

FM 5-415

Fire-Fighting Operations

Headquarters,
Department of the Army

DISTRIBUTION RESTRICTION: Approved for public release; distribution is unlimited.

FM 5-415
9 FEBRUARY 1999

By Order of the Secretary of the Army:

Official:


JOEL B. HUDSON
*Administrative Assistant to the
Secretary of the Army*
05446

DENNIS J. REIMER
*General, United States Army
Chief of Staff*

DISTRIBUTION:

Active Army, Army National Guard, and U. S. Army Reserve: To be distributed in accordance with the initial distribution number 115732, requirements for FM 5-415.

FIRE-FIGHTING OPERATIONS

Table of Contents

	Page
Preface	x
Chapter 1: Fire-Fighting Basics	1-1
THREAT	1-1
TRAINING	1-1
SUPPORTING FORCE XXI	1-1
MISSION STATEMENT	1-2
Chapter 2: Organization, Responsibilities, and Equipment	2-1
ORGANIZATIONS	2-1
DEPARTMENT OF THE ARMY	2-1
ENGINEER BRANCH	2-1
MAJOR COMMAND	2-1
FIRE-PREVENTION/-PROTECTION PROGRAMS	2-2
FIRE-FIGHTING TEAMS	2-2
TEAM LA, FIRE-PROTECTION HQ	2-2
TEAM LB, FIRE TRUCK	2-2
TEAM LC, WATER TRUCK	2-3
FIRE-PROTECTION PERSONNEL	2-3
FIRE-FIGHTING DRILLS	2-3
PERSONAL PROTECTIVE EQUIPMENT (PPE)	2-4
FIRE-FIGHTING EQUIPMENT	2-4
FIRE TRUCKS	2-5
MODEL 2500L MILITARY-ADAPTED COMMERCIAL ITEM (MACI) FIRE TRUCK	2-5
MODEL A/S230-19 CRASH TRUCK	2-5
TACTICAL TANKER TRUCK	2-6
COMMERCIAL STRUCTURAL PUMPER TRUCK	2-6
MINI-PUMP TRUCK	2-6
COMMERCIAL TANKER	2-6
SKID-MOUNTED PUMPING UNIT	2-6
OTHER VEHICLES	2-6
MAINTENANCE	2-6

DISTRIBUTION RESTRICTION: Approved for public release; distribution is unlimited.

	Page
Chapter 3: Command and Control	3-1
FIRE-FIGHTING HQ TEAM (LA)	3-1
WARTIME FIRE-FIGHTING TASKS	3-1
DETERMINING MANNING REQUIREMENTS	3-1
ASSIGNING SHIFTS	3-1
INVENTORYING EQUIPMENT AND SUPPLIES	3-2
ACQUIRING THE COMMANDER'S PRIORITY LIST	3-2
MAKING A FIRE-FIGHTING PLAN	3-2
SELECTING DISPERSAL SITES	3-2
DETERMINING RADIO STATUS AND CALL SIGNS	3-2
LOCATING VEHICLE MAINTENANCE PERSONNEL AND ASSETS	3-2
INITIATING AN FCC	3-2
DEVELOPING MUTUAL-AID AGREEMENTS	3-2
LOCATING FIRE-FIGHTING ASSETS AND ESTABLISHING RESUPPLY CHANNELS	3-3
INITIATING THE REQUIRED TRAINING PROGRAM	3-3
CONDUCTING FIRE-PREVENTION INSPECTIONS OF FACILITIES	3-3
ENSURING THAT PROTECTIVE MEASURES ARE TAKEN TO PROTECT PERSONNEL AND EQUIPMENT	3-3
PREPARING A RESPONSE CHART	3-3
FIRE-FIGHTING TEAMS (LB AND LC)	3-3
Chapter 4: Wartime Operations	4-1
FIRE-PROTECTION WARTIME MISSION, LIMITING FACTORS, AND ASSUMPTIONS	4-1
FIRE-PROTECTION WARTIME MISSION	4-1
LIMITING FACTORS	4-1
ASSUMPTIONS	4-2
PREATTACK	4-3
FIRE-PROTECTION SYSTEM	4-4
PLANNING	4-4
TRAINING	4-6
CRITICAL ACTIONS	4-6
TRANSATTACK	4-7
POSTATTACK	4-8
TRANSITION TO BASE OPERABILITY (BO)	4-8
LOCATION OF A FIRE CHIEF	4-8
CONSIDERATIONS	4-9
Fire Spread	4-9
Damaged Facility Fires	4-10
Vehicle Operability	4-10
Explosive Ordnance Reconnaissance	4-10
Decontamination	4-10
Contamination Avoidance	4-11
FIRE-DEPARTMENT OPERATION PROCEDURES	4-11
REATTACK	4-12
VEHICLE AND MANPOWER CALCULATION	4-12

