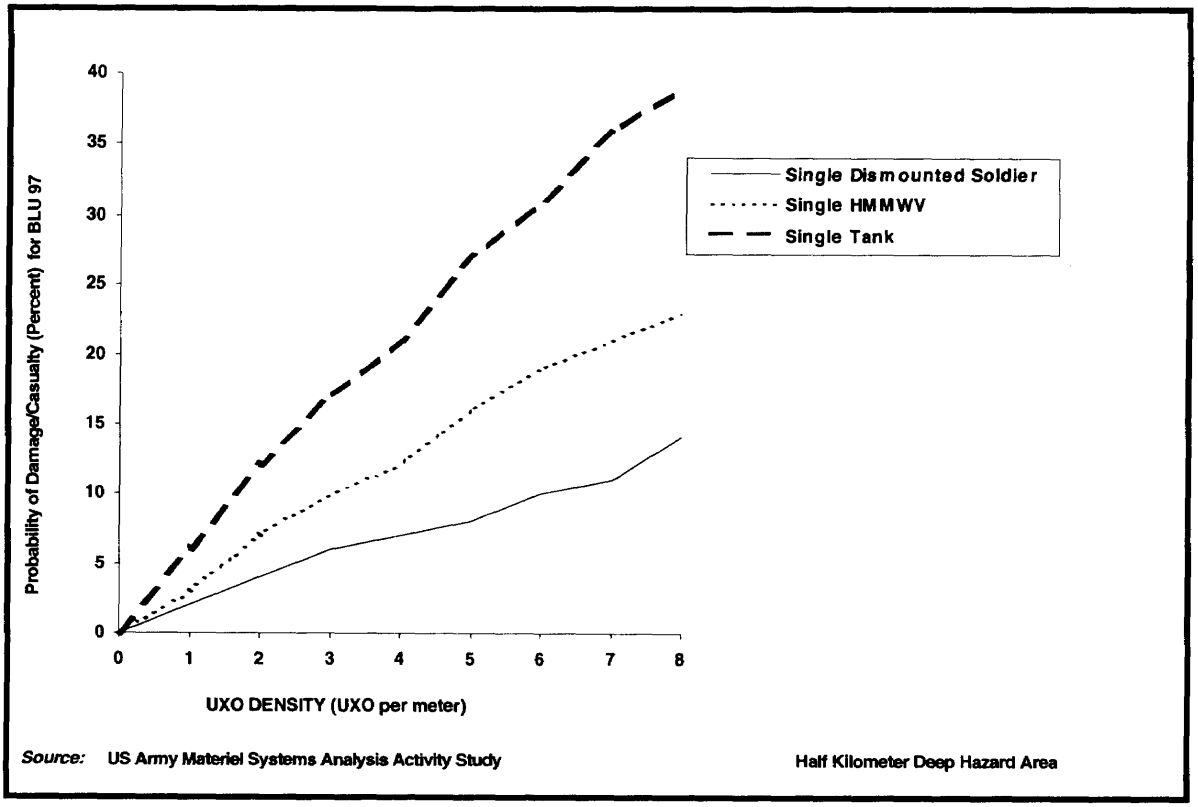


Figure I-4. UXO Expected Damage/Casualties Versus BLU 97 UXO Hazard Area Density

Chapter II

JOINT FORCE OPERATIONS

1. Background

a. This chapter addresses the joint force command and control procedures for coordinating use of submunition ordnance and reporting all UXO encountered on the battlefield. As such, it defines the command and staff procedures for planning, reporting, and tracking UXO to minimize risk to joint forces.

b. Ensuring personnel safety and precluding undue constraints on movement of forces and maneuver elements require proper planning and coordination. Although UXO is not a mine, UXO hazards pose problems similar to mines concerning both personnel safety and the movement and maneuver of forces on the battlefield. Coordination and information flow are the integral components that bind the planning, reporting, and tracking. Providing the proper information, at the right time, to the responsible authority is paramount.

2. Staff Responsibilities

Coordination between component commanders and the joint force commander (JF'C) may be required before use of submunitions by any delivery means. To ensure UXO does not occur in areas that negatively affect current and projected operations, coordination is conducted and guidance established before the use of submunition ordnance. The following areas identify the minimum responsibilities for joint force UXO procedures. During planning, evaluate the impact of known UXO hazard areas on mission accomplishment from both an offensive and defensive posture. The employment of submunitions must balance with troop safety and mission accomplishment. Table II-1 lists staff and unit primary responsibilities for UXO planning, reporting, and tracking.

a. JFC. The commander addresses specific considerations for employing ICMs/ CBUs and their associated UXO hazards when providing intent and planning guidance. The JFC intent provides safety guidance and establishes antifratricide procedures within the joint operations area (JOA).

b. Plans Directorate of a Joint Staff (J-5). During the planning phase, the J-5 incorporates commander's guidance regarding joint force submunition reporting, tracking, and dissemination procedures into operational plans. During the plan formulation, emphasis is on minimizing the impact of UXO. Using the special instructions (SPINS) section of the air tasking order (ATO) and coordinating instructions on the operations plan (OPLAN), components are alerted not to employ submunitions in particular areas or on certain targets because of the UXO danger to personnel or maneuver. The J-5 ensures planning includes adequate safety of personnel and antifratricide procedures. Planning considerations also include terrain management, the impact of potential UXO hazard areas on friendly operations, and any munitions' restrictions. Planning must address proper training and equipping of personnel and units for reducing and clearing UXO hazards.

(1) Other considerations include-

(a) Preplanning, deconflicting, and coordinating with other components.

(b) Impact of residual effects on friendly operations.

• Planned use of current enemy controlled terrain, including airfields and airstrips.

- Requirements for dismounted operations. (Security operations—patrolling, reconnaissance, etc.)

- Requirements for mounted operations only.

- Availability of engineer and explosive ordnance disposal (EOD) support.

(c) Impact on terrain management.

- Friendly troops transiting or occupying the area.

- Locations of proposed main supply route (MSR).

- Restricted areas—proposed logistics base sites.

- Availability of engineers and EOD units.

(d) Communications requirements.

- Availability of automation and communications equipment to rapidly disseminate information.

- Information requirements.

- Information flow to inform friendly forces of expected UXO locations.

