TM 3-34.30

Firefighting

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Firefighting

Contents

*This publication supersedes FM 5-415, dated 9 February 1999.

Tables

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Preface

TM 3-34.30 is the primary manual for engineer fire and emergency services (F&ES). This technical manual provides the linkage between engineer doctrine contained in FM 3-34. It specifically draws from the Army's keystone engineer manual FM 3-34 and should always be used with an understanding of its relationship to that manual. As the implementing manual for the engineer function of engineer F&ES, TM 3-34.30 describes how to apply and integrate engineer F&ES principles in support of unified land operations

TM 3-34.30 is designed primarily to assist Army leaders at all echelons in planning and coordinating engineer F&ES at the strategic, operational, and tactical levels. TM 3-34.30 establishes guidance for engineer F&ES and is to be used in conjunction with unit standard operating procedures. It outlines the basic guidelines to ensure the survivability of all firefighting resources during conflict. It also explains doctrine and tactical decisions to guide commanders and fire protection personnel at all levels in preserving mission resources.

Commanders, staffs, and subordinates ensure that their decisions and actions comply with applicable United States, International, and in some cases host-nation laws and regulations. Commanders at all levels ensure that their Soldiers operate in accordance with the law of war and the rules of engagement. (See FM 27-10.)

TM 3-34.30 uses joint terms where applicable. Selected joint and Army terms and definitions appear in both the glossary and the text. Terms for which TM 3-34.30 is the proponent (the authority) are marked with an asterisk (*) in the glossary. Definitions for which TM 3-34.30 is the proponent publication are boldfaced in the text. For other definitions shown in the text, the term is italicized and the number of the proponent publication follows the definition.

TM 3-34.30 applies to the Active Army, Army National Guard/Army National Guard of the United States, and United States Army Reserve unless otherwise stated.

The proponent for TM 3-34.30 is the United States Army Engineer School (USAES). The preparing agency is the Maneuver Support Center of Excellence (MSCoE) Capabilities Development and Integration Directorate (CDID); Concepts, Organizations, and Doctrine Development Division (CODDD); Doctrine Branch. Send comments and recommendations on DA Form 2028 *(Recommended Changes to Publications and Blank Forms)* to Commander, MSCoE, ATTN: ATZT-CDC, 14000 MSCoE Loop, Suite 270, Fort Leonard Wood, Missouri 65473-8929; by e-mail to <usarmy.leonardwood.mscoe.mbx.cdidcodddengdoc@mail.mil>; or submit an electronic DA Form 2028.

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

ACKNOWLEDGMENT

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Introduction

The engineer F&ES mission is preventing fires and minimizing losses of lives and property, alleviating the negative impact to the environment support humanitarian needs. Included both man-made and natural incidents; fire prevention and suppression; fire and rescue; mitigation or containment of releases of hazardous materials resulting from industrial accidents or other enemy action; emergency medical response support; and provides training for both the fire brigade and host nation firefighting personnel.

Fire protection personnel have extremely limited capabilities during any operations (especially throughout the transitional period until follow-on forces arrive). Initially, the resources common to stability operations will not be available. Commanders must prioritize assets accordingly to provide appropriate manpower needed for 24-hour continuous operations. This technical manual is not intended to answer every possible incident scenario. However, it provides a commander and firefighting teams the knowledge to make informed, timely, and confident decisions at an incident. If individuals need more specific technical guidance, they should acquire the technical orders, doctrinal publications, standard operating procedures, standard operating guidelines, National Fire Protection Association (NFPA®) publications, Army regulations, and other necessary publications.

Leaders at all levels must remain informed when engineer F&ES activities are performed with resources and capabilities below standard requirements, including reduced manning, vehicles and equipment, and agent levels. Employ risk management when tasking emergency response crews in order to minimize risk to firefighting personnel, vehicles, equipment, and support materials/elements, especially when limiting factors and shortfalls exist.

TM 3-34.30 recognizes the need for joint interdependence and the reality of actions frequently performed in a joint, interagency, and multinational environment. This technical manual describes the technical detail how to apply the principles of the engineer F&ES discipline.

Unless specifically stated in this publication, the terms firefighting, fire protection, and fire and emergency services are interchangeable terms for the purposes of this and related doctrine.

A listing of preferred metric units for general use is contained in Federal Standard 376B.

Chapter 1

Engineer Fire and Emergency Services

Engineer F&ES teams support a variety of missions on the modern battlefield and enhance force protection and infrastructure protection capabilities for the Army's mission. Engineer F&ES teams remain relatively small, specialized organizations. Each team has specific duties and responsibilities but is flexible enough to support the commander in limited peripheral duties. They normally provide direct support to the Army Service Component Command commander (or equivalent Joint Forces Command commander).

ENGINEER FIREFIGHTER MISSIONS

1-1. The mission of the engineer F&ES team is to provide fire prevention and protection, firefighting, technical rescue, urban search and rescue, and hazardous material response capabilities to prevent or minimize injury, loss of life, and damage to property and the environment throughout the range of military operations. Core missions include both man-made and natural incidents; on-scene incident management, fire prevention, suppression, and hazard mitigation; providing basic life support and emergency medical response; providing initial response to incidents where F&ES are the appropriate force for response and mitigation. Such instances include the specialized and technical rescue of entrapped, sick, and injured personnel from aircraft, buildings, equipment, machinery, ground vehicles, water, ice, confined spaces, collapsed structures, below-grade structures, enclosures, and high angles.

PROTECTION

1-2. Engineer F&ES teams provide engineer emergency and response services for deployed forces in offensive, defensive, stability, and defense support of civil authorities. The teams respond when domestic or host nation F&ES support resources cannot provide adequate protection; suffers degraded operational capabilities; becomes operationally overwhelmed due to the size, scope, and nature of an emergency incident; or are nonexistent. The teams protect internal and external (host nation and other U.S. services) Army assets. They maintain fire-protection equipment, advise the higher commanders of fire-defense plans, and evaluate and train host nation and auxiliary firefighters as required or requested. The engineer F&ES teams are designed to provide task-oriented support, depending on the tactical and logistical considerations involved.

1-3. Fire prevention and suppression encompass all efforts aimed at preventing or stopping fires. Fire prevention programs exist at all levels and all levels of command are responsible for the Army's fire protection plan. Commanders and supervisors are responsible for the fire safety policies and plans in their organizations. Army firefighting capabilities consist of general firefighting and tactical firefighting. The engineer F&ES team missions can be further broken down into the following categories:

- **General firefighting.** General firefighting skills are embedded into all Army safety programs (annual drivers' training, unit fire safety, unit fire prevention) and during the transportation of personnel, petroleum, munitions, and explosives.
- **Tactical firefighting.** Tactical firefighting requires more specialized capabilities and is typically provided by engineer, host nation, or other identified firefighting units. In addition to normal fire protection/suppression, tactical firefighting capabilities include administering first aid; providing initial response to hazardous material incidents; and rescuing entrapped, sick, and injured personnel from but not limited to aircraft, buildings, equipment, vehicles, water, confined spaces, and high angles.

SUPPORTING ACTIONS

1-4. Engineer F&ES teams support commands by providing engineer F&ES where the current infrastructure collapsed or deteriorated such that it cannot support the U.S. interest. Strategic planners determine the number and types of engineer F&ES teams needed to provide engineer F&ES to an operation based on the type of facilities; size, scope, and complexity of a particular emergency incident.

TRAINING

1-5. Qualified military occupational specialty (MOS) 12M personnel man Engineer F&ES teams. The Louis F. Garland Department of Defense (DOD) Fire Academy located at Goodfellow Air Force Base, Texas, conducts the 13 week long Basic Fire Protection Apprentice Course (12M Advanced Individual Training). The DOD fire academy also offers advanced leadership courses, senior leadership courses, and other specialized functional 12M training courses. Chapter 3 of this manual, along with AR 420-1, DODI 6055.06, DOD 6055.06-M, and DA Pamphlet 611-21 addresses the mandatory 12M certification to grade requirements needed to perform specific MOS duty positions.

1-6. When not deployed, engineer F&ES team firefighters conduct regular training maintaining skills, knowledge, and proficiency according to their mission-essential task list. See AR 420-1 for the required baseline proficiency training required.

1-7. Assign active duty engineer F&ES teams to the installation's fire department for training purposes. F&ES teams conduct organic training quarterly to ensure team cohesion when assigned to the installation's fire department. This practice ensures 12M firefighters receive continuous training on the tactics, techniques, and procedures relevant to engineer F&ES and that firefighters gain experience in engineer F&ES response.

1-8. While deployed, engineer F&ES teams maintain skill proficiency by regularly conducting training drills. Additionally, engineer F&ES teams conduct theater specific response training as well as joint training with other emergency response entities such as, but not limited to, military police, medics, F&ES agencies from other branches of service and/or coalition forces, and local emergency responders.

EQUIPMENT

1-9. Engineer F&ES tools and equipment are specifically designed for use in engineer F&ES. The current modified table of organization and equipment for engineer F&ES teams determines only the most basic tool sets, vehicles, and equipment that engineer F&ES teams require to accomplish their fire suppression mission, and accomplish proficiency training at the unit level. Engineer F&ES fire trucks provide the capability of needed firefighting agents and equipment for all mission types.

1-10. For missions beyond basic fire suppression (hazardous material, technical rescue, emergency medical response), engineer F&ES teams require specialized, personal protective equipment (PPE), tools, and equipment designed and intended for such missions. The senior fire official (SFO) in charge of the engineer F&ES team retains responsibility for developing a mission-essential equipment list based on their evaluation of the threats present in their area of operations. Commanders at all levels have responsibility for supporting the SFOs assessment and procuring additional mission required engineer F&ES equipment.

1-11. Commanders ensure the maintenance, security, and proper employment of all engineer F&ES vehicles, tools, and equipment for service longevity and asset availability. Maintain all engineer F&ES equipment at the highest state of readiness level due to mission requirements. Engineer F&ES equipment will not support routine business or utility work due to its readily available staging for an emergency. The only allowable exception requiring emergency vehicles and equipment sustains a critical role directly affecting the combat mission.

ENGINEER FIRE EMERGENCY SERVICES SAFETY AND HEALTH

1-12. The U.S. Army adopted the most current NFPA® codes and standards. At the revision of each NFPA® standard, the Assistant Chief of Staff, Installation Management and Installation Management

Command engineer F&ES staff reviews the standard and issues technical implementation guidance as necessary for the new standard. Section 272, Title 15 United States Code (15 USC 272) requires all federal agencies and departments to use technical standards developed or adopted by voluntary consensus bodies, such as the NFPA®. If DOD elects not to use these consensus standards, the DOD must give the Office of Management and Budget an explanation as to why it elected to use different standards.