	Page
Chapter 5: Fire-Prevention Operations	5-1
Section I. Plans and Procedures	5-1
FIRE REGULATIONS	5-1
PREFIRE PLANS	5-2
AIRCRAFT	5-2
MISSILE AND SPACE VEHICLE	5-3
NATURAL-COVER FIRES	5-3
PREDISASTER	5-3
Section II. Water Supply	5-4
STORAGE	5-4
GROUND STORAGE	5-4
HIGH-LEVEL STORAGE	5-4
REQUIREMENTS	5-4
WATER	5-5
DISTRIBUTION SYSTEMS	5-5
Grid System	5-5
Nongrid System	5-5
FIRE HYDRANTS	5-6
LOCATION AND SPACING	5-6
FLOW TEST	5-6
Section III. Fire Prevention During Field-Training Exercises (FTXs)/Deployments ..	5-8
SMOKING	5-8
MATCHES	5-8
OPEN FIRES	5-9
FLARES AND SMOKE GRENADES	5-9
HEATERS	5-9
TENTS	5-10
VEHICLES	5-10
STORAGE AREAS	5-11
CAMOUFLAGE	5-11
DISTRIBUTION OF FIRE EXTINGUISHERS	5-12
Chapter 6: Water-Tanker Resupply Operations	6-1
MISSION	6-1
RESUPPLY OPERATIONS	6-1
TEMPORARY WATER SUPPLY	6-1
DRAFTING SITES	6-2
FIRE-FIGHTING OPERATIONS	6-2
Chapter 7: Aircraft Crash/Rescue Fire-Fighting Operations	7-1
AIRCRAFT CRASH OPERATIONS	7-1
AIRCRAFT EMERGENCY NOTIFICATION	7-1
NOTIFYING THE CONTROL TOWER	7-1
NOTIFYING OTHER PERSONNEL	7-1
STANDBY AND RESPONSE OPERATIONS	7-2
COMMUNICATIONS	7-2

	Page
AIRCRAFT-ACCIDENT EMERGENCY TEAMS	7-3
EMERGENCY RESPONSE	7-4
ON AN AIRFIELD	7-4
Fire-Fighting and Rescue Crews	7-4
Medical Personnel and Ambulance Crews	7-4
Fire Chief orSFO	7-5
Provost Marshal,MP, orGuard Personnel	7-5
Aviation Maintenance Officer	7-5
Photographic Personnel	7-5
Aviation Safety Officer	7-5
Chaplains	7-5
Public Affairs Officer	7-5
OFF AN AIRFIELD	7-6
GRID MAPS	7-6
SCHEDULED AEROMEDICAL EVACUATION	7-7
SEARCH AND RESCUE OPERATIONS	7-7
EMERGENCY EVACUATION OF THE INJURED	7-7
FARP OPERATIONS	7-7
HAZARDOUS MATERIALS	7-8
AIRCRAFT PREFIRE PLANS	7-8
TECHNIQUES AND PROCEDURES OF FIGHTING AIRCRAFT FIRES	7-9
AIRCRAFT FIRE-FIGHTING AND CRASH/RESCUE	7-9
AIRCRAFT ENGINES	7-9
AIRCRAFT SYSTEMS	7-9
FUEL	7-11
INSTALLED FIRE EXTINGUISHING	7-11
ELECTRICAL	7-11
HYDRAULIC	7-11
OXYGEN	7-12
ANTI-ICING	7-12
ORDNANCE AND AIRCRAFT	7-12
SPECIAL HAZARDS	7-13
FLAMMABLE MATERIALS IN AIRCRAFT	7-13
AVIATION GASOLINE	7-13
JET FUELS	7-14
Jet A Fuel	7-14
Jet B Fuel	7-14
HYPERGOLIC FUEL MIXTURES	7-14
FUEL CHARACTERISTICS	7-14
AIRCRAFT INCIDENTS	7-15
WHEEL, BRAKE, ANDTIRE FIRES	7-15
WHEELS-UP LANDINGS	7-15
WATER CRASHES	7-15
NOSE-DIVE CRASHES	7-15
BUILDING CRASHES	7-15
HILLSIDE CRASHES	7-15