(e) Risk to noncombatants.

c. Operations Directorate of a Joint Staff (J-3). The J-3 staff responsibility includes planning and executing the commander's guidance and establishing procedures to ensure subordinate components receive UXO hazard areas information. The J-3, in coordination with the joint force engineer and EOD staffs, establishes joint force reporting requirements and procedures.

d. Joint Rear Area Coordinator (JRAC). In the joint rear area (JRA), the JRAC plays a significant and critical role in UXO reporting. The JRAC must be part of the coordination and information network dealing with UXO. The JRAC is responsible for creating a secure environment in the JRA to facilitate sustainment, host nation support (HNS), infrastructure development, and joint force movements. The JRAC establishes tracking and dissemination procedures ensuring personnel and units operating in the JRA are knowledgeable of UXO hazards.

e. Joint Force Engineer Function. The joint force engineer is the principal staff element in the planning, reporting, and tracking of UXO hazard areas. During planning, the engineer element includes UXO as part of the mission analysis and, in coordination with EOD, advises the JFC on task organization and equipment required for clearing and breaching UXO hazards. During operations, the joint force engineer receives and consolidates reports, forwards reports to EOD, and incorporates UXO hazard area information into the engineer obstacle overlay. The engineer overlay is the primary source of UXO hazard areas classified as obstacles or barriers. The engineer staff maintains reports on historical UXO hazard areas while the EOD element maintains information on all UXO hazards.

f. Joint Force EOD Function. The joint force EOD function provides technical expertise during the mission analysis by assessing hazards and risks from all sources of UXO, including US, allied, and threat munitions. During the conduct of operations, EOD personnel provide technical assistance for marking, breaching, and clearing operations. EOD personnel coordinate with the engineers to obtain information on all known UXO hazards. The EOD function normally maintains UXO historical files that include all unexploded munitions. This historical file provides information for follow-on units and to civil-military units for post-conflict operations.

g. Units. Unit responsibilities include marking, reporting, and tracking UXO hazards within their assigned AO. Units follow guidance contained in FM 21-16/ FMFM 13-8-1, *Unexploded Ordnance (UXO) Procedures,* when required to conduct limited breaching and clearing operations or self-extract to reestablish operations in another location.

h. Joint Force Air, Land, and Maritime Component Commanders. Reporting requirements established per joint force guidance normally include antifratricide procedures and component reporting architecture and requirements. Component commanders normally establish coordination and reporting procedures with other components. Each component consolidates reports and maintains current and historical records concerning UXO. For example, the land component engineer compiles the obstacle, barrier, and minefield reports while the EOD staffs compile reports tracking all UXO on the battlefield. The joint force air component commander (JFACC) publishes and maintains UXO hazards based on the ATO.

i. Risk Management. Risk management is the commander's decision. Many factors contribute to this decision; one of which is the impact of submunitions on current and future operations. The current and future operations, level of protection available to the committed force, the type and amount of engineer or EOD support, and time available are factored into the commander's decision. This assessment results in the commander's guidance on types of munitions and areas of employment.

3. Reporting

Immediate reporting is essential. UXO hazard areas are lethal and unable to distinguish between friend and foe. Positive control and a rapid and continuous flow of information are necessary. Reactive and predictive reporting are necessary to give the commander the true picture of the hazards.

a. Land Forces. Land force units send spot reports (Appendix B) relaying information on confirmed UXO locations and reporting locations of previously employed submunition ordnance.

(1) UXO Spot Report. The UXO Spot Report is the first-echelon report sent when encountering an UXO hazard area. It is a detailed 2-way reporting system that clarifies the UXO hazard area location, identifies clearance priority, and identifies affected units. The report also serves as a request for assistance with an UXO hazard.

Table II-1. Staff and Unit Primary Responsibilities

	J3	JRAC	Engineers	EOD	Units
Planning	X	X	X	X	X
Reporting	Establish procedures		Accept and compile reports		X
Tracking	X	X	UXO as barrier or obstacle	All UXO	X
Marking			Establish procedures	Technical assistance	X
Clearing				Technical assistance	
Breaching			X	X	
Disseminating		X	Via overlay		
Historical Records			X	X	

(2) Reported Locations. Land force units report UXO hazard areas according to the JFC's guidance. Once reported, units treat UXO hazard areas as obstacles. As such, UXO information received requires processing, plotting, and disseminating to higher, lower, and adjacent units. The engineer representative converts the UXO obstacle report into obstacle overlays for dissemination to subordinate units.

b. Air Units. Air units can report submunition ordnance employment through their battle damage assessment (BDA), munitions effectiveness assessment reporting, and correlation with the ATO standard conventional load for each mission tasking. Also, air units can use intelligence reports (INTREPs), in-flight reports (INFLTRPTs), or mission reports (MISREPs) for munitions reporting.

4. Tracking

The JFC establishes the required UXO tracking level. Tracking of every submunition ordnance may not be required. The JFC bases the tracking level on the location, amount of potential UXO, or other criteria. The J-3, coordinating with the Intelligence Directorate of the joint staff (J-2) and component commanders' headquarters, tracks UXO hazard area information. The J-3 should maintain a historical database that includes type, quantity of ordnance dropped or observed, location, and date dropped or observed, of possible and known UXO hazard areas. Components update this database as required (frequency of update, ordnance type, and amount) by the JFC or J-3. The J-3 disseminates UXO information affecting maneuver, movement, and protection of land forces. Primary means of dissemination is by obstacle overlay. Alternate methods include providing location (aim point), delivery system, type and quantity of ordnance.

5. Operations

a. When setting up operational bases or work sites, units must consider the UXO threat. Hard surface roads are the best evacuation routes and easiest to clear. Units develop clearance plan procedures to reconnoiter and mark clear paths to other unit positions and to the nearest hard surfaced road or clear area. Extraction procedures resemble in-stride breach or clearing operations.

b. Combat units that have the assets to conduct an in-stride breach can do so. Their breach reduces the hazard and allows follow-on forces to continue in the original direction of the march. CS and CSS units must rely on alternate routes or breached lanes. After discovery of an UXO hazard, units take immediate actions to alert personnel, locate the submunition or scatterable mines, and provide protection for personnel and equipment. When dealing with an UXO hazard the following tactical factors should be assessed:

(1) Effects of the delay on the mission.

(2) Threat from direct and indirect fire. The risk of casualties from direct or indirect fire may be greater than that from the submunitions or scatterable mines.

(3) Terrain. The terrain determines the effectiveness of submunitions or scatterable mines, their visibility, and, consequently, their ability to be detected, avoided, or neutralized.

(4) Alternate routes or positions available.

(5) Degree of protection available.

(6) Specialized support, such as EOD or engineer teams and equipment available.

c. After assessing the situation, three main options are available—

(1) Accept the risk of casualties and continue with the assigned mission.

(2) Employ tactical breaching procedures and extract to alternate routes or positions.

(3) Employ preplanned alternate tactical plans according to the current OPORD.

d. Units bypass UXO hazard areas if possible. When bypassing is not feasible, units must try to neutralize the submunitions and scatterable mines that prevent movement. There is no single device or technique that will neutralize every submunition or scatterable mine in every situation. The differences in fusing, self-neutralization, terrain, and unit mission mean that multiple techniques must be considered. The following extraction techniques should be considered in the order listed:

(1) Perform area reconnaissance and mark a cleared route.

(2) Use engineer equipment to remove or neutralize items.

(3) Destroy items using explosive charges.

(4) Destroy items using direct-fire weapons.

(5) Contain the item by building barricades.

(6) Move UXO out of the way remotely.

DANGER

Employing breaching techniques on ordnance other than submunitions or scatterable mines is not recommended. The amount of explosives involved would create more of a hazard to your operations than the UXO itself.

WARNING

Before employing breaching techniques, make sure that none of the items contain chemical or biological agents.

e. Using engineer equipment is the preferred method of breaching small submunitions and scatterable mines. This procedure allows for the quickest clearance of an evacuation route. Suitable equipment includes a bulldozer, combat engineer vehicle, and an armored combat engineer earth-mover. If an unarmored vehicle is used (such as a bulldozer), the operator's cab requires protection against fragmentation. Three major disadvantages to heavy force breaching are—

(1) Equipment may be damaged or operators injured. If either happens, extraction through the area will be hampered.