1-13. To the maximum extent possible, NFPA® 1500 applies in deployed locations. When compliance is not possible, the command evaluates the tactical risk of deviating from NFPA® requirements. Do everything possible to protect firefighters, but mission comes first, which may require doing actions during war that would not be done when at peace.

SECURITY

1-14. Engineer F&ES teams are not structured to execute engineer F&ES tasks and provide for their security simultaneously. Engineer F&ES teams do not possess crew served weapons and should not be used in an offensive role. Engineer F&ES conducted in unsecured environments requires task organized security.

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Chapter 2

Engineer Fire and Emergency Services Missions

Engineer F&ES teams adapt to the requirements of the operational environment and execute missions. The teams protect internal and external (host nation and other U.S. services) Army assets.

FIRE AND EMERGENCY SERVICES MISSIONS

2-1. Personnel in these teams provide 24-hour-a-day engineer F&ES capabilities for deployed forces throughout the range of military operations. Use engineer F&ES teams when no host nation fire protection exists or the host nation cannot provide adequate protection. They maintain engineer F&ES equipment, advise higher commanders of engineer F&ES planning, and train auxiliary firefighters as required. Engineer F&ES teams enhance protection by providing for reduction of fire threat to personnel, equipment, aircraft, and facilities through a robust fire inspection, prevention, and suppression capability. The firefighting teams are AA and AB teams. Engineer F&ES teams provide task-oriented support, depending on the tactical and logistical considerations involved.

2-2. Engineer F&ES forces are a primary consequence management assets and must be responsible to the commander's requirement to provide force protection. To meet this requirement, engineer F&ES are task organized based on mission requirements. In order for engineer F&ES teams to effectively perform required missions, it is imperative that teams follow regulatory guidance that directs all standards for firefighter safety and health. Use the risk management process to mitigate risks, when deviating to execute missions. During all emergencies, engineer F&ES teams use the Incident Management System for initiating operational command and coordinating all the actions of the subsequent arriving engineer F&ES units involved in the incident response in enduring locations. Break down engineer F&ES missions into the following two major categories:

- **General firefighting.** General firefighting duties include—
  - Fire inspection and prevention services.
  - Training for auxiliary (fire brigades) and host nation fire protection.
  - Unit fire safety and prevention training.
- **Tactical firefighting.** Tactical firefighting duties include—
  - Structural firefighting and rescue.
  - Wildland firefighting.
  - Ground vehicle rescue and firefighting.
  - Rescue air mobility squad (RAMS).
  - Aircraft rescue firefighting (ARFF).
  - Hazardous material weapons of mass destruction incident response.
  - Emergency medical service (EMS).
  - Technical and specialized rescue.

FIRE INSPECTION AND PREVENTION SERVICES

2-3. The fire inspection and prevention services goal is to meet the same occupational safety and health criteria as in a garrison environment. However, this is not practical when operating at locations for short durations and using expedient construction methods. Once a location transitions into enduring location, fire chiefs recommend construction standards which adhere to established guidelines as outlined in DODIs, ARs, Unified Facilities Criteria (UFC), Engineering Technical Letters (ETLs), NFPA® codes, and other relevant engineering and prevention documents.

2-4. In deployed locations, it is important to understand a good fire inspection and prevention program, as the availability of firefighting resources are not adequate to handle some areas of responsibility. Effective fire inspection and prevention programs require establishing well-planned programs. Enforcing the guidelines in these programs both saves the effort and expenses of extinguishing fires and reduces the loss of life. Engineer F&ES teams must have command support and cooperation to implement and maintain these programs.

2-5. Engineer F&ES fire inspection personnel conduct a plan review on facilities as required and coordinate with the major Army command, area of operation (AO) fire chief, and engineer staff, as needed. An engineer F&ES team must inspect the facilities within their jurisdiction or AO and other assets occupied by U.S. forces ensuring the safety of personnel and equipment. The inspector inspects all buildings equipped with or without a fire protection system, ensuring proper operation and serviceability. Also conduct inspections of temporary housing areas (tent city) organic in nature, and any other categories of facilities where personnel or assets are housed. The engineer F&ES team establishes local provisions for general fire safety based on the commander's priority list and command input. All engineer F&ES personnel perform facility inspections and prefire plan updates at the direction of the SFO and under the supervision of fire inspection and prevention experienced personnel.

TRAINING OF AUXILIARY (FIRE BRIGADES) AND HOST NATION FIRE PROTECTION ASSETS

2-6. At expeditionary locations, it is likely there may be a lack of engineer F&ES forces. It is important in these circumstances that nonfirefighting personnel understand basic firefighting skills and have the capability to react to and extinguish small fires in their general area. A fire event beyond the incipient stage in the expeditionary initial stage environment can destroy all assets in its path. When available, engineer F&ES teams train deployed personnel in the basics of fire safety and how to properly use portable extinguishers for combating small, incipient stage fires on base camps as part of their in-brief training needed for their specific mission assignments. This training practice is not a substitute for a trained firefighting professional, but can fight small fires in their initial stages before they get out of hand.

2-7. Engineer F&ES personnel, whenever properly certified, conduct basic firefighting training for host nation firefighters when called upon. Engineer F&ES personnel can also present expedient firefighting training and fire extinguisher training to the base populace as required or requested. The SFO, along with the host nation liaison, tailors the proper training and support engineer F&ES personnel provide with the specific mission requirements. Lesson plans, training facilities, proper PPE, and other equipment must be identified and acquired as part of coordination efforts.

Note. Use table 6-1, page 6-2, as a general guide for auxiliary (fire brigade) firefighting teams.

STRUCTURAL FIREFIGHTING

2-8. The structural firefighting mission includes responding to all fire incidents involving structures or buildings tents, trailers, sea huts, warehouses, and hangers. Factors such as the total fire involvement and fuel load, life hazards, firefighting agent resources, security, and mission-essential priorities determine the type and degree of response. Structural firefighting includes the response and firefighting attack on the burning structure, dumpsters, trash containers, water supply, utilities control, entry, rescue, basic life support, exposure protection, ventilation, and salvage and overhaul of the structure. Structural firefighting and rescue skills are the firefighter's foundation. Operating in forward deployed locations require standardized procedures, unit cohesion, and an even higher safety consciousness. When special hazards exist, it may be necessary to perform firefighting in the joint firefighter integrated response ensemble.

WILDLAND FIREFIGHTING

2-9. Wildland fires include fires in weeds, grass, agricultural crops, brush, forests, and similar vegetation. Wildland fires have characteristics of their own that are not comparable to other forms of firefighting. Local topography, fuel type, water availability, and weather combine to present different challenges.

Properly trained, certified, and equipped engineer F&ES teams are capable of performing various wildland firefighting missions, both in the continental United States (CONUS) and outside the continental United States (OCONUS). In addition to basic wildland firefighting is the term wildland/urban interface. Wildland/urban interface is where the line, area, or zones where structures and other human development meet or intermingle with underdeveloped wildland or vegetation fuels. DOD has recently adopted specific certification levels required for DOD firefighters to perform this mission. AR 420-1 details specifics regarding training requirements to perform wildland firefighting.

GROUND VEHICLE RESCUE AND FIREFIGHTING

2-10. The ground vehicle rescue and firefighting mission includes all types of civilian and military vehicles in incidents or accidents (both inside and outside the wire) that involve Army and host nation support assets. Engineer F&ES RAMS teams are specially trained and equipped at handling these types of missions that take engineer F&ES teams outside the wire. New technology or agent combinations provide equivalent quantities of firefighting agent sufficient to perform ground vehicle rescue firefighting are authorized for use in firefighting missions according to DODI 6055.06.

2-11. A fire involving tactical vehicles outside the wire varies in origin. Depending on the seriousness and the location of a fire in relation to the weapon, the driver and courier either combat the fire immediately or evacuate the area before fighting the fire. The SFO ascertains whether a fire involves just the ordnance (rockets and missiles) or the ready-to-launch rockets or missiles on a launcher. The SFO aids the on-scene military commander as to what actions to take under emergency decisions, with the military commander having the overall jurisdiction and authority. If a fire involves the carrying vehicle or launcher, try to unload the vehicle and isolate the complete weapon from the fire. If you cannot unload the vehicle, position the vehicle or launcher so that the rocket impacts on a solid earth mass, which helps if the motor ignites.

RESCUE AIR MOBILITY SQUAD

2-12. The Rescue Air Mobility Squad (RAMS is made up of Army firefighters trained to respond to tactical vehicle incidents including improvised explosive devices), aircraft incidents, accidents, and emergencies. The firefighter's training qualifies their response and assisting the aeromedical evacuation squadron. Response to incidents involves the possibility of fighting the fire, extricating and packaging the victim, and transporting the victim by ground or air ambulance.

2-13. The intent of the RAMS is to provide the emergency extrication and special rescue of casualties from various types of incidents; facilitating patient access for the medical evacuation (MEDEVAC) to provide medical care; and the ability to transport casualties. RAMS members may assist the medics when required, but not perform procedures outside their scope of training.

2-14. The objective of the RAMS is to have a fully trained and equipped rescue team on-site and in a ready state to immediately react and respond to rescuing injured or trapped personnel "outside the wire" of the base camp. Responses may consist of fire suppression, vehicle extraction, recovery of remains, or adverse public reaction. These teams are normally outfitted with four engineer F&ES trained personnel and equipment embedded with either an aviation or a MEDEVAC unit.

AIRCRAFT RESCUE FIREFIGHTING

2-15. An engineer F&ES team provides ARFF support to Army, Air Force, Navy, Marine, allied, and civil aviation assets in support of military operations. The types of support include ARFF, search and rescue, emergency evacuation, forward arming refueling point (FARP), and basic life support.

2-16. ARFF includes aircraft incidents, accidents, MEDEVAC or RAMS, search and rescue, refuel/defuel, and maintenance stand-by both on and off an airfield, on or off bases/base camps. Airfield fire departments staff the ARFF apparatus to provide flight line protection 24 hours per day, even if the air traffic control tower is closed for aircraft control. They provide a coordinated program of emergency response/stand-by and rescue services for ARFF to announce and unannounce in-flight/ground emergencies, crashes, and mishaps including ordnance and spill containment and other related incidents.

HAZARDOUS MATERIALS AND EXPLOSIVE DETONATIONS

2-17. Engineer F&ES teams are capable of reacting to both hazardous material and the effects of explosive detonations occurring on a base camp. The degree of response and mitigation of the incident depends on available resources, equipment, training capabilities, required certification levels, and life safety hazards. The engineer F&ES team provides initial control and containment, investigation, decontamination, safeguard, and scene security of the hazardous material/explosive detonations incident within the limits of their training, personnel, and equipment.