	Page
HELICOPTER CRASHES	7-15
NO-FIRE CRASHES	7-16
RESPONSE PROCEDURES TO AN AIRCRAFT EMERGENCY	7-16
FIRE-TRUCK POSITIONS	7-16
INITIAL ATTACK	7-16
RESCUE ENTRANCES	7-16
Standard	7-17
Emergency	7-17
Cut-In	7-17
VICTIM RESCUES	7-18
EXTINGUISHMENT AND OVERHAUL	7-20
Chapter 8: Structural Fire-Fighting Operations	8-1
Section I. Fire Operations	8-1
STRUCTURAL OPERATIONS	8-1
EMERGENCY NOTIFICATION	8-2
STRATEGY AND TACTICS	8-2
ACCESSIBILITY TO A FIRE	8-3
FIRE-FIGHTING EQUIPMENT	8-3
BUILDING FEATURES	8-3
PROTECTIVE SYSTEMS	8-4
EXPOSURE HAZARDS	8-4
TIME OF EMERGENCY	8-4
HAZARDS FROM CONTENTS	8-4
STRUCTURAL FEATURES	8-4
EXTERIOR WALLS	8-4
ROOFS	8-6
Shingled Roofs	8-6
Composition Roofs	8-7
Metal Roofs	8-7
FLOORS	8-7
DOORS	8-8
DOOR LOCK AND FASTENER	8-8
FORCIBLE ENTRY	8-8
DOORS	8-8
Overhead Doors	8-8
Stopped-Frame Doors	8-9
Rabbeted-Frame Doors	8-9
Double Doors	8-9
Latched Doors	8-9
Single-Hinged Doors	8-9
Fire Doors	8-9
WINDOWS	8-9
Factory-Type Windows	8-9
Check-Rail Windows	8-10

	Page
Basement Windows	8-10
Casement Windows	8-10
CEILINGS	8-10
WALLS	8-10
FENCE LOCKS	8-10
SAFETY PRECAUTIONS	8-11
VENTILATION	8-11
TYPES	8-12
Horizontal	8-12
Vertical	8-13
Forced	8-14
Portable Machines	8-14
Fog Streams	8-14
COMMON ROOF TYPES AND OPENING TECHNIQUES	8-14
LOCATION	8-16
Section II. Rescue	8-16
PROCEDURES	8-16
SEARCH PATTERN	8-18
SEARCH AND RESCUE	8-18
ROOMS	8-18
COLLAPSED BUILDINGS	8-18
CAVE-INS	8-21
ELECTRICAL CONTACT	8-21
VEHICLES	8-21
Safety Considerations	8-21
Assessment	8-22
Stabilization and Access	8-22
VICTIM CARE AND REMOVAL	8-22
CARRIES	8-23
OTHER REMOVAL METHODS	8-25
Dragging	8-25
Using a Stretcher	8-25
Using a Ladder	8-25
Section III. Control and Extinguishment	8-26
LOCATING A FIRE	8-26
INTERIOR FIRES	8-26
EXTERIOR FIRES	8-26
CONFINING A FIRE	8-26
Section IV. Salvage and Overhaul	8-27
PROTECTION PROCEDURES	8-27
SALVAGE COVERS	8-28
TYPES	8-28
MAINTENANCE	8-28
THROWS AND SPREADS	8-28