(2) Equipment may only partially clear the area, requiring further clearance procedures.

(3) Equipment may bury some submunitions or scatterable mines, keeping them from being detected while using the evacuation route.

f. Mine-clearing Line Charge (MICLIC). The MICLIC is a rocket-propelled explosive line charge used to reduce minefield containing single-impulse, pressure-activated antitank (AT) mines and mechanically activated antipersonnel (APERS) mines. The MICLIC will explosively clear a path through an area. Several MICLICs may be required in the same area to ensure that a wide enough path is cleared. It has limited effectiveness against magnetically activated mines, including scatterable mines and those containing multiple-impulse or delay-time fuses. Three major disadvantages to using MICLICs are–

(1) The explosive charges may not be close enough to the submunition or scatterable mine to cause destruction. This can result in *"kick outs"* where submunitions or scatterable mines are thrown away from the detonation, possibly towards your position.

(2) Further reconnaissance of the area is required prior to using the route for evacuation in order to detect those submunitions or scatterable mines that are still in place after using MICLIC.

(3) MICLIC cannot be used if detonation of the submunitions or scatterable mines will cause unacceptable damage.

g. Hand-placed Explosive Charges. This is the most effective way to clear an evacuation route. Explosive charges should be placed to counter charge the main charge. Four major disadvantages to using hand-placed charges are—

(1) They are very labor intensive to use and expose personnel to greater risk, especially if the submunitions use magnetic, delay, or trip-wire fusing.

(2) Their use is very slow and time consuming, because all must be detected, marked, and destroyed individually.

(3) They cannot be used if detonation of the submunitions or scatterable mines will cause unacceptable damage to the operational area and/or equipment.

(4) They should not be used in heavy concentrations of submunitions or scatterable mines. The detonations will cause *"kick-outs."*

h. Direct-fire Weapons. Submunitions and scatterable mines can be destroyed or neutralized by the use of direct-fire service weapons. The goal of this procedure is to produce a disabling reaction that rapidly reduces or eliminates the designed fuse functioning of the submunition or scatterable mine. Service weapons such as the 5.56 millimeter, the 7.62 millimeter, the .50 caliber, and the 25 millimeter should produce the desired effect. Three major disadvantages to direct-fire destruction are—

(1) It is very slow and time consuming. Each item must be individually located, and each person can only engage one target at a time.

(2) Some submunitions are too small to engage effectively with direct-fire weapons from a distance of 25 meters.

(3) The terrain has a major effect on this procedure. Because submunitions and scatterable mines are so small, it does not take very much vegetation or loose dirt to hide them.

i. Containment. By using engineer equipment, one or two items can be contained by building barricades or by placing loose fill dirt on top of them. This procedure is recommended for use only where equipment must be recovered and no other procedure is acceptable. Major disadvantages to containment are—

(1) Placing fill dirt on top of the UXO may cause a detonation that could damage the equipment or injure the operator.

(2) Building barricades is time and personnel intensive.

j. Remote Movement. If the submunition or scatterable mine must be moved, it must be moved remotely using grapnel hooks, rope, or some other suitable material. Three major disadvantages to remote movement are—

(1) Movement of the item can cause detonation.

(2) Personnel must approach the item in order to attach necessary materials.

(3) The UXO will be pulled toward the person moving it.

Chapter III

SERVICE OPERATIONS AND PROCEDURES

1. Background

This chapter defines recommended methodologies for use by the services for planning, reporting, and tracking to enhance operations in an UXO contaminated environment. While the focus is on tracking US and allied submunition ordnance, threat ordnance poses an equal hazard and must be incorporated into planning, reporting and tracking where appropriate.

Section A. Army

2. General

Effective operations in an unexploded ordnance environment require integrated planning, tracking, and reporting of submunition employment. The fire support coordinator (FSCOORD) advises the maneuver commander and the operations staff officer (G-3) on fire support employment. This includes CAS and considerations for various field artillery munitions. The maneuver commander must provide guidance on the use of submunitions (DPICM/CBU) after assessing the mission, the UXO risk to troops, intent to maneuver, and terrain management. The maneuver commander does so after consultation with the G-3 and FSCOORD. This does not mean that the maneuver commander must approve individual missions or weapon employment. Guidance concerning submunition employment is disseminated through operations and fire support channels to higher, subordinate, and supporting forces. Only exceptions to the commander's guidance (i.e., location or munition use) must be individually approved by the commander, G-3, or FSCOORD. Reporting and tracking of DPICM/CBU missions fired is an administrative task and must not impede the responsive fire support for the maneuver commander.

3. Staff Responsibilities

a. G-2 (Intelligence). The G-2 includes potential UXO obstacles in the intelligence preparation of the battlefield (IPB). The resulting reconnaissance and surveillance (R&S) plan should include UXO detection reporting and marking.

b. G-3 (Operations) Function. G-3 function is the primary staff responsibility for planning and publishing operations orders (OPORDs). Using the battlefield framework, the G-3 considers the mission, the commanders' intent, forces available, terrain, commander's risk tolerance, choice of available weapons, branches to follow-on operations, and terrain management. Within the OPORD, the coordinating instructions could include commander's guidance on the employment of UXO producing submunitions. Additionally, reporting of special information on UXO locations could be part of the commander's critical information requirements (CCIR). The coordinating instructions can include guidance on reporting procedures, density levels, locations restricted, and no fire areas. The planning factors addressed in this section are not all inclusive but illustrate some of the requirements necessary to minimize the impact of UXO on operations. Submunition planning considerations include–

(1) Availability of nonsubmunition producing ordnance.

(2) Effectiveness of nonsubmunition ordnance against anticipated targets.

(3) Availability of engineer and EOD support.

(4) Impact on terrain management.

(5) Impact on friendly troop movements or occupation of an area.

(6) Impact on proposed main supply route (MSR).

(7) Restriction on areas—proposed logistics bases, refuel-on-the-move (ROM), and forward arming and refueling point (FARP) sites.

(8) Requirements for communication and automation equipment to rapidly disseminate information.

(9) Requirements for UXO reporting.

(10) Information flow to inform operating forces of possible UXO locations.

(11) Preplanning, deconflicting, and coordinating with other components.

(12) Impact of UXO on operations.

(13) Future operational requirements for current enemy controlled airfields or airstrips.

(14) Requirements for dismounted operations in the area (security, patrolling, reconnaissance, etc.).

c. Fire Support Function. The FSCOORII and fire support element (FSE) are the commander's link into fire support channels. The FSCOORD ensures that commanders and staffs are aware of the capabilities and hazards associated with the use of submunition ordnance, adherence to the commander's guidance regarding use, and reporting to appropriate staff officers the expenditure of submunition ordnance. The FSCOORD conducts detailed planning of fire support assets to support the commanders' intent. The supporting field artillery headquarters tracks the execution of all indirect fire missions and reports to higher and subordinate units.

d. Engineer Staff Function. Engineer staff function is the primary staff responsibility for obstacle planning. The engineer staff officer, in coordination with the FSCOORD, EOD, G-2, and G-3, conducts mission analysis on the impact of UXO. Responsibilities include breaching, reducing, recording, and marking UXO hazard areas.

e. EOD Staff Function. EOD staff function advises maneuver and support commanders on all matters pertaining to EOD support; provides command and control for subordinate EOD units; and has primary responsibility for clearing UXO hazard areas.