2-18. The following items are guidelines for initial-response teams dealing with hazardous material incidents in a theater of operations (TO). Most of the guidelines also apply to installation firefighting detachment initial-response teams.

- Engineer F&ES teams do not correct hazardous material release sites. They do everything possible to mitigate or contain a release in the defensive mode. A clean-up specialist (probably contracted) will correct the situation.
- Since each hazardous material team is different, the SFO establishes a hazardous material team or teams to meet the threat of a hazardous material explosive detonations incident in their AO.
- Incidents that require an initial response are located in the rear areas.
- Incidents in a main battle area outside the wire will not require an immediate response; however, they must be corrected after a battle is over.
- A hazardous material and explosive detonations incidents may require initial-response actions, depending on the mission and the host nation's requirements.

EMERGENCY MEDICAL SERVICES

2-19. Engineer F&ES personnel provide EMS, prehospital care to the sick, injured, entrapped, or otherwise incapacitated personnel in urgent need of medical care. Engineer F&ES personnel provide EMS care at the first responder level at a minimum.

TECHNICAL AND SPECIALIZED RESCUE

2-20. Technical rescue is the application of special knowledge, skills, and equipment to safely resolve unique and/or complex rescue situations with advanced rescue knowledge. Technical rescue missions involve the rescue of entrapped, sick, and injured personnel from aircraft, buildings, equipment, machinery, ground vehicles, water, ice, confined spaces, collapsed structures, below-grade structures, enclosures, and at high angles in an all hazards approach. Technical rescue missions are conducted by personnel that are both certified and qualified to perform specific rescue tasks to the required levels according to mission requirements. The SFO determines the need for a specialized technical rescue team depending on the specific mission requirements.

2-21. Engineer F&ES teams provide a specialized tactical rescue capability in TOs via RAMS concept of operations. In the RAMS concept of operations, engineer F&ES personnel respond to off-installation accidents, incidents, or emergencies involving entrapped or injured personnel from aircraft, ground vehicles, or other coalition equipment.

2-22. The Robert T. Stafford Disaster Relief and Emergency Assistance Act (known as the Stafford Act) is the primary federal statute giving the President power to direct federal agencies to provide assistance to state and local authorities during an incident. The purpose of this assistance is to save lives, alleviate human suffering, protect public health and safety, and lessen or avert the threat of a catastrophe. In the past, engineers have provided civil support and most certainly will be called on in the future to do so again. It is imperative that engineers have the knowledge and trained capabilities to assist state and local governments in time of need. Technical rescue is a task combining DOD expertise and civilian forces. Legal thresholds and certifications are areas of concern, but there is no doubt that bringing engineers to the fight dramatically enhances capabilities and saves lives.

DEFENSE SUPPORT OF CIVIL AUTHORITIES

2-23. Defense support of civil authorities provides essential services, assets, or specialized resources to assist civil authorities dealing with all-hazard situations, both natural and man-made, that are beyond their capabilities within the United States and its territories. These activities often involve a variety of actions that directly provide governmental agencies and nongovernmental organizations with support to activities to alleviate hunger, disease, or other consequences from a man-made or natural disaster.

2-24. Defense support of civil authorities are only performed within the United States and its territories. They, along with offensive and defensive operations, are the three types of operations performed by Army forces in support of homeland security. There are very few new or unique general engineering missions performed in support of homeland security that are not performed during other operations. The difference is the context in which they are performed.

2-25. Although Title 10 forces are not initial responders, engineer F&ES teams can support local authorities in an emergency. In the absence of a federally declared disaster, installation commanders and responsible officials from DOD components and agencies are authorized by the Secretary of Defense to provide support to save lives, prevent human suffering, and mitigate great property damage. This includes mutual aid for fire protection and immediate response.

MUTUAL AID AGREEMENTS FOR FIRE PROTECTION

2-26. According to Title 42, USC, Chapter 15A, Subchapter 1, paragraph 1856a, each agency head charged with the duty of providing fire protection for any property of the United States may enter into agreements with local firefighting organizations to provide assistance in fighting fires. This includes personal services and equipment required for fire prevention, the protection of life and property from fire, firefighting, and emergency services, including basic medical support, basic and advanced life support, hazardous material containment and confinement, and special rescue events involving vehicular and water mishaps, and trench, building, and confined space extrications.

2-27. In an emergency situation, such as managing the consequences of a terrorist attack or a natural disaster, DOD may receive requests for assistance once local, state, and federal resources are overwhelmed. DOD has the capability to provide self-deploying, self-sustaining forces with a wide variety of skills and equipment, including engineer forces which can play a major role in support of—

- Rural and urban firefighting.
- Rescue entrapped, sick, and injured personnel from collapsed buildings, equipment, vehicles, water, ice, confined spaces, or high angles.
- Emergency medical care during all firefighting missions and activities.

Note. During response to Hurricane Katrina in New Orleans, engineer firefighting units from the Montana Army National Guard provided structural firefighting and personnel rescue services in areas of the Lower Ninth Ward impacted by storm surge flooding. At the time, the New Orleans Fire Department was under staffed due to personnel attrition and was additionally incapable of mobilizing equipment into the affected areas due to the flooding and damage to surface roads. The military fire trucks used by the fire protection teams were capable of entering the affected areas and operating at capacity without impediment.

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Chapter 3

Organization, Responsibilities, and Equipment

Engineer F&ES teams are currently organized into two types of teams: the engineer F&ES headquarters team and the engineer F&ES fire truck team. Assign or attach these teams to support units and base camps anywhere in the AO. Typically, engineer F&ES truck teams collocate with a supporting engineer F&ES headquarters team, but not always. Additionally, 12M personnel and equipment embed within the headquarters platoon of the ammunition ordnance company (table of organization and equipment 09408L000). Personnel in these teams provide engineer F&ES functionality for the Army Service Component Command in both CONUS and OCONUS TO to include stability and defense support of civil authorities.

ENGINEER FIRE AND EMERGENCY SERVICES HEADQUARTERS TEAM

3-1. On a 24-hour concept, the engineer F&ES headquarters team is normally assigned to the Army Service Component Command to provide command and control over one and up to five assigned subordinate engineer F&ES teams. The headquarters team must have the capability to conduct multiple activities simultaneously while providing the command and control functionality to direct the protection of property, preservation of life, conduct maintenance and logistical support to engineer F&ES teams, conduct fire prevention, and provide command and control for major emergencies. Attach or assign the team to a subordinate headquarters or task-organize with supporting units to provide direct support engineer F&ES capabilities. The headquarters team capabilities include—

- Developing plans for engineer F&ES on an installation or within an AO.
- Conducting fire prevention inspections and training.
- Conducting fire investigations.
- Supervising rescue and firefighting during aircraft crash incidents, structural fires, ground vehicle emergencies, wildland fires, emergency response during hazardous material incidents, RAMS, technical and specialized rescue, and EMS.
- Establishing, directing, and supervising a 24-hour-per-day fire alarm communications center (FACC).
- Commanding the engineer F&ES teams within an AO.
- Inspecting fixed fire protection systems on an installation in an AO.
- Coordinating for the resupply of engineer F&ES assets, fire suppression agents, self-contained breathing apparatus (SCBA), compressed breathing air, fuel, and the maintenance of firefighting vehicles, and technical equipment.
- Coordinating mutual aid and training support with other joint service and coalition fire protection entities, domestic, and host nation F&ES assets.
- Participating in homeland security missions related to engineer F&ES as required.

COMMANDER/FIRE MARSHAL

3-2. The commander/fire marshal performs as fire marshal. He advises the senior mission commander on engineer F&ES related issues. Other duties include—

- Assist the commander in developing his priority list as it pertains to engineer F&ES.
- Establish a fire protection program and a FACC for the AO with the assistance of the fire chief, fire inspector, and subordinate fire station chiefs.

- Conduct fire investigations with the assistance of the fire inspector and forwards the report to the commander.

3-3. The commander/fire marshal is required to attend the resident Fire Marshal's Course located at Louis F. Garland DOD Fire Academy, Goodfellow Air Force Base, Texas. He must also be trained to the National Incident Management System (NIMS) course levels IS-100.B, 200.B, 700.A, and 800.B which are prerequisites to the NIMS 300 and 400 resident course.

FIRE CHIEF

3-4. The fire chief is both the noncommissioned officer in charge and SFO for all engineer F&ES at the Army, corps, division, and brigade level for an AO. His duties consist of—

- Advising the fire marshal, fire inspector, mayor cell, forward engineer support team, and commander of force protection issues relating to engineer F&ES.
- Establishing and directing engineer F&ES planning and coordination.
- Working with the fire marshal in establishing and directing a FACC.
- Providing engineer F&ES management oversight.
- Establishing a fire prevention and inspection program to include training.
- Providing senior leadership advice on vital information for minimizing loss of life, property damage, life safety, and limiting damage from fire that would seriously degrade mission capability.

3-5. The fire chief is designated as incident commander during major engineer F&ES incidents and is the operations section chief or branch director (fire protection) when not employed as the incident commander in the NIMS hierarchy of incident command. He is required to be certified for the DOD IFSTA hazardous material incident commander, airport firefighter, fire inspector II, fire instructor II, and fire officer IV levels as skill level substitutions are not allowed. He must also be trained to the NIMS course levels IS-100.B, 200.B, 700.A, and 800.B which are prerequisites to the NIMS 300 and 400 resident course.

FIRE INSPECTOR

3-6. The headquarters team fire inspector provides fire inspection and prevention capability in support of activities in a base camp. The fire inspector provides expeditionary fire inspections and limited fire prevention functions including—hazard assessments, public fire safety education, and facilities plans reviews. Additional duties include maintaining the current status of the engineer F&ES team equipment and supplies for 24-hour continuous missions and resupply after the missions. Duties may also include coordinating for recharging and servicing of SCBA and firefighting agents for mission vehicles. The headquarters team manages the team capabilities to ensure the team's capacity is not diminished. The fire inspector also maintains a status board on both equipment and personnel issues located in the FACC. To perform the duty of a fire inspector, the inspector must be certified to the airport firefighter, fire instructor I, hazardous material, fire Inspector II, hazardous material incident commander, and fire officer II levels and must be trained to the NIMS course levels IS-100.B, 200.B, 700.A, and 800.B, which are prerequisites to the NIMS 300 and 400 resident course.