	Page
OVERHAUL	8-31
STRUCTURAL CONDITIONS	8-31
HIDDEN FIRES	8-31
Section V. Investigation and Return to Service	8-31
INITIAL INVESTIGATION	8-31
ORIGIN OF A FIRE	8-33
WOOD	8-33
GLASS	8-33
METAL	8-34
CAUSE OF A FIRE	8-34
LOSS ESTIMATE	8-35
FINAL ACTION	8-35
RETURN TO QUARTERS	8-36
Chapter 9: Miscellaneous Facility-Based Fire-Fighting Operations	9-1
TACTICAL PETROLEUM TERMINAL	9-1
MISSION	9-1
SITE DESIGN	9-1
TRAINING	9-1
ADDITIONAL SUPPORT	9-2
FIRE-SUPPRESSION EQUIPMENT	9-2
LOGISTICS BASE	9-4
FIRE PROTECTION AND PREVENTION	9-4
HAZARDOUS MATERIALS	9-4
OTHER MISSIONS	9-4
INTERNMENT/DISLOCATED-CIVILIAN CAMP	9-4
GENERAL-SUPPORT HOSPITAL	9-5
Chapter 10: Fire-Fighting Operations Involving Explosives	10-1
RESPONSIBILITIES	10-1
COMMANDERS	10-1
FIRE DEPARTMENTS	10-1
SUPPORT AGENCIES	10-1
FIRE DIVISIONS	10-2
DIVISION 1	10-2
DIVISION 2	10-2
DIVISION 3	10-2
DIVISION 4	10-3
FIRE SYMBOLS	10-3
CHEMICALS	10-6
FIRE-FIGHTING PROCEDURES	10-8
AMMUNITION AND EXPLOSIVES	10-8
Divisions 1 and 2	10-8
Division 3	10-9
Division 4	10-9
CHEMICAL WEAPONS	10-9
Nerve Agents	10-9

	Page
Blister Agents	10-10
Blood Agents	10-10
Choking Agents	10-10
Riot-Control Agents.....	10-10
NUCLEAR WEAPONS	10-11
UNEXPLODED ORDNANCE	10-13
DROPPED MUNITIONS	10-13
PROJECTED MUNITIONS	10-13
THROWN AND PLACED MUNITIONS	10-13
UXO HAZARDS	10-13
UXO SPOT REPORT	10-13
Chapter 11: HAZMAT Incidents and Fire Procedures	11-1
Section I. HAZMAT Incidents	11-1
SCOPE	11-1
RESPONSIBILITIES	11-2
DEPLOYED MILITARY PERSONNEL	11-2
FIRE-FIGHTING TEAMS	11-2
INCIDENT COMMANDER	11-2
HAZMAT-INCIDENT RESPONSE PROCEDURES	11-2
SIZING UP AND ESTABLISHING COMMAND	11-3
CONTROLLING ACCESS TO THE SCENE, SECURING THE SCENE, AND ISOLATING THE HAZARD	11-4
IDENTIFYING THE HAZARD AND EVALUATING THE RISK	11-5
RESCUING AND EVACUATING PERSONNEL AND VICTIMS	11-5
STAGING THE RESOURCES	11-6
REEVALUATING THE SITUATION	11-7
FIRST RESPONDER	11-7
ENTRY CONTROL	11-7
DECONTAMINATION	11-7
SUPPORT	11-8
MEDICAL SUPPORT/EMERGENCY MEDICAL SUPPORT (EMS)	11-8
INCIDENT COMMAND	11-8
SAFETY PROCEDURES AND SITE SAFETY	11-8
TECHNICAL INFORMATION	11-9
PROTECTION OF PERSONNEL	11-9
OPERATIONS	11-10
EMERGENCY MEDICAL TREATMENT	11-10
PERSONAL PROTECTION EQUIPMENT	11-11
COMMUNICATING INSIDE ACID SUITS	11-11
REMOVING FACE PIECES BEFORE LEAVING AN AREA	11-11
WORKING WITH AN AIR SUPPLY	11-11
TOOLS AND EQUIPMENT	11-12
Section II. HAZMAT Fire Procedures	11-13
NUCLEAR FIRES	11-13
STORAGE FIRES	11-13

	Page
RAIL FIRES	11-14
TRANSPORT-VEHICLE FIRES	11-14
TACTICAL-VEHICLE FIRES	11-14
WEAPON-OPERATION FIRES	11-14
MISSILE FIRES (WITH OR WITHOUT WARHEADS)	11-15
INERT MISSILE	11-15
PARTIALLY COMPLETED MISSILE	11-15
COMPLETE MISSILE	11-16
Appendix A: Metric Conversion Chart	A-1
Appendix B: Aircraft Prefire Plans	B-1
FAMILIARIZATION	B-1
SPECIFICATIONS	B-1
AH-1 Huey Cobra	B-3
A-H 64 Longbow Apache	B-8
CH-47 Chinook	B-14
CH-54 Tahre-Skycrane	B-18
OH-6 Cayuse	B-21
OH-58 Kiowa	B-24
UH-1 Iroquois	B-27
UH-60 Blackhawk	B-31
FIXED-WING AIRCRAFT	B-34
C-5 Galaxy	B-34
C-12 Huron	B-47
C-17 Globemaster III	B-54
C-130 Hercules	B-81
C-141 Starlifter	B-90
OV-1 Mohawk	B-96
U-21 King Air	B-100
Appendix C: Ammunition Identification Chart	C-1
Glossary	Glossary-1
References	References-1
SOURCES USED	REFERENCES-1
JOINT AND MULTISERVICE PUBLICATIONS	REFERENCES-1
ARMY PUBLICATIONS	REFERENCES-1
OTHER MILITARY PUBLICATIONS	REFERENCES-1
NONMILITARY PUBLICATIONS	REFERENCES-2
DOCUMENTS NEEDED	REFERENCES-2
NONMILITARY PUBLICATIONS	REFERENCES-3
RELATED PUBLICATIONS	REFERENCES-4
NONMILITARY PUBLICATIONS	REFERENCES-4
Index	Index-1