4. Operations

a. Engineers. Engineers provide mobility and survivability in support of the operational plan. They conduct mine and countermine operations and in-depth UXO obstacle breaching.

b. EOD. EOD eliminates or reduces the hazards of domestic or foreign conventional, nuclear, chemical, biological munitions, and improvised explosive devices that threaten personnel, military operations, facilities, and materiel. EOD personnel and units provide technical assistance to units in conducting UXO obstacle breaching.

c. UXO hazard areas are potential obstacles that must be considered while developing and wargaming courses of action. Commanders use the battlefield framework to assess the impact of submunition ordnance and issue guidance on employment. This planning guidance establishes submunition employment constraints and restraints and includes recommendations for both surface and air delivered ordnance within current and projected boundaries. Air delivered submunition ordnance and the area outside current boundaries require coordination with the JFC, functional component commanders (if designated) service components, and adjacent allied forces.

d. Close/Deep Operations. Primary concerns in deep and close operations are fratricide and casualty prevention and retaining freedom of maneuver. Careful coordination prevents UXO from restricting

or impeding maneuver space while decreasing fratricide.

(1) Detection. Submunitions and scatterable mines are very small in size and are difficult to detect in optimum circumstances. In some terrain, such as dense foliage, tall grass, or uneven ground, many of them will go undetected. During periods of limited visibility or at night, detection is almost impossible. Combat vehicle personnel traveling cross-county in a buttoned-up vehicle will be at a great disadvantage, because they will not be able to visually detect and avoid them.

(2) Reconnaissance. After detection, the characteristics and extent of UXO hazard areas must be determined using both ground and aerial reconnaissance and remote imagery. The unit detecting a submunition hazard area, scatterable minefield, or other UXO must mark and report it and, if directed, clear lanes. All areas remain marked until cleared.

(3) Clearing. Considering the factors of mission, enemy, troops, terrain, and time available (METT-T), clearance may be by breaching (see FM 90-13-1) or route clearance. Route clearance normally requires the deliberate sweep prior to opening a road. While there is no set time limits, an average of 1 to 3 kilometers can be covered per hour (see FM 20-32). Once detected, mechanical and explosive techniques are the preferred methods for sub munition neutralization.

e. Rear Operations. Planners must carefully consider use of submunition ordnance in rear operations due to the potential for fratricide. Forces that may come into contact with UXO in the rear area are the logistical sustainment forces, normally the most vulnerable and difficult to replace. The potential for contact increases during offensive operations as logistical forces move forward into areas of high density UXO. Employment of submunition ordnance or the discovery of UXO hazards in the rear area require immediate reporting and dissemination. EOD forces normally clear UXO hazards within the rear areas. Engineer forces provide equipment support as required. Clearing techniques include mechanical, explosive, and manual operations. ***Note: Only EOD is trained to render UXO safe without a high order detonation.***

5. Reporting

The commander uses established reporting and tracking requirements for protection of forces. UXO hazards are reported through appropriate channels and incorporated into intelligence data. Records are forwarded to the appropriate headquarters, where they are maintained on file. (See Figure III-l.)

a. Reports begin at the tactical level and forwarded through the senior Army headquarters to the JFC. Units encountering UXO hazard areas on the battlefield must assess, mark, and report using the 9-line spot report according to FM 21-16/FMFM 13-8-1. This report is forwarded to the force engineer. Friendly submunition management and reporting are the responsibility of FSE. The engineer representative at each level evaluates the reports and when appropriate integrates the reports into the obstacle overlay.

b. Dissemination. Forces receive information on UXO hazard areas via the obstacle overlay passed through intelligence and operations channels. The rear operations center (ROC) maintains UXO hazard information within the rear area.

c. Army/JFACC Interface. The battlefield coordination detachment (BCD) ensures the JFACC is aware of the Army forces (ARFOR) commander's intent, scheme of maneuver, and the constraints/restrictions on submunition use within the ARFOR AO. All wings and squadrons must be informed of ARFOR submunition restrictions through the SPINS of the ATO. The BCD Plans Section provides additional information to

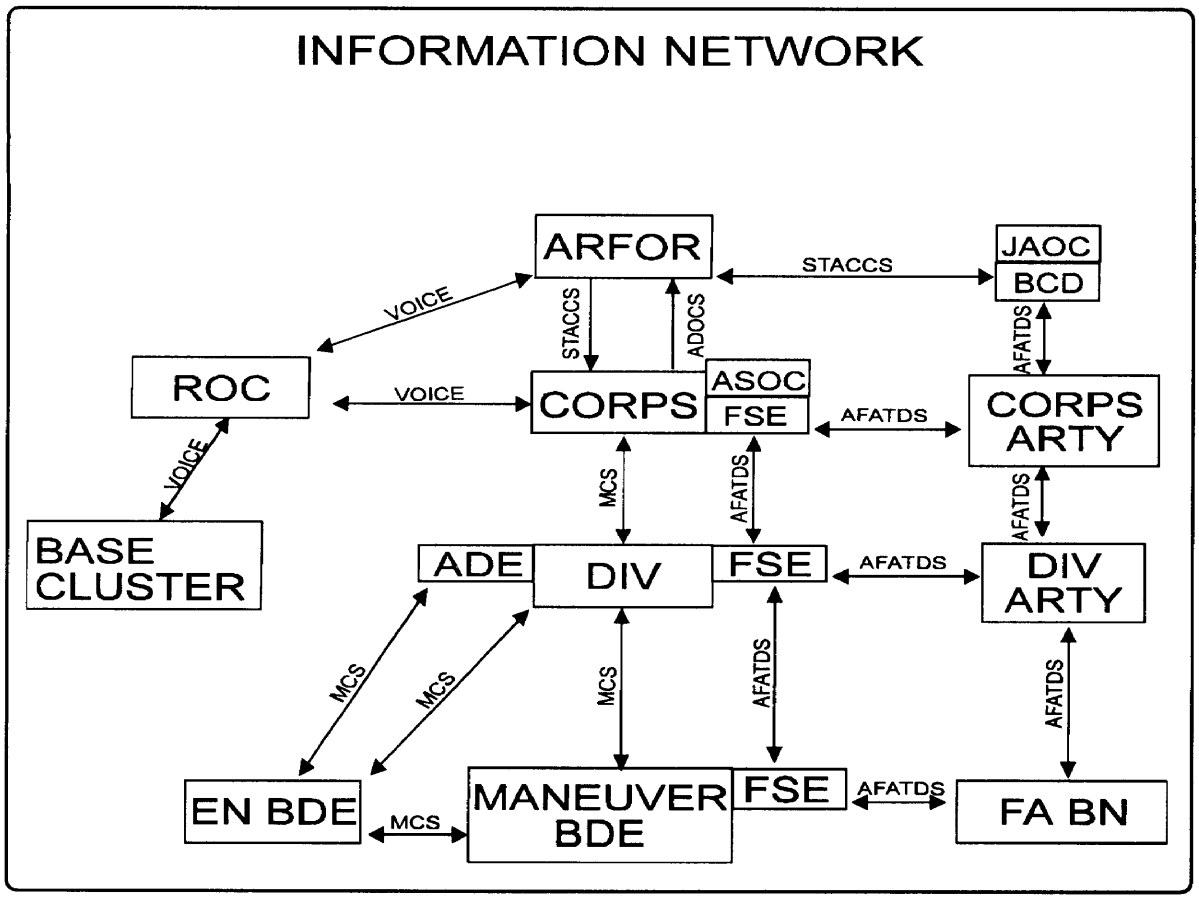


Figure III-1. Theater Army Information Network

the ARFOR commander on JFACC planned submunition use within or near Army boundaries by highlighting CBU scheduled mission on the ATO. During the ATO development, the BCD Plans Section ensures that JFACC planned submunition missions conform to ARFOR policy. The Operations/ Current Intelligence Section provides information of actual CBU employment within Army boundaries by highlighting CBU-scheduled missions on the ATO. BCD automation linkage is through the Standard Theater Army Command and Control System (STACCS), Contingency Theater Automated Planning System (CTAPS), and Automated Deep Operations Coordination System (ADOCS).