ENGINEER FIRE AND EMERGENCY SERVICES FIRE TRUCK TEAM

3-7. On a 24-hour concept, the engineer F&ES fire truck teams perform fire suppression, administer emergency medical care to victims, respond to hazardous material incidents, perform personnel rescue, and maintain a fire prevention program within the AO. This team is normally assigned to a supporting headquarters, but may be deployed separately without the presence of a headquarters in the AO. When not assigned to a headquarters, the engineer F&ES team is normally assigned to the Army Service Component Command and may be attached or assigned to a subordinate headquarters or task-organized with supporting units to provide direct support engineer F&ES capabilities. The engineer F&ES team identifies all bodies of water that may be used to combat a fire or resupply empty firefighting vehicles. It then develops a plan that identifies the locations and the equipment needed to use these water sources. The sources should be within

a camp's perimeter or within a 2-mile radius of a camp. Plot sources on an AO map located in the FACC. The engineer F&ES team—

- Provides ARFF.
- Conducts fire prevention inspections on base camps, airfields, or within an AO.
- Provides command and control of the MOS-immaterial firefighting personnel and associated assets used to support wildland firefighting (such as heavy equipment and operators).
- Executes fire suppression missions for structures, aircraft, wildland areas, and ground vehicles.
- Provides EMS assistance to victims.
- Provides an initial response capability to explosive detonations.
- Executes RAMS.
- Coordinates and conducts the training of auxiliary and host nation fire protection assets, to include tactical convoy emergency fire responder training.
- Executes technical and specialized rescue tasks.
- Provides a minimum of 2,500 gallons of water per trip with the heavy-expanded mobility tactical truck (HEMTT)-based water tender (HEWATT) to support the tactical firefighting truck (TFFT) in all engineer F&ES.

STATION CHIEF

3-8. The station chief staff sergeant performs as fire station chief. His duties include—

- Supervising the team in all engineer F&ES missions.
- Acting as SFO during initial response to an emergency.

3-9. In the absence of a supporting headquarters, he assumes responsibilities of fire chief. The station chief is certified as a DOD airport firefighter, fire instructor I, fire inspector II, fire officer II, and hazardous material incident commander. This training is conducted to the NIMS course levels IS-100.B, 200.B, 700.A, and 800.B, which are prerequisites to the NIMS 300 and 400 resident course.

LEAD FIREFIGHTER

3-10. The lead firefighter sergeant performs as a firefighting crew leader. He leads team personnel at the scene of an emergency and conducts and records team level training as directed by the fire station chief. He is required to be certified as a DOD airport firefighter, fire instructor I, fire officer I, and fire inspector I and must be trained to the NIMS course levels IS-100.B, 200.B, 700.A, and 800.B.

FIRE TRUCK DRIVER OPERATOR

3-11. The fire truck driver operator specialist performs as the driver operator of an engineer F&ES vehicle. He must be licensed to operate engineer F&ES vehicles assigned to the team. He is also required to be certified as a DOD driver operator-pumper, driver operator-mobile water supply, and driver operator-ARFF and must be trained to the NIMS course levels IS-100.B, 200.B, 700.A, and 800.B.

FIREFIGHTER

3-12. The firefighter private specialist performs engineer F&ES tasks under the direction of the lead firefighter and fire station chief. He is required to be certified as a DOD firefighter II, hazardous material awareness and operations level, airport firefighter, and emergency medical first responder. He must also be trained to the NIMS course levels IS-100.B, 200.B, 700.A, and 800.B.12M Personnel Embedded in Ordnance Units

3-13. Within the ammunition ordnance company (09408L000), there are eight authorized 12M firefighter positions for the purpose of providing direct support for fire suppression within the supported company’s ammunition storage areas as well as the AO in which the company occupies. These ordnance companies are authorized two each M-1142 TFFTs. All 12M Soldiers embedded with ordnance organizations are required to comply with the certification process identified in DA Pamphlet 611-21 and are also required to be provided and use all the PPE identified in chapter 5 of this publication. Firefighters in these

organizations must maintain MOS sustainment training at the individual and cumulative level and follow the 12M career progression path for noncommissioned officer education system distribution of 12M personnel in these organizations are as follows:

- Lead Firefighter Sergeant (12M20) 1 each
- Fire Truck Driver Operator Specialist (12M10) 2 each
- Firefighter Private Specialist (12M10) 5 each

Note. When deployed to forward areas, Engineer F&ES teams have limited staffing and equipment; therefore, they operate in a "minimum manning" mode at all times. Supported commanders must ensure they use all engineer F&ES assets (personnel and equipment) properly according to all Army and DOD regulations and directives. Should a commander elect to use engineer F&ES assets outside their prescribed criteria, the command's assumption of responsibility for the diminishment of available engineer F&ES capability should be documented in memorandum format and distributed via the chain of command. The SFO ensures that all command prescribed deviations from minimum fire protection standards are properly documented.

RESPONSIBILITIES AND SUPPORT

3-14. Higher headquarters establishes and executes comprehensive installation engineer F&ES programs. These programs execute DOD 6055.6-M, DODI 6055.06, and AR 420-1.

3-15. Higher headquarters provides replacement fire vehicles and parts as required. Replacement parts receive the highest force activity designator assigned to the mission being supported if the part renders a fire vehicle out of service or in a limited service status.

ENGINEER FIRE AND EMERGENCY SERVICES EQUIPMENT MAINTENANCE

3-16. Firefighting tools and equipment (such as fire trucks, water tankers/tenders, rescue tools, ladders, rope, and hose) have been specifically designed for use in engineer F&ES. The type of fire station, the primary mission of the engineer F&ES fire department, or any unusual requirements of an installation or surrounding community generally dictates the type of tools and equipment a fire station should have. Purchase, service test, inspect, and maintain all engineer F&ES vehicles and equipment according to the most up-to-date NFPA® guidelines for the respective piece of equipment.

3-17. Guidelines on inspections and maintenance are found in the appropriate technical manuals or operator's manuals. Maintenance inspections are performed daily and after each emergency action. Inspection, maintenance, calibrations, and certifications for testing of all engineer F&ES equipment, such as ladders, breathing air compressors, rescue equipment, fire pump flow testing, SCBAs, hazardous material equipment, and PPE must be conducted according to the current NFPA® guidelines. Record the status of all vehicles and equipment, including any deficiencies, on DA Form 2404 (*Equipment Inspection and Maintenance Worksheet*); DA Form 5379 (*Apparatus Maintenance Record*); DA Form 5984-E (*Operator's Permit Record*); and DA Form 5988-E (*Equipment Inspection Maintenance Worksheet*). Each truck's pump capacity must meet the standards set by the manufacturer.

ENGINEER FIRE AND EMERGENCY SERVICES FIRE TRUCKS

3-18. Engineer F&ES teams have two different types of fire trucks that provide the necessary capability needed to perform required mission functional tasks. When considering numbers of engineer F&ES fire trucks and teams, conduct an analysis of data in relation to the number of base personnel, type of mission aircraft, water supply, high hazard areas, and fire demand zones. Both types of engineer F&ES fire vehicles have the capability to provide mission support for unified land operational capability.

3-19. Firefighting organizations employ tactical vehicles that are specifically designed and manufactured for the purpose of providing engineer F&ES assets throughout unified land operations. The vehicles can be

modified with an up-armor upgrade kit with tank automotive command approval. However, the up-armor kit diminishes the basic capabilities of the apparatus, but not to a degree where the firefighting mission is jeopardized. Both the TFFT and the HEWATT are C-17 and C-5 transportable only.

M-1142 TACTICAL FIREFIGHTING TRUCK

3-20. The primary vehicle used by engineer F&ES teams for the purpose of firefighting is the M-1142 TFFT. The TFFT cab and crew quarters carries up to six (four optimal ordnance firefighting teams) firefighters in full SCBA gear. The TFFT is equipped with a 1,000-gallon water tank, 2,000 feet of hose, 1,000-gallons-per-minute pump, with roof (500 gallons per minute), bumper turrets (250 gallons per minute), and in-cab remote controls. The TFFT is a multipurpose truck used for every type of fire suppression mission. There are storage compartments for carrying everything needed onto the scene. The truck contains a hydraulic generator with a basic issue items list including rescue, EMS, salvage and overhaul, wildland, and other equipment used to perform engineer F&ES missions.

3-21. The TFFT is an 8 by 8 HEMTT based on the M-977 chassis capable of structural, aircraft, vehicle, and wildland firefighting. This truck carries rescue equipment needed for extrication actions and limited emergency medical care. The TFFT has the capability to pump-n-roll during ARFF actions. Besides the TFFT, the sets, kits, and outfits and basic issue items for the TFFT fire truck are the most critical tools for every engineer F&ES action.

HEMTT-BASED WATER TENDER (HEWATT M-1158)

3-22. The HEWATT's equipment includes a 2,500-gallon integrated water tank, 500 gallons per minute single-stage pump, 50-gallon foam cell, 250 gallons per minute front bumper mounted turret/monitor, Detroit Diesel© 8V92TA electronic engine, two-person seating, an 8 by 8 axle configuration, Oshkosh© two-speed transfer case, and light emitting diode lighting. This vehicle is an 8 by 8 HEMTT based on the M-985 chassis. Capabilities include supporting the TFFT in structural, aircraft, and wildland firefighting. Fill the HEWATT by gravity, drafting, or by pressure being fed by another apparatus or fire hydrant. The HEWATT can dump 1,000 gallons per minute of water from three sides of the truck by gravity dumps, with the capability of dumping at a higher rate by combination of the pumping and dumping method. The truck also carries a portable drop tank for rapid dump and resupply of multiple truck activities. The vehicle can seat two firefighters, including the driver operator. For further technical specifications see TM 9-2320-328-13&P-2 and TM 9-2320-328-13&P-3.

PERSONAL PROTECTIVE EQUIPMENT

3-23. DODI 6055.06, AR 420-1, NFPA 1500, and Title 29, Part 1910.132 Code of Federal Regulations (29 CFR 1910.132) require engineer F&ES teams to wear PPE for each type of mission they perform. Those missions include all types of fires, performing rescues, and delivering other emergency services that are inherently dangerous activities. PPE usually includes personal protective clothing, an SCBA, or other required respiratory protection and personal alert safety systems that meet NFPA® 1982 requirements. The combination of personal protective clothing and equipment forms the complete PPE ensemble. SCBAs wear, fit, maintenance, and testing will meet NFPA® 1404, NFPA® 1982, and 29 CFR 1910.134. More specific information regarding regulatory guidance can be found in NFPA® 1500. All firefighters deploying to a TO, (CONUS or OCONUS) must have the required PPE to perform their assigned duties safely and effectively.