Chapter 1

Fire-Fighting Basics

1-1. All levels of command are responsible for the Army's fire-protection plan. All commanders and supervisors must be responsible for the fire-safety policies and plans in their organizations. They must be aware of fire safety in all endeavors of life.

THREAT

1-2. Fire-fighting teams are not priority targets, but they may become targets of opportunity because of their location in relation to other mission-essential facilities. In low-level conflicts, fire-fighting teams become targets because of the response into the public domain. Fire-fighting units have no organic security assets. During fire-fighting operations, all crew members are engaged in the operations. Because of this, security must be provided for during response, retrieval, and fire-fighting operations.

TRAINING

1-3. Fire-fighting teams are manned by qualified military occupational specialty (MOS) 51Ms. The Basic Fire-Protection Apprentice Course (51M advanced individual training [AIT]) is currently conducted at Goodfellow Air Force Base (AFB), Texas (TX), and is 13 weeks long. Other advanced, specialized courses are taught there as well.

1-4. During garrison operations, engineer fire-fighting teams will be operationally assigned to an installation's fire department. This will allow the 51M firefighters to practice and train with an installation's firefighters to maintain skills, knowledge, and performance according to their mission-essential task list (METL).

SUPPORTING FORCE XXI

1-5. Fire-fighting teams will support Force XXI by providing fire protection to deployed forces throughout the world in areas of operation (AOs) where the current infrastructure has collapsed or is in such deterioration that it cannot support the United States' (US) interests. The number and types of fire-fighting teams needed to protect an AO will depend on its size and the type of facilities in that AO. Chapters 2 and 3 address the issue of fire-fighting teams. Consider the following guidelines when planning for fire-protection requirements:

- Aviation (unit support)—one LB team per air-traffic services company.
- Airfield (point support)—two LB teams per fixed airfield and heliport (UH-60, AH-64, CH-47).

- Supply (area support)—one LB team for each of the following: 5 square miles of AO, corps support group (CSG), division support area (DSA), area support group (ASG), corps storage area (CSA), and theater storage area (TSA).
- Ammunition (point support)—one LB team for each of the following: ammunition supply point (ASP), nuclear ammunition supply point (NASP), and chemical ammunition supply point (CASP).
- Petroleum, oils, and lubricants (POL) (point support)—two LB teams per petroleum supply company and two per petroleum pipeline/terminal operations company.
- Internment/dislocated civilian camp (point support)—one LB team per internment/dislocated civilian camp.
- Contingency operations—one LB team per 5 square miles of AO.
- Natural cover/brush—two LB teams per ASG.

NOTE: Each LB team requires one LC team for water supply.

MISSION STATEMENT

1-6. On the 24-hour concept and according to existing directives (the commander's priority list and mission requirements), engineer fire-fighting teams will provide fire-prevention/-protection, aircraft-crash/rescue, natural-cover-fire, and HAZMAT responses within a TO. The teams will—

- Conduct fire-prevention inspections and fire-fighting operations.
- Provide first-responder-level medical response and assistance to victims.
- Provide an initial response to HAZMAT incidents.
- Set up, operate, and maintain a 24-hour-a-day, fire-department communications network.
- Conduct POL fire-fighting operations.
- Conduct reconnaissance of the water-supply points.
- Provide water resupply to the fire-fighting teams.
- Maintain the emergency water-supply points.
- Provide additional manpower support to the fire-fighting teams.
- Provide command and control (C²) of non-fire-fighting assets used when supporting brush fire-fighting operations.
- Conduct crash/rescue operations, provide support for normal flight and maintenance operations, and support medical-evacuation (MEDEVAC) operations.