d. STACCS-CTAPS Interface (Figure III-2), STACCS cannot transfer directly to CTAPS. The ARFOR STACCS transfers target nominations to the BCD STACCS. The BCD Plans Section downloads the target nominations onto a diskette and gives the diskette to the Combat Plans Section in the AOC. The Combat Plans Section enters the target nominations to the rapid application of airpower (RAAP) portion of CTAPS. Consolidated nominations are submitted for integration into the joint integrated prioritized target list (JIPTL). The approved JIPTL is used to build the master air attack plan (MAAP) and the ATO. The ATO is passed to the BCD via CTAPS. The BCD then provides the ATO to the ARFOR.

(1) The BCD compiles results of the current ATO by correlating mission tasking with MISREPS received from the flying units. The BCD also informs the ARFOR commander of any reroled, targets of opportunity, or unexecuted missions employing CBUs.

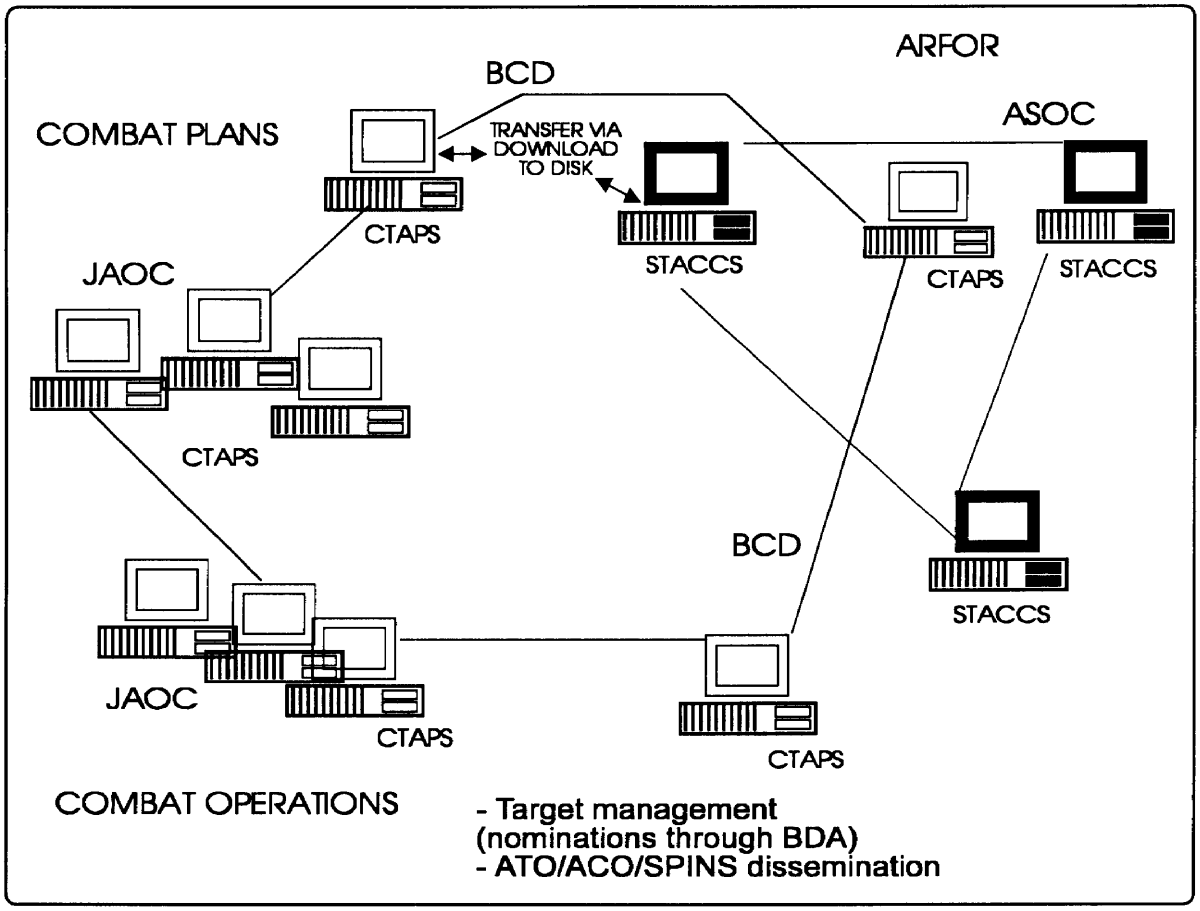


Figure III-2. STACCS-CTAPS Interface

(2) The air support operations center (ASOC) is another source of submunition information. The ASOC can access the JAOC database and provide submunition information (munitions' effectiveness assessments and air combat assessment summaries) directly to corps FSE.

6. Tracking

a. Obstacle tracking is the traditional responsibility of the engineer element. The engineer representative converts the UXO reports into obstacle overlays for dissemination to subordinate units. See Appendix A for UXO obstacle numbering system.

b. The Advanced Field Artillery Tactical Data System (AFATDS) link to Maneuver Control System (MCS) relays information concerning field artillery employment of submunition ordnance. The primary interface is at the division and corps main command post (CP).

(1) ATCCS. ATCCS is an integrated, ground mobile, and fixed deployable network of common hardware and software for echelons at corps and below. Its purpose is to assist commanders and their staffs to obtain a near real-time access to command critical information requirements (task organization, maneuver, engineer, nuclear, biological, and chemical (NBC), signal, army airspace command and control, fire support, air defense, intelligence and electronic warfare (IEW), CSS, resources, and enemy situation) through a force level database. The ATCCS architecture includes five constituent battlefield functions analysis systems. Two of those systems, MCS and AFATDS, are critical to reporting and tracking UXO.

(2) MCS. MCS is the primary automated decision support/information system supporting the tactical commander and staff. The MCS provides the functional applications necessary to access and manipulate the force level information (FLI) database to satisfy all stated CCIR for a specific operation, to effect timely control of current combat operations (deep, close, and rear), and to effectively develop and distribute plans and estimates.