BREATHING AIR COMPRESSOR AND CASCADE FILL SYSTEM

3-24. Engineer F&ES team missions require an uninterrupted purified breathing air supply to prevent and minimize loss of lives and damage to property in environments. The ability to supply breathable air in support of engineer F&ES actions is the foundation for all engineer F&ES actions. Engineer F&ES teams may not be collocated with an engineer F&ES headquarters team that normally provides breathing air SCBA fill support. All engineer F&ES fire truck teams must have organic capability to fill SCBAs in all AOs. The compressor and fill station will be able to provide purified high-pressure breathing air capable of

filling SCBA bottles, while also providing for rapid-fill for sustained engineer F&ES actions. Conduct compressor maintenance and testing according to NFPA® 1989.

Chapter 4

Planning Considerations

During wartime operations and in support of defense support to civil authorities, engineer F&ES teams are assigned or attached to a corps support group, an area support group of a theater Army area command, and must provide life safety protection to personnel, fire protection, and crash rescue for aircraft, facilities, materials, and equipment from fire and other disasters. Extensive facility, utility, runway, and taxiway damage may occur as well as danger to personnel life safety. Under these circumstances, a commander will face many critical emergency situations on and off the base camps. Engineer F&ES fire departments provide fire suppression, and other emergency response requirements. Commanders at all levels employ the resources to move and fight. To this end, fire protection resources protect the critical components needed for mission execution, such as facilities, equipment, aircraft, and personnel. This chapter provides general guidance for planning, training, and developing wartime and deployment operations policies, which must be adapted to threat, mission, and location by planners at all levels.

Note: Commanders at all levels must understand the engineer F&ES accomplish the mission with very limited resources and capabilities. Expect these limitations for a significant period and plan for sustaining activities for 72 to 96 hours initially. Fire protection forces have the primary mission to provide an engineer F&ES intervention force to protect critical components and personnel that support the major combat operation. Consider all constraints when tasking emergency response crews. Minimize risks to fire protection personnel, equipment, vehicles, and support materials/elements to sustain engineer F&ES continuity and capabilities. Commanders will not use engineer F&ES personnel for any ancillary nonengineer F&ES duties or taskings that directly impacts or degrades the engineer F&ES team's capability for mission requirements according to AR 420-1.

ENGINEER FIRE AND EMERGENCY SERVICES MANNING AND RESPONSE CRITERIA

4-1. The most crucial element in a successful fire suppression effort is highly-trained personnel and adequate firefighting equipment. Fire protection manning and equipment requirements are based on specific fire suppression requirements of assigned aircraft, base population, special hazards, required fire flow for all actions, and response times to meet the coverage area from fire stations. These fire suppression requirements, in turn, are predicated on such data as the number of aircraft on the ground, aircraft size and fuel loads, sorties to be flown, and so forth. Using this data in an AO with a series of correlation charts, the numbers and types of necessary vehicles are determined. Engineer F&ES teams will use TFFT and HEWATT fire trucks to support all other required engineer F&ES missions in their AO. Whenever there is no airfield support mission required, set up and man engineer F&ES teams with personnel to support all other mission requirements. Additionally, engineer F&ES teams will be set up and be capable of performing 24-hour-a-day activities according to published response and manning criteria in this chapter.

4-2. Engineer F&ES manning requirements are predicated upon a specific level of engineer F&ES resources (staffing, vehicles, equipment, and fire station locations). If any one of these critical resources is not available, mission objectives cannot be fully accomplished. It is important to understand that a fully staffed ARFF or structural firefighting vehicle accomplishes initial offensive aircraft fire ground actions upon arrival. Conversely, inadequately staffed ARFF vehicles cannot accomplish initial offensive aircraft

fire ground actions. The AO SFO and fire marshal must articulate shortfalls to their senior theater command leadership and explain how such shortfalls impact mission support capabilities. These impacts can result in loss of life, property, and equipment; reduce operational processes and/or mission continuity, or lead to potential damage to the environment. The impact of these shortfalls include—

- The life safety of Soldiers and civilians.
- The execution of offensive versus defensive fire ground actions.
- The inability to comply with Occupational Safety and Health Act (OSHA) 2 In/2 Out Policy (29 CFR 1910.134).
- Compromising the safety of firefighters on the fire ground.
- Reducing the potential air frame salvage value.
- The inability to conduct interior search and rescue.
- Increasing aircraft loss severity.
- Impairing on-scene resupply capabilities for a sustained fire attack.
- Degrading the incident command structure.

4-3. Table 4-1 provides the required minimum manning and response criteria for each type of engineer F&ES mission. Situate base camp fire stations to meet response time criteria as listed in table 4-1 whenever engineer F&ES teams are required to provide the level of service listed in table. The fire chief or SFO at each deployment location will have to allocate available firefighters to the unique vehicle package according to their specific mission requirements. The SFO of each installation should refer to information contained in the DODI 6055.06, AFPAM 32-2004, AR 420-1, and this technical manual when planning for engineer F&ES services. Whenever there is no ARFF requirement, base manning requirements on square footage and each additional mission requirement. For example, troop populations of 5,000 to 10,000 persons, or storage areas containing more than 100,000 square feet of storage space are each allocated at least two engineer F&ES truck teams per shift, along with one engineer F&ES headquarters team for a 24-hour day offensive firefighting and rescue actions with an additional engineer F&ES team allocated to perform RAMS missions outside the wire.

Table 4-1. Minimum level of engineer F&ES service objectives-actions

MISSION ELEMENT	*ART Minutes (1)*	*Rate (percent) of time (2)*	*Minimum Teams (3)*	*Minimum (3) Manning*
Structure Fire				
1st Arriving Team	7	90	1	4
Initial Full Alarm	12	90	2	13
ARFF Response				
Unannounced	3	90	1	4
Announced (5)	1	90	1	3
Hazardous Material Response				
Defensive (4) Actions	7	90	1	4
Offensive (4) Actions	22	90	3	15
Emergency Medical				
1st Arriving EMS	7	90	1	2
ALS Capability (5)	12	90	1	2
Technical Rescue				
1st Arriving	7	90	1	4
Full Alarm	22	90	3	13

Note. This table deviates from NFPA® standards based on historical risk profile of DOD installations.

1. Consists of dispatch time, turnout time, and the remainder travel time.
2. Response rate indicates the percentage of responses that are equal to or less than the ART.
3. Indicates the minimum number of companies and personnel required to safely and effectively perform initial actions for the respective program element. These minimum requirements do not provide sustainment capability and will not provide sufficient resources for major incidents.
4. Assumes pre-positioned units for an announced emergency; ARFF apparatus will be capable of responding to any incident on the runways within one minute.
5. If applicable.

Note. During actual emergency actions, the incident commander determines the deployment of available resources using ORM principles.

Legend:

ALS	advanced life support	EMS	emergency medical service
ARFF	aircraft rescue firefighting	NFPA®	National Fire Prevention Association
ART	average response time	ORM	operational risk management
DOD	Department of Defense		

AIRCRAFT RESCUE AND FIREFIGHTING MANNING AND VEHICLE REQUIREMENTS CRITERIA

4-4. Airfield engineer F&ES staff the ARFF apparatus to provide flight line protection 24 hours per day, even if the air traffic control tower is closed for flight activities. The engineer F&ES provides a coordinated program of emergency response/stand-by and rescue services for ARFF to announced and unannounced in-flight/ground emergencies, and crashes and mishaps, including ordnance and spill containment and other related incidents, if required. Engineer F&ES teams considers outside resources and coordinate their

program with local airports, municipal ARFF organizations, medical activities, and other federal agencies as required.

4-5. The number of ARFF vehicles required varies according to the type of aircraft assigned to the installation or the type of aircraft at the installation more than 50 percent of the time. This indicates the ideal core set of vehicles (see table 4-2) and engineer F&ES teams required for fire ground actions.

4-6. Whenever there are more than 40 or more aircraft movements (average) per day—

- An ARFF apparatus or equivalent (with assigned staffing) for rotary wing and small fixed-winged aircraft (less than 60 feet) is required. Minimum optimal manning for 24-hour-per-day activities is one engineer F&ES fire truck team on duty per shift.
- CH–47 and larger aircraft averaging six or more movements above the 40 movements per day (for example, 46 per day average at airfield) require an additional ARFF apparatus or four engineer F&ES teams for 24-hour-per-day activities (with assigned staffing) for two rotating shifts.
- Headquarters, Department of the Army (DA) may approve additional ARFF apparatuses to meet the requirements of AFPAM 32–2004.
- AR 385-10, Air Force TO 00–105E–9, and IFSTA contain suggested preaccident plans and give detailed information on ARFF techniques.

Table 4-2. Engineer F&ES core vehicles sets

Vehicle Type	*Vehicle Capacity and Capability*
M-1142 tactical firefighting truck	- 1,000 gallons per minute fire pump - 1,000 gallons of water - Roof turret - 500 gallons per minute capacity - Bumper turret - 250 gallons per minute capacity - 60-gallon Class “A” foam tank for structure and wildland fires - 60-gallon Class “B” foam tank for AFFF
M-1158-HEMTT based water tender (tanker) HEWATT (resupply)	- 500 gallons per minute power take off driven fire pump - 2,500 gallons of water - Bumper turret - 250 gallons per minute capacity - 50-gallon Class “A” foam tank for structure and wildland fires
T-11588 HMMWV (command and control incident command vehicle)	Carry extra tools, equipment, and incident command personnel
Legend.	
AFFF	aqueous film forming foams
HEMTT	heavy-expanded mobility tactical truck
HEWATT	HEMTT-based water tender
HMMWV	high-mobility multipurpose wheeled vehicle

4-7. Table 4-3 identifies the minimum fire suppression agents based on aircraft categories for NFPA® 403 minimum acceptable (normal day-to-day activities) sustainment operations fire protection capabilities. As the number of aircraft increases, the fire protection capability should also increase from severe risk/loss to greater risk/loss or NFPA® minimum acceptable levels of protection as outlined in table 4-3.