(3) AFATDS. AFATDS provides automated decision support for the fire support function, including joint and combined fires. AFATDS provides a fully integrated fire support (FS) command, control, communications (C3) system, giving the FS coordinator automated support for the planning, coordinating, controlling, and executing of close support, counterfire, interdiction, and suppression of air defense systems. AFATDS performs all of the FS operational functions, including automated allocation and distribution of fires based on target value analysis.

c. Historical Records. Units forward UXO hazard records through operational channels to Army component (ARFOR) headquarters. The ARFOR engineer element maintains the hazard reports on file. These historical files are available for planning, use by subordinate units, and for dissemination to follow-on forces/units or for use by appropriate agencies during postconflict operations.

Section B. Marine Corps

7. General

Marine Corps units are task organized into Marine air-ground task forces (MAGTFs). MAGTF components are capable of delivering both air and artillery submunitions. The MAGTF commander (Marine expeditionary force (MEF) level), along with the force fires coordinator (FFC), is responsible for planning fires and reporting and tracking the use of submunitions as appropriate. Submunitions management and reporting are the responsibility of the force fires coordination center (FFCC). Tracking of potential UXO locations is the responsibility of the MAGTF engineer officer. Potential locations of UXO require tracking and integration into operations when developing the scheme of maneuver.

8. Planning

The FFC advises the MAGTF commander on employment of fires. This includes considerations for air and artillery delivered submunitions. Reporting use of submunitions is an administrative task and not intended to impede the responsive coordination of fires for the MAGTF commander.

a. Planning Factors. The following list provides abase line of planning requirements necessary to minimize the impact of UXOs on friendly operations. Primary responsibility for planning fires is the FFC. The FFC is the commander's link into fire support channels. Using the battlefield framework, the FFC considers the mission, commanders' intent (higher commander included), forces available, terrain, commander's risk tolerance, choice of available weapons, branches and sequels to the operation, and terrain management. The coordinating instructions of the OPORD contain the commander's guidance on the employment of submunitions. The coordinating instructions also contain guidance on reporting procedures, density levels, locations, and no fire areas. Information relating to the use of UXO producing ordnance is received and disseminated through a variety of means. The Marine Corps Fire Support System (MCFSS) link to the FFCC relays information concerning artillery employment of submunitions. This information is available to all MAGTF agencies concerned with tracking UXO; however, the actual delivery of the ordnance and the time and place of delivery requires confirmation. The direct air support center (DASC) receives initial reports upon delivery

of the ordnance. The DASC forwards information from these reports to the senior FSCC, MAGTF FFCC, and tactical air command center (TACC) for further dissemination.

b. Deep Operations. Employing submunitions may be ideal in deep operations. Preparing to conduct deep operations, the commander and FFC must consider future maneuver in the deep operations area.

c. Close Operations. The primary principle when employing submunitions is to retain freedom of maneuver. The use of submunitions in close operations requires careful coordination. When used on flanks, coordination informs adjacent units of the possible UXO.

d. Rear Operations. The use of submunitions in the rear area also requires careful consideration due to the potential for fratricide. Forces that may come into contact with UXO in the rear area are the logistical sustainment forces—the most vulnerable and the hardest assets to replace. The division main must immediately disseminate information concerning submunition ordnance employment within the rear area to all units.

9. Reporting

a. Artillery Reporting Format.

(1) MCFSS. Marine Corps artillery units and fires coordination agencies use MCFSS as a primary communications system. The Ammunition and Fire Unit Mission Fire Report (AFU;MFR) of the MCFSS informs all units of submunitions deployed in their AO. This message reports target information and ammunition expenditure after a mission execution. This report contains vital information such as target number, shells and fuses expended, and target locations. The MCFSS relays mission fire reports (MFRs) to the ground combat element (GCE) and to the senior fire direction center (FDC) as appropriate. The division FSCC determines impact on future operations.

(2) How to Report (Figure III-3). After mission execution, the artillery battalion FDC sends this report to the regimental FSCC and artillery regimental FDC. The artillery regiment FDC adds the MFR to the Message of Interest File for distribution to other agencies. Regimental FSCCS consolidate the MFRs periodically (based on operational tempo) and send the consolidated reports to the division FSCC for transfer to the historical file. The division engineer must maintain the consolidated MFRs and historical file of UXOs, minefield, and other obstacles. The division engineer then forwards consolidated reports to the MAGTF FFCC. There are a number of communication channels that are available to send this consolidated report to the division FSCC. These include courier, mobile subscriber equipment (MSE), and facsimile (FAX). The units' standing operating procedure will specify communication channel priority.

b. Offensive Air Support Reporting Format.

(1) Initial Report. Rotary- and fixed-wing aircraft that conduct CAS, deep air support (DAS), and terminal control provide the DASC with BDA. BDA reports provide results and munition expenditures after a target is attacked. The DASC then provides BDA reports to the appropriate FSCC. Units may obtain potential UXO hazard area information in their area of operation from these BDA reports.

(2) MISREP. The MISREP transmits results and amplifies an in-flight report. The MISREP message provides timely reports of mission results and other information obtained during postflight debriefing. The MISREP is used to retransmit or amplify an in-flight report and is submitted to the tasking agency, the requesting unit/agency, and to other interested organizations.

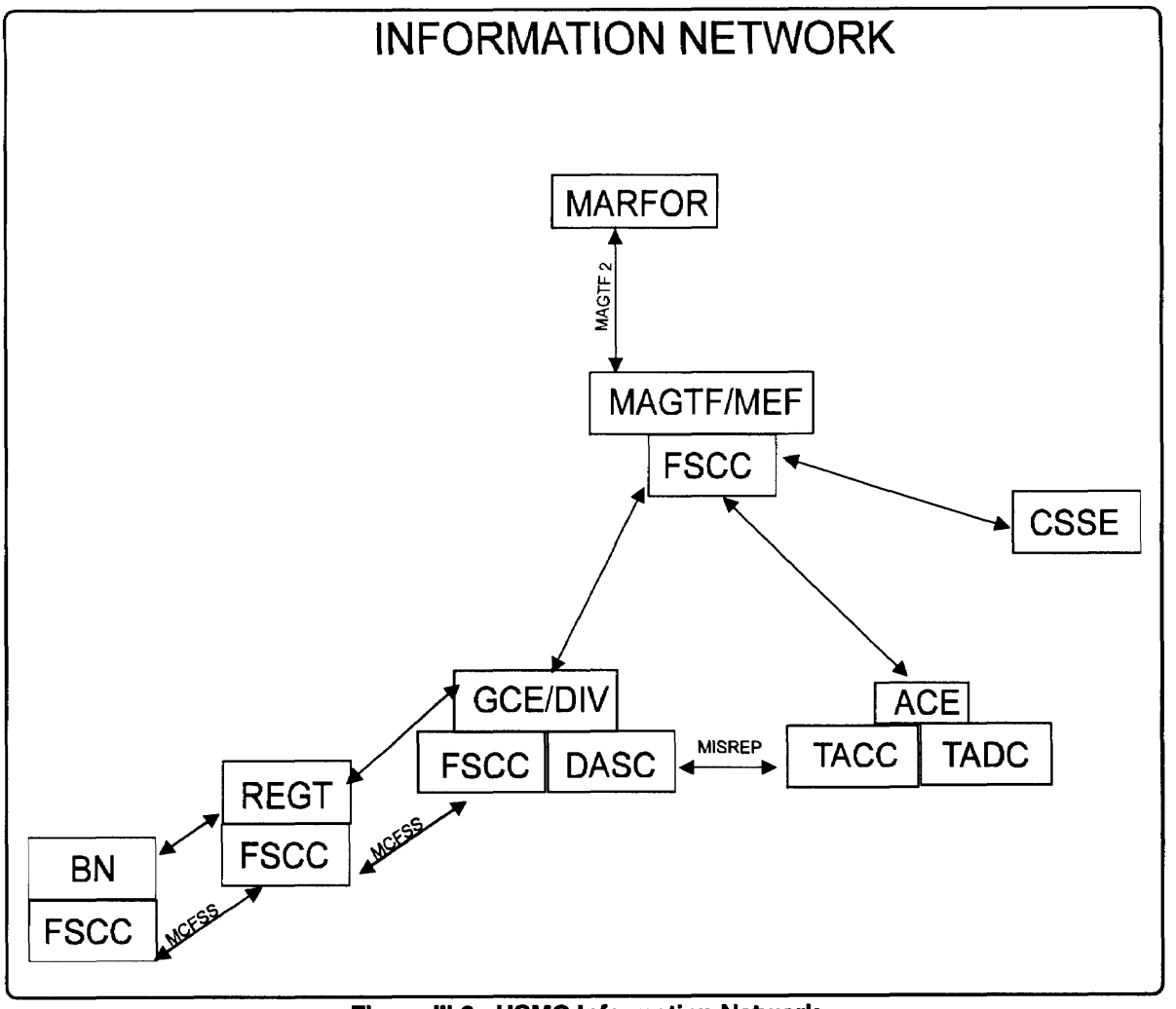


Figure III-3. USMC Information Network

10. Tracking

a. The Marine Corps employs the MCFSS to report and track artillery submunitions. The MCFSS provides automated connectivity between agencies. The MCFSS can perform automated allocation and distribution of fires based on target value analysis.

b, Potential Location of UXO, Plotting/ Numbering. See Appendix A, UXO Obstacle Numbering.

Section C. Navy

11. General

Navy forces deliver submunition ordnance by either carrier-based strike aircraft or TLAM-D. If a JFACC is designated and an ATO is in use, both Navy aircraft sorties and TLAM missions are depicted on the ATO. Each carrier air wing commander (CAG) is responsible for strike mission reporting. The Mission Distribution System (MDS) maintains and distributes, upon request, TLAM-D postmission reports. All postmission submunition ordnance delivery information is available to the JFC.

12. Planning

a. Air Strike Planning. Navy strike planning is conducted by air wing strike teams led by designated strike leaders from within the wing. Targets are selected by higher authorities and the best aircraft, weapons, and tactics are chosen to accomplish the assigned mission. If a JFACC

has been designated, the joint ATO delineates targets and normally specifies the weapon to accomplish the mission. Additionally, if the weapon load has been depicted on the ATO and the strike leader disagrees with the selection, changes are coordinated through liaison on the JFACC staff.

b. TLAM-DPlanning. The JFC through the JFACC, or through the Navy component commander if a JFACC has not been designated, determines targets appropriate for TLAM-D strike and provides that information to the TLAM strike coordinator. If a JFACC is designated, the type of TLAM used and its target appear on the ATO. If there is no JFACC, the Navy's INDIGO message contains the TLAM type and its target. TLAM can be used as a stand-alone weapon or with manned aircraft as part of a strike package. If used with strike aircraft, close coordination between the strike leader and the TLAM strike coordinator is essential.

c. Planning Coordination. Land components must identify concerns regarding submunition employment (by strike aircraft or TLAM-D) versus future operations to the appropriate planning commander (i.e., JFACC or naval component commander). Naval commanders conducting initial planning must consider the impacts of submunition employment regarding potential future use of airfields, ports, logistic sites, maneuver areas, etc.

13. Reporting

a. Air Strike Reporting. Aircrews provide postmission debriefs to the strike warfare commander via each carrier air intelligence center (CVIC) that files the Joint Interoperability of Tactical Command and Control Systems (JINTACCS) formatted MISREP. This report includes target information and munitions used. Additionally, crews report the estimated location of jettisoned submunition ordnance. When using submunitions, *REMARKS* in the *RESULT* field should include observed weapons effectiveness. CVIC will enter the submunition danger area into the Joint Maritime Command Information System (JMCIS). The JFC is responsible for the collection and dissemination of information regarding submunition employment in theater. Therefore, it is imperative that the JFC is an addressee on all MISREPs.

b. TLAM-D Reporting. Combatant commanders provide postmission reports through the MDS. These reports give impact points and dispersion patterns. MDS is currently a component of the Afloat Planning System and the Rapid Deployment Suite, whichever is available to the combatant commander, naval component commander, and carrier battle group (CVBG) commander. CVIC enters TLAM-D dispersion patterns into JMCIS from the MDS report.

14. Tracking

In addition to reports provided to the JFC, each CVIC enters and maintains Navy targets engaged/destroyed and subrnunition employment in the JMCIS historical database. Each CVBG provides historical information to the naval component commander upon request.

Section D. Air Force

15. General

The joint air operations center (JAOC), primary command and control for all joint air assets, has overall responsibility for planning the employment of munitions, to include CBUs. The intelligence section, within the Air Force AOC, tracks munition employment for BDA and munitions effectiveness assessment (MEA). The BDA and MEA tracking procedures are key mechanisms for reporting the success of the planned employment.

16. Planning

a. The JAOC selects targets from a joint list of targets normally called the JIPTL. The

master air attack plan (MAAP) phase of the ATO planning cycle is the mechanism sometimes used to assign weapons to targets and develop mission profiles/packages. The final phase of ATO production occurs with the assignment of weapons to the aircraft. However, some selections are simply "best available" and the individual wings determine the final choice based on their weapons availability. Mission profiles/ packages dissemination to the employing units is via the ATO. Units are responsible to develop specific mission plans to support the ATO. Units select weapons type if the ATO does not mandate a specific weapon. When the JAOC retargets or reroles aircraft based upon current situation requirements, units report CBU information through intelligence channels if so instructed. The JAOC normally annotates CBU exclusion areas using restricted operating zones (ROZ) or restricted fire areas (RFA). Planning factors to be considered before munitions/ weapons selection to minimize the impact of UXOs on operations include—

(1) Friendly troops transiting or occupying the area.

(2) Locations of proposed main supply routes (MSRs).

(3) Locations of proposed logistics bases, forward operating locations (FOLs), and forward arming and refueling points (FARPs).

(4) Future operational requirements for current enemy controlled airfields/ airstrips.

(5) Dismounted operations required in the area (medical evacuation or special operations force landing zones, etc.).

b. The Engineer function provides for damage assessment and recovery actions associated with UXO and the mitigation of UXO effects. The EOD function maintains a capability to eliminate or reduce the hazards of conventional, chemical, biological munitions, and improvised explosive devices that threaten personnel, operations, facilities, and materiel in support of theater operations. The engineer and EOD functions develop plans to support air base recovery actions and activities relating to the exploitation of forward areas such as FOLs and FARPs for Air Force forces (AFFOR). These activities include runway clearance and repair for aircraft use or the employment of techniques for air base denial.