Table 4-3. Aircraft category matrix

NFPA® Aircraft Category	*Fixed Agent Required (DODI 6055.06) AFFF and Water Mixture*	*Number and Type of Vehicles to Deliver Required Agent*	*Manpower Number of UICs or AA, AB Teams (Number of Personnel) Total for 24-hour-per-day activities*
Category 10 (C-5A/B,B-2,VC-25)	12,626 gallons	6 TFFT (6,000 gallon) water 6 HEWATT (tankers) (15,000 gallons) 2 HMMWV (incident commander and support vehicles)	2 AA (headquarters) team (8) 12 AB (engineer F&ES) teams (84) Total (92)
Category 9 (E-4, MD-11, 747, 777, KC-10)	9,570 gallons	5 TFFT (5,000 gallon) water 5 HEWATT (tankers) (12,500 gallons) 2 HMMWV (incident commander and support vehicles)	2 AA (headquarters) team (8) 10 AB (engineer F&ES) teams (70) Total: (78)
Category 8 (B-1, B-52, C-17, C-141, E-3A, KC/EC-135, 767, C-727, AC-130)	7,780 gallons	4 TFFT (4,000 gallon) water 4 HEWATT (tankers) (10,000 gallons) 2 HMMWV (incident commander and support vehicles)	2 AA (headquarters) team (8) 8 AB (engineer F&ES) teams (56) Total: (64)
Category 7 (C-9, C-20, C-130, T-43, MH-53, 737, MD-80, MC-130, CH-47)	4,880 gallons	2 TFFT (2,000 gallon) water 2 HEWATT (tankers) (5,000 gallons) 2 HMMWV (incident commander and support vehicles)	1 AA (headquarters) team (4) 4 AB (engineer F&ES) teams (28) Total: (32)
Category 4 (A-10, F-15, F-16, F-22, FB-111, F-117, T-1, T-37,T-38, T-39, C-12, C-21,C-27, UH-1, UH-60, OH-58, OH-6, other rotary wing not listed above)	1,335 gallons	1 TFFT (1,000 gallon) water 1 HEWATT (tankers) (2,500 gallons) water 1 HMMWV (incident commander and support vehicles)	1 AA (headquarters) team (4) 2 AB (engineer F&ES) teams (14) Total: (18)

Legend:

AFFF	aqueous film-forming foam	HMMWV	high-mobility multipurpose wheeled vehicle
DODI	Department of Defense Instruction	NFPA®	National Fire Prevention Association
F&ES	fire and emergency services	TFFT	tactical firefighting truck
HEWATT	HEMTT-based water tender	UIC	unit identification code

4-8. Table 4-4, page 4-6, is a decision matrix showing the probability of success when less than the NFPA® minimum acceptable fire protection capability is provided and sustainment operation fire protection personnel are faced with a variety of emergency scenarios.

4-9. When fire suppression resources are not green (see table 4-4), the fire chief or SFO ensures fire ground actions are conducted in a manner to take full advantage of the limited capability on hand. Agent conservation maximizes the opportunity for rescue and containment. Commanders consider curtailing high-risk activities anytime firefighting capability is not green. For the rule of thumb for foam consumption for TFFT ARFF vehicle actions, see table 4-5, page 4-7.

Table 4-4. Risk decision matrix

Personnel Provided	***3***	***6***	***9***	***12***	***15***
TFFT Vehicles Provided	***1***	***2***	***3***	***4***	***5***
Firefighting Agent Provided	***1,000 Gallons***	***2,000 Gallons***	***3,000 Gallons***	***4,000 Gallons***	***5,000 Gallons***
Barrier Actions	R	R	Y	Y	G
Aircraft - Wheel/Brake/Engine Fires	G	G	G	G	G
Aircraft - Interior Electrical Fire	R	Y	G	G	G
Crash With Fuel Spill Fire - NFPA® Category 1 to 4 Aircraft	R	Y	G	G	G
Crash With Fuel Spill Fire - NFPA® Category 7 and 8 Aircraft	R	R	R	Y	Y
Crash With Fuel Spill Fire - NFPA® Category 9 and 10 Aircraft	R	R	R	R	R
Rescue - Fighters - NFPA® Category 1 to 4 Aircraft	Y	G	G	G	G
Rescue - Medium Frame - NFPA® Category 7 and 8 Aircraft	R	R	R	Y	Y
Rescue - Large Frame - NFPA® Category 9 and 10 Aircraft	R	R	R	Y	Y
Aircraft Standby	Y	Y	G	G	G

Note. For 24-hour-per-day activities, double the number of personnel listed in the above matrix.

Legend 1.

G (Green) = Reasonable expectation firefighting forces will be successful at interior/exterior aircraft fire suppression and rescue of aircrew.

Y (Yellow) = Interior/exterior aircraft rescue or fire suppression capability is severely limited. Firefighting forces can still be expected to fight and control exterior fires in such a manner as to maintain a rescue path for one minute. Aircrew must exit under their own power; attempted rescue of trapped personnel severely endangers rescuers.

R (Red) = Firefighting forces cannot be expected to be successful in interior aircraft fire suppression/rescue actions. Firefighting forces can perform only limited exterior fire suppression. Aircrew must exit under their own power; rescue of trapped personnel should not be expected.

Legend 2.

NFPA® National Fire Prevention Association
TFFT tactical firefighting truck

Table 4-5. Foam consumption for TFFT ARFF vehicle actions (rule of thumb)

TFFT. The TFFT has 1,000 gallons of water and 60 gallons of AFFF. If 30 gallons of AFFF (at 3 percent concentration) is used per tank of water (1,000 gallons of water) = two loads for 2,000 gallons of fixed foam/water agent.
HEWATT. The HEWATT has 2,500 gallons of water with each HEWATT carrying a minimum of 60 extra gallons of AFFF agent (one full TFFT load) for rapid resupply of TFFT (12/5 gallon buckets 3 percent AFFF foam).
To combat a Category 1 type aircraft fire from table 4-2, page 4-4, the required minimum agent is needed. Five TFFT loads of water (5,000 gallons) is needed, and would use 154.65 gallons of AFFF foam at 3 percent concentration to combat Category 1 type of aircraft.
TFFT rule of thumb: Thirty gallons of AFFF per tank of water (1,000 gallons).
Example: This would only allow for **2 loads of water** before the AFFF tank is empty.
Legend. AFFF aqueous film-forming foam HEWATT HEMTT-based water tender TFFT tactical firefighting truck

ENGINEER FIRE AND EMERGENCY SERVICES ESSENTIAL CRITICAL OPERATIONAL ELEMENTS

4-10. Fire protection consists of many interdependent elements contributing to the survivability and operability of the firefighting force. These elements include—

- Expedient splinter protection and physical protection. Base camp fire stations must provide adequate climate controlled storage areas for engineer F&ES firefighting vehicles.
- A sufficient number of trained, certified, and capable firefighters.
- Ancillary equipment, which includes proximity suits and structural gear, SCBA, a recharging apparatus for SCBA, chemical-warfare-defense equipment or joint firefighter integrated response ensemble suits, mobility gear, and weapons.
- The required amounts of Class A and B foam carried by an engineer F&ES team for the TFFT fire truck (one full load [60 gallons] for each mission vehicle).
- Each HEWATT support vehicle carrying an additional rapid resupply load of aqueous film-forming foam (AFFF) Class B foam (60 gallons).
- A FACC secure base radio stations and mobile and portable radio (handheld) units for communications with capabilities to adjust multiple frequencies/bands with sufficient projection to cover the AO.

Note. Ensure the FACC has at least two methods of dedicated communication devices to directly receive incoming emergencies from the control tower; usually named the "primary" and "secondary" crash telephone lines.

- Essential support regarding vehicle maintenance/spares, fuel, food service, and medical resupply, facilities, and utilities.
- Adequate Warrior training, MOS, and skills to grade training and skills, priorities, and tactics, techniques, and procedures.
- Adequate computer and data services for FACC, fire inspections, management, maintenance, MOS proficiency training, and access to NFPA® reference material.
- A National Fire Incident Reporting System at every base camp.

OPERATIONAL RISK MANAGEMENT

4-11. Determine risk by an assessment of the probability that a life safety, fire emergency, or other unforeseen emergency event will occur, and the expected severity of such an event. The probability factor relies heavily on historic emergency response data to predict future events. Since no expeditionary

operations historical data exists, make assumptions to estimate risk. Conduct risk assessments before any planning for and degradation of the level of required services provided decreases.

- **Probability.** Anecdotal information indicates that fire emergency events are more probable at expeditionary locations due to the intensity of aircraft activities and the potential for enemy actions (such as aircraft battle damage).
- **Severity.** The severity of fire emergency events is expected be more probable due to the combustibility of materials used in temporary construction and temporary wiring, making fires easier to start and quicker to spread.
- **Risk management.** Risk management primarily involves allocating resources according to the risk. Allocate resources according to the most probable time of day and day of the week that a fire emergency event occurs, using historic fire response data. This data is not available for expeditionary locations. Consequently, assume the risk is static and maintain the same level of capability continuously. For more information regarding risk management see AR 420-1.

ENGINEER FIRE AND EMERGENCY SERVICES FIRE STATION BASE CAMP PLANNING

4-12. Primarily base the concept of firefighting in hostile and deployed environments on the fact that fire protection has a viable and necessary home station and deployed operational firefighting role. The overall base response effort will be hindered if fire protection fails to adequately function in a scenario prior to, during, and after hostile, or warfighting environments.

- **Preincident fire protection.** Eliminate or reduce the threat to personnel, aircraft, and facilities before an incident.
- **Transincident fire protection.** Protect the installation and fire protection resources.
- **Postincident fire protection.** Provide suppression and rescue response to fire incidents that seriously jeopardize the installation's and air activities capability.

PREINCIDENT PERIOD

4-13. There are three time periods that engineer F&ES forces are employed in a hostile or deployed environment. These are the preincident period, transincident period, and the postincident period. The preincident period is a continuous and flexible period of time used to identify requirements and obtain resources needed to provide for either a defensive or offensive posture. The preincident period includes—

- **Planning.** Planning is the key element to the successful transition from one period to the next. Obtain a comprehensive understanding of expected potential threats through planning documents prepared by a variety of agencies at all levels of command. Plans developed before an incident are available at main operating bases and may aid at deployed operating bases. However, plans may not be available which address specific forward operating locations that may become operational. In this event, accomplish planning immediately upon arrival. Also include and consider constraints and assumptions when developing planning documents (worst case scenario).
- **Preplanning.** Preplanning serves as a baseline to develop execution documents. The fire chief or SFO coordinates with local plans divisions, flight activities, and commanders to develop an essential facility, operational process, and/or asset priority emergency response listing. Use this listing to predetermine the sequence of emergency response priorities that impact aircraft activities when multiple events occur.

4-14. Areas to consider include, but are not limited to—

- **Available water supplies.** Survey both on and off base water supplies for use during engineer F&ES actions. Include potential sources such as swimming pools, cooling towers, reservoirs, tankers, pumps, wells, storage bladders, supply points, and mobile water distribution systems.
- **Accessibile water supplies.** Construct expedient access routes or establish alternative routes to auxiliary water supply sources. Establish a supply of pumps, hoses, and equipment for rapidly replenishing water where hydrants are not available. Consider installing dry hydrants at lakes,

streams, and rivers to facilitate the drafting of water. Stage water supplies at specific locations on airfields, runways, billeting areas, and special high-hazard areas.

- **Apparatus dispersal.** Conduct a survey of the base terrain locating and potentially use of naturally protected areas for fire vehicles, agents, equipment, and personnel. Use topographical features such as ditches, hill sides, and trenches for maximum protection. Use natural features to provide effective concealment without expense. Identify dispersal sets of equipment (see the examples in AFH 32-2005).
- **Apparatus protection.** Identify dispersal locations where expedient construction could be used to provide protection for vehicles, reserve agents, and specialized equipment.
- **Base agency coordination.** Establish coordination with senior host nation fire officials for lateral support. Coordinate for petroleum, oils, and lubricants ensuring petroleum, oils, and lubricants L areas have drainage ditches and holding areas preventing spilled fuel from endangering other areas. Coordinate with vehicle maintenance for expedient and priority repair of fire vehicles. Coordinate with local communications officials establishing station and vehicle radio communication between key base agencies and air traffic management.
  - Exercise and refine procedures.
  - Identify and procure new or reserve equipment.
  - Train engineer F&ES personnel in the concepts of operation. Train firefighters to quickly adapt to hostile and stability operations is essential for survival.

Note. Additionally, deployed forces require fire prevention awareness training.

- **Tactics and strategies.** Train firefighters in the necessary tactics and strategies to use during engineer F&ES actions while in a biological, chemical, or conventional weapons postattack environment. This includes offensive and defensive firefighting, limitations of protective clothing, rehabilitation, decontamination processing, and incident response priorities.
- **Assigned aircraft.** Train firefighters on the assigned aircraft at the base or deployed location and must be familiar with egress systems and the ordnance carried on the aircraft.
- **Fire prevention awareness.** Since deployed forces may encamp in large groups, accomplish initial coordination with senior deployed unit officers and noncommissioned officers establishing relative degrees of fire prevention awareness. Establish firebreaks or lanes for the fire vehicle and/or hose line access. Establish waste disposal sites and isolated smoking locations established to control sources of ignition and readily available combustible materials. Apply a common sense approach.

4-15. Train base occupants on fire protection responsibilities and provide them with the necessary refresher training for protecting base resources. Occupants must know what to do in case of a fire, how to use available fire extinguishers, standpipes, and installed systems as well as what the risks are in such actions.

4-16. When situations dictate, consider the dispersing fully equipped (water, full fuel, and agents tanks) vehicles, equipment, agents, spare parts, and other critical equipment to protected areas. Agent dispersal should include both engineer F&ES fire department stock and backup agent supplies. Record dispersal and locate agents in the same protected areas as the vehicles.

4-17. Develop a means and procedures to use expedient construction including providing protection and concealment for agents that cannot move, fire/crash radio network base station, and the repeater units and fuel supplies.

4-18. Disperse engineer F&ES vehicles to conceal vehicles with natural cover when possible. Place no more than one vehicle in one location. Position at least one vehicle to observe runways and aircraft parking areas when possible and keep vehicles at least 300 feet (100 meters) away from high priority buildings, aircraft, and other potential targets.

TRANSINCIDENT PERIOD

4-19. The transincident period is the span of time begining with the first offensive action at the base and ends when the base reverts back to a recovery mode. During the transincident period, fire protection personnel and resources disperse to protected locations throughout the base so they can observe and report the airfield incident status. Protect all personnel with the appropriate equipment, according to the threat. These measures may have been inhibited during preincident actions if advance warning was available. However, firefighters must be prepared to cease activities instantly and don their protective equipment in case of an unusual incident. During a hostile event, survival takes priority over all other activities, including firefighting and rescue. Engineer F&ES forces would not normally respond to any incident except immediate area buddy care activities during a hostile incident, unless directed by higher command due to a critical mission impact. Fire protection personnel should not take cover inside or beneath a fire vehicle unless located in a protected dispersal location.

POSTINCIDENT PERIOD

4-20. The postincident period immediately follows an event on the base. Fire protection actions in the postincident environment are critical to base interoperability. They provide a smooth transition to recovery activities following an event. They address the transition to base operability in environments where communications are intact, interrupted, or totally destroyed. During the postincident period engineer F&ES forces reconstitute and validate several preplanned actions. These include—

- Protective measure impairments.
- Accountability and status of personnel.
- Availability of water and agent supplies.
- Support equipment operability.
- Personnel replenishment requirements.
- Vehicle serviceability.
- Functional communications.

4-21. Firefighters may face numerous fires, extensive damage, and injured personnel requiring emergency rescue and lifesaving care. Improvised explosive devices, unexploded ordnance, and roadway or pavement damage and facility debris may complicate deploying to firefighting and rescue emergency locations. Firefighting and rescue actions may have to be accomplished with a limited number of people, equipment, and materials. Attrition may decrease the availability of firefighters, fire vehicles, and agent levels. Commanders, in concert with fire chiefs, decide which fires to fight, which fires to let burn, which people to rescue, and which people to leave to buddy care. General considerations during an event or hostile act could be—

- Fire spread.
- Damaged facilities fires.
- Vehicle operability.
- Explosive ordnance disposal.
- Decontamination.
- Contamination avoidance.

CONSIDERATIONS

4-22. Firefighting actions in hostile environments are not performed as they are in peacetime scenarios. Firefighters may encounter several critical problems during these types of operations, including—

- The lack of adequate PPE to protect against terrorism/chemical warfare/biohazards, causing fire protection capability to be minimal to nonexistent under these forms of firefighting conditions. Existing protective garments are bulky, induce heat stress, and limit firefighter physical performance. When using protective garments, firefighters should not attempt firefighting and rescue unless a reasonable probability exists of successful lifesaving efforts or preserving mission-critical assets without injury or death to themselves.

- The lack of adequate water supplies may severely limit firefighting and rescue actions.
- Climatic conditions may vary from extreme cold to hot, seasonal dry to wet periods, and low to relatively high humidity possibly limit performance.
- Fire protection personnel, vehicles, and equipment are at risk until protective measures are established. Fire vehicles are not up-armored making them susceptible to major damage during explosive devices, munitions, and air and ground force attacks.

4-23. Response plans address firefighting vehicles and equipment ready availability for the initial phases of hostile and deployed operations. Shortfalls take time to correct. The priority should be on assets that directly affect capabilities. Because there may not be enough firefighters to respond to all emergencies, use other services' or host nation firefighting assets to the maximum extent possible. Military firefighters probably face more fires in combat situations than they will extinguish. An AO commander, with input from an available SFO, determines a priority of effort. Priority of effort first considers the safe and effective rescue of personnel, and then prioritize additional efforts based on mission. With the likelihood of these assumptions being real, firefighters expect the following:

- The effectiveness of fire protection personnel diminishes by physical and psychological stresses because of sustained emergency response actions and potential injury/attrition of engineer F&ES personnel.
- Fire protection resources preposition before a hostile assault or attack on an airfield, key facilities, and/or resources.
- Terrorist and potential enemy actions may include conventional and unconventional munitions and chemical, biological, radiological, and nuclear agents.
- Base water distribution systems may be damaged during offensive operations and may not be totally usable for firefighting purposes.
- Engineer F&ES team responses may be delayed by unexploded ordnance, craters/debris in roads, and explosive devices designed to injure people and damage equipment.

4-24. Engineer F&ES teams may not have the resources to attack and extinguish all structural building fires, respond to all rescue situations, and support all aircraft incidents simultaneously. Priority response to key facilities will be established within national plans.

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Chapter 5

Firefighter Safety and Health

This chapter describes and gives an overview of both the required actions taken before deployment, and firefighter safety and health guidelines. It outlines applicable standards and regulations applying firefighter safety and health. Also it describes the general safety guidelines for fire response and fire station safety.

SAFETY STANDARDS FOR ENGINEER FIRE AND EMERGENCY SERVICES PERSONNEL

5-1. A number of occupational safety standards exist that apply to engineer F&ES teams. Some standards are more prominent than are the standards and recommended practices published by the NFPA® and OSHA. The U.S. Army adopted the most current NFPA® codes and standards. As each NFPA® standard is revised, the Assistant Chief of Staff, Installation Management and Installation Management Command engineer F&ES staff reviews the standard and issues technical implementation guidance as necessary for the new standard. 15 USC 272 requires all federal agencies and engineer F&ES teams to use technical standards developed or adopted by voluntary consensus bodies, such as the NFPA®. If DOD elects not to use these consensus standards, the DOD must give the Office of Management and Budget an explanation why it uses different standards.

SAFETY AND HEALTH POLICIES

5-2. In many ways, almost every NFPA® standard relates back to firefighter safety and health. NFPA®1500 is the most comprehensive standard relating to firefighter safety and health. The NFPA®1500 gives specific guidance for firefighters relating to firefighter safety and health programs. NFPA®1500 gives the minimum standard that engineer F&ES teams must follow in relation to firefighter safety and health.

SAFETY IN TRAINING

5-3. The overall goal of the engineer F&ES training and education program is to prevent occupational deaths, injuries, and illnesses. Engineer F&ES teams conduct the required training evolutions according to AR 420-1, DODI 6055.06, and NFPA®1500 guidelines. Although firefighting is a dangerous job, it is important to follow established policies and procedures outlined in applicable standards. It is a critically important for training to be as realistic as possible because of the very nature of the profession. Conduct live firefighting exercises for each engineer F&ES action. Conduct training at training centers or in an abandoned building ready for demolishment acquired for that purpose. To ensure exercises are safe, conduct them according to NFPA® 1403. When conducting any training exercise, designate a safety officer to oversee all safety aspects, to include acting as the safety officer for all training evolutions.

EMERGENCY SCENE SAFETY

5-4. There are basic elements conducted on almost every emergency scene as a general rule. The SFO or fire chief of the first arriving firefighting unit begins control of the incident by assuming command and coordinating all the actions of arriving units by the use of an Incident Management System. After assuming command, the initial incident commander sizes up all the critical factors involved. Critical factors are the basic items that the incident commander must consider when evaluating tactical situations. Critical factors include, but are not limited to—

- Life safety hazards.

- Incident stabilization.
- Nature and extent of the emergency.
- Building, aircraft, vehicle, hazardous material product, or other incident type.
- Resources needed to mitigate the incident.
- Special hazards present.

5-5. The incident commander then considers the most severe factors and the risk management plan determining the incident's overall strategy. The strategy determines the location of the engineer F&ES forces and falls into either of two modes—offensive or defensive. Conduct offensive actions inside the hazard zone; defensive actions outside the hazard zone.

5-6. After determining the proper strategy, the incident commander develops the incident action plan and bases all activities around the completion of the tactical priorities within the chosen strategy. For example, in a structure fire the following are the tactical priorities in the proper order of their completion:

- Firefighter safety (life safety).
- Rescue (life safety).
- Fire control (incident stabilization).
- Loss control (property conservation).