17. Reporting

a. The pilot submits INFLTREP. The INFLTREP is the initial report on target location and ordnance effects. Upon landing, local intelligence representatives debrief aircrews and then file a MISREP. Wing intelligence forwards the MISREP to JAOC intelligence representatives, who extract the data and provide essential mission results to operations and plans using the air combat assessment summary. This report contains the location, type, and amount of ordnance dropped. The JAOC operations section updates the CTAPS database and submits the air combat assessment summary reports to the joint force headquarters J-3 via CTAPS. The JAOC provides information copies to the BCD (Figure III-4). The BCD then forwards this information to the ARFOR G-3 current operations division.

b. ALO, If the air liaison officer (ALO) in the corps or division main coordinates the strike, then the ALO reports the submunition information (time, location, target number, and number of weapons/CBUs dropped) to the FSE or FSCC.

c. Special Operations Liaison Element (SOLE). The SOLE at the JFACC's headquarters reports submunition employment information to the joint forces special operations component commander (JFSOCC) headquarters. This information is then disseminated to the SOF components.

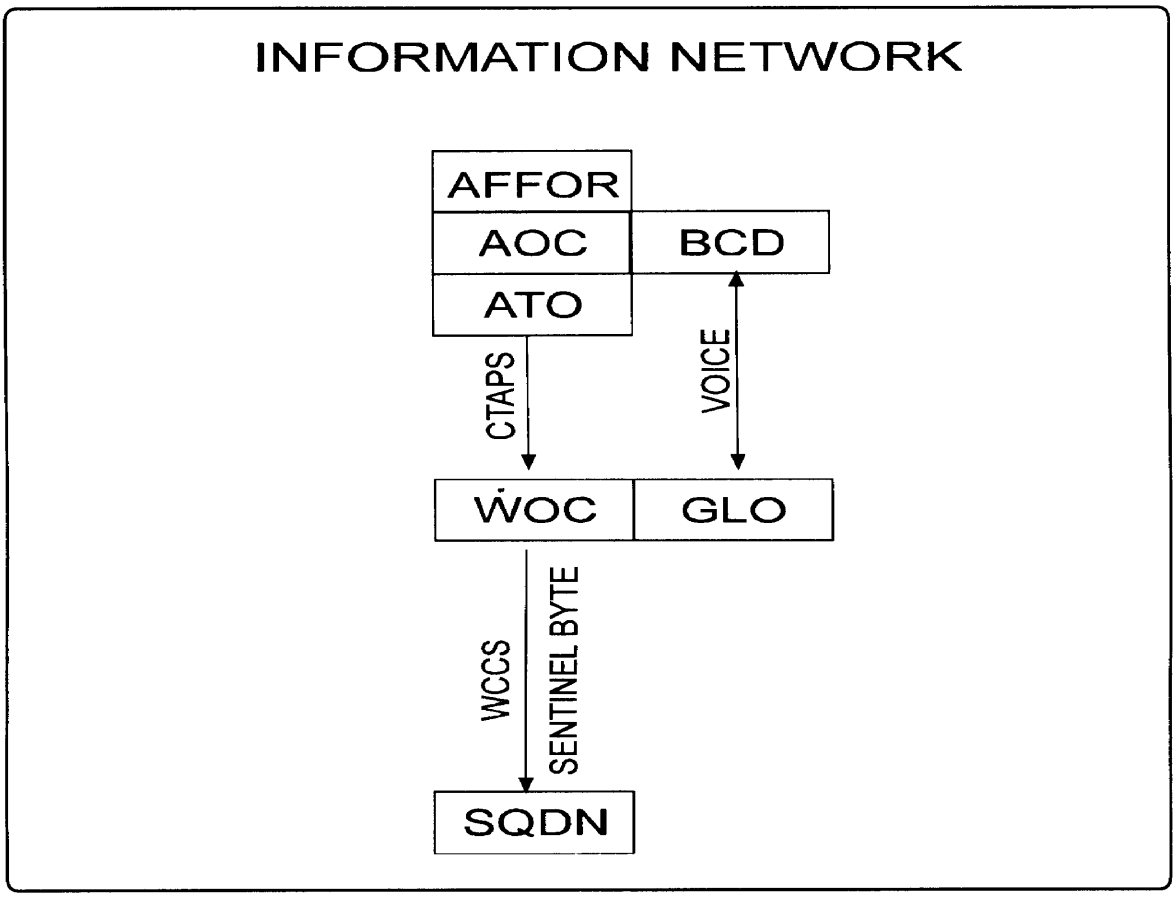


Figure III-4. USAF Information Network

d. Units, At the main operating bases, units report UXO to the survival recovery center (SRC). Away from the main operating bases (forward operating locations, FARPs, forward operating bases), units report using the standard 9-line spot report (Appendix B).

18. Tracking

Executed air mission tracking is by MISREPs. Intelligence accumulates MEA and BDA for combat assessment purposes. MISREPs originate at squadron level. Squadrons forward MISREP summaries to the wing operations centers (WOCs). WOCs consolidate reports and submit them to the JAOC. The JAOC updates the CTAPS database and furnishes reports to the J-3 and maintains copies for the historical file. The updated CTAPS database serves as the historical tracking system. JAOC operations section personnel use locally generated reports to sort and query the database. If it is not feasible to track CBUs due to too much data being generated, the JAOC may annotate areas where high concentrations of UXO may exist.

FM 100-38/MCRP 4-5.1/NWP TP 3-02.4.1
ACCPAM 10-752/PACAFPAM 10-752/USAFEPAM 10-752

COMBAT AIR FORCES AUTHORIZATION

The procedures in this publication are authorized for use throughout the Combat Air Forces as indicated below.

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Marine Corps: PCN 14400000500

EXECUTIVE SUMMARY

UXO
Multiservice Procedures for Operations in an Unexploded Ordnance Environment

Experience from Operation Desert Storm revealed that a battlefield strewn with unexploded ordnance (UXO) poses a twofold challenge for commanders at all levels: one, to reduce the potential for fratricide from UXO hazards and two, to minimize the impact that UXO may have on the conduct of combat operations. Commanders must consider risks to joint force personnel from all sources of UXO and integrate UXO into operational planning and execution. This tactics, techniques, and procedures (TTP) publication provides methodologies for planning, implementing, and executing procedures to protect forces from unexploded submunitions.

Submunition UXO Hazards

Chapter I defines the hazards and impacts on operations from air and surface delivered submunition ordnance. While the risk appears low to armored and mechanized forces, their personnel in dismounted operations and support elements face a much greater risk when exposed to UXO. Commanders must be aware of the hazards and make an assessment of the risk to their operations if transiting UXO hazard areas.

Joint Force Operations

Chapter II discusses the joint force procedures for reducing UXO casualties and fratricide potential. Staff responsibilities and procedures for joint force planning, reporting, tracking, and disseminating UXO hazard area information are identified. This chapter also includes recommended TTP for units transiting or operating within an UXO hazard area. Properly integrated, these procedures will save lives and reduce the impact of UXO on operations.

Service Operations and Procedures

Chapter III explains the individual service methodologies for planning, reporting, and tracking submunition ordnance. These methodologies include submunition ordnance employment and UXO found on the battlefield. Each of the service systems is discussed and procedures are established to integrate UXO tracking and reporting into planning and operations.

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