5-7. Additionally, the strategic objectives below can be employed as benchmarks for the incident scene:

- Rescue.
- Exposures.
- Confinement.
- Extinguishment.
- Ventilation.
- Salvage.
- Overhaul.

PERSONNEL ACCOUNTABILITY ON FIRE GROUND

5-8. Engineer F&ES teams must use some system of accountability that identifies and tracks all personnel working in the hazard zone at all types of incidents. For example, in structural fires the hazard zone is anywhere within the collapse zone or anywhere that firefighters must have their SCBA operating to breathe. The accountability system must be used and established in standing operating procedures and all personnel trained in its use. Personnel accountability is vital in all aspects of the F&ES. Use and make available a personnel accountability report to the incident commander signifying which firefighters are working in the hazard zone for accountability purposes.

RAPID INTERVENTION CREW

5-9. Both NFPA®1500 and the OSHA regulations in 29 CFR 1910.134 state that whenever firefighters are in an atmosphere that is immediately dangerous to life or health, including the inside of burning buildings when the fire is beyond the incipient or early growth stage, they must work in teams of two or more. In addition, at least two fully trained and equipped firefighters must be standing by ready to respond. The outside team must be ready to enter the burning structure or immediately dangerous to life or health environment at a moment's notice to rescue the entry team.

5-10. On a typical fire ground or incident scene, rapid intervention crew members may perform other fire ground duties as long as they can abandon those assignments (without endangering other firefighters), when needed to locate and rescue lost, disoriented, trapped, or injured in a burning building or immediately dangerous to life or health environment.

MEDICAL AND PHYSICAL REQUIREMENTS

5-11. Engineer F&ES personnel are required to undergo a firefighter occupational health examination according to NFPA® 1582, NFPA® 1583, and a fit test for the firefighter's assigned SCBA annually at a

DOD approved medical facility. Permanently place a record of annual examinations in the Soldier's individual medical record file and maintain at the local unit. Guidelines for the occupational safety and health of firefighters are AR 420-1.

RISK MANAGEMENT

5-12. A risk management plan is an established set of criteria by which tactical firefighting decisions can be made based on an assessment of the benefits to be gained compared to the risks involved. Given these criteria, firefighters perform a risk/benefit analysis of possible tactical options in a given emergency situation. NFPA®1500 requires all Incident Management Systems include a risk management plan. An example of a risk management plan is as follows:

- Limit activities presenting a significant risk to the safety of firefighters to situations where there is a potential to save endangered lives.
- No risk to the safety of firefighters will be acceptable when there is no possibility to save lives. When applying these principles there are three key points to keep in mind:
  - Firefighting team integrity is vital to safety and must be emphasized.
  - No property is worth the life of a firefighter.
  - Firefighters should not be committed to interior offensive firefighting in abandoned, unstable, or derelict buildings known or reasonably believed to be unoccupied.
  - Firefighters should maintain situational awareness at all times. In the event of a Mayday call, personnel inform the incident commander of the following information: Who is involved, location if known, and the possible equipment needed to affect the rescue.
  - Incident commanders should use a risk matrix to develop a coherent strategy to mitigate a fire event. Consider all of these as well as other considerations before deploying firefighters and conducting interior offensive actions. Variables may include, but are not limited to—square footage of structure, life safety considerations, building construction, smoke color, and wind speed and direction.

5-13. When conducting engineer F&ES actions, many accidents happen while riding on a fire hippopotamus to and from the scene of emergency calls. Many other accidents, both in the fire station and while performing firefighting tasks, could be reduced or eliminated by following NFPA®1500 guidelines.

FIRE DEPARTMENT REHABILITATION

5-14. Engineer F&ES fire department rehabilitation is a vital firefighting service on the fire ground. This provides firefighters and other emergency personnel immediate medical attention including rehydration, treatment for smoke inhalation, and the prevention of such life threatening conditions as heatstroke and heart attack. Firefighter rehabilitation ensures the physical and mental well-being of members operating at the scene of an emergency (or a training exercise) do not deteriorate to the point where it affects the safety of other members. The SFO designates the rehabilitation location during the initial phase of the firefighting mission. Medics or EMS personnel should be on-scene and available to aid with needed firefighter rehabilitation.

5-15. The on-scene safety officer has the additional duty and responsibility of identifying, examining, and evaluating the physical and mental status of fire-rescue personnel working during the emergency incident or a training exercise. Following a proper survey, determine what additional treatment, if any, may be required. Anticipating rehabilitation needs early in the incident is the key to a successful rehabilitation activity. During large-scale actions, the incident commander should consider augmenting existing resources by requesting additional medical personnel or another engineer F&ES team to assist in the operation of the rehabilitation sector.

PERSONAL PROTECTIVE EQUIPMENT

5-16. Firefighter PPE ensembles are classified according to the nature of the emergency response mission requirement. Other factors in this selection process are matching PPE to work requirements and task-specific conditions, task duration, and heat stress. To meet NFPA® and OSHA requirements, provide each firefighter with at least one serviceable set of mission specific PPE for the hazards for which they will be exposed, and the mission they perform.

5-17. At a minimum, all firefighters are authorized one set of structural bunker gear with SCBA with a personal alert safety system device, along with one set of aluminized ARFF proximity gear. Additionally, provide firefighters additional PPE for technical rescue, hazardous material, wildland, and RAMS-type missions when applicable.

Note 1. Never use structural or proximity gear as a replacement for the proper hazardous material protective gear. Many chemicals can be lethal if absorbed or inhaled in very small quantities. If you cannot positively identify a hazardous material, do not compromise your crew's safety with inadequate protective clothing.

Note 2. All personal protective clothing must meet the current NFPA® and OSHA standards for that particular PPE item.

RESPIRATORY PROTECTION PROGRAM

5-18. In activities requiring firefighter respiratory protection, establish a program for the selection, use, inspection, training, fit testing, and maintenance that complies with AR 11-34, 29 CFR 1910.134, and NFPA®1404. Document this in the written respiratory protection program. Test both the SCBA and the breathing air compressor according to applicable NFPA® and American Society for Testing of Materials guidelines.

OUTSIDE THE WIRE PERSONAL PROTECTIVE EQUIPMENT

5-19. Use the RAMS team protective ensembles for fire protection personnel when—

- Firefighters are assigned to a RAMS team.
- Firefighters assigned to a RAMS team respond to tactical emergencies outside the perimeter of the bases of operations while in TOs.
- Firefighters are engaged in RAMS training exercises.

CORRECTIVE GLASSES OR GOGGLES

5-20. Corrective glasses or goggles that interfere with the sealing edge of a respirators face piece are prohibited. Optical inserts (including mounts) exist for use inside a respirators face piece and are required according to DA Pamphlet 40-8 and DA Pamphlet 40-173. Spectacle kits must be the type approved by National Institute for Occupational Safety and Health (NIOSH) and NFPA® for use with that particular manufacturer's face piece. More than one set of optical inserts may be necessary if, for example, optical inserts are returned with the mask for cleaning and sanitizing.

CONTACT LENSES

This TM does not prohibit using contact lenses with respiratory protection. See the United States Army Center for Health Promotion and Preventive Medicine Fact Sheet 63-006-1206 for information regarding the unique environment the respirator presents to the eye and the potential for irritation or injury, see—
https://safety.army.mil/Portals/0/Documents/ON-DUTY/WORKPLACE/PERSONALPROTECTIVEEQUIPMENT/Standard/Chemicals_Contact_Lenses_Respirators_USACHPPM.pdf

FIREFIGHTER DUTY UNIFORMS

5-21. Fire protection personnel are required to wear duty uniforms providing a specific level of personal protection beyond that of standard military issue uniforms. NFPA®1975 outlines in great detail the composition of duty uniforms for fire protection personnel. Headquarters, DA and the DOD adopted NFPA® guidelines for fire protection actions, compliance with NFPA® standards is mandatory. Fire protection personnel must be easily identified as valid, certified emergency responders at all times to ensure unhindered urgent response to an emergency or access to a facility involved in an emergency. Wearing duty uniforms is necessary during all training and operational scenarios to ensure personnel safety according to the critical risk management process.

- **Army Aviation Combat Uniform.** The Army Aviation Combat Uniform provides personnel protection, similar to that of the one-piece flight uniform and suits the same purpose. This item is becoming more available and taking the place of the Flight uniform.
- **Army Fire Resistant Environmental Ensemble.** The Army fire resistant environmental ensemble is a cold- and wet-weather clothing system developed for our aviators and armored-vehicle crewmen who have a very high requirement for flame-resistant uniforms. In addition to providing all-weather capability in terms of keeping our Soldiers warm and comfortable and able to operate in any environment, it has very high levels of flame protection.
- **Army Fire Resistant Uniform**. The Army fire resistant uniform provides personal protection similar to that of the one-piece flight uniform and suits the same purpose. However, availability of this garment in the supply system, especially to the United States Army Reserve and Army National Guard components, often precludes its use.
- **Safety-toe boots.** Boots providing impact resistance in the toe area are a requirement under NFPA® guidelines for all fire protection personnel. There are resources in the logistics system to procure steel toe uniform boots that comply with AR 670-1. Local commands may wish to evaluate the need to use composite safety-toe boots in lieu of steel-toe boots, as the composite material reduces the risk of electrical conduction for the wearer's safety. Additionally, local commands may authorize zippers inserted in duty uniform boots for ease and speed of removal when donning PPE in response to an emergency.
- **Natural fiber undershirts and under garments.** NFPA®1975 requires the wear of natural fiber, nonsynthetic undergarments for fire protection personnel. The standard issue (tan tee shirt) and most moisture-wicking variants are a 50 percent or more polyester blend with an increased risk of melting to the wearer's skin and causing injury when exposed to high temperatures encountered in fire protection actions. The sage green 100 percent moisture managed cotton, United States Marine Corps certified Soffe Dri Cotton® (Soffe 10G38-000579-65-10) is currently in wide use for Army personnel (aviators, maintenance personnel, fuel handlers, and food service personnel) who, by nature of their duties, risk exposure to flash fires or open flames, and is available through logistics procurement channels.

5-22. The NFPA®1975 requirements extend to all uniform ensembles the individual firefighter may wear during the course of the duty day. A distinctive physical fitness uniform worn by on-duty firefighters when engaged in on-duty physical fitness activities may be locally authorized. Specific design will be per local policy. However, it is highly recommended the design mirror as close as possible the standard issue Army physical fitness uniform. Additionally, athletic footwear with safety-toe characteristics for wear during physical fitness is commercially available for purchase or issue, but not required.

5-23. Engineer F&ES personnel performing official duties, must be easily identifiable with either credentials detailing position and certification level, or by wearing an approved engineer F&ES fire department badge or brassard. Engineer F&ES personnel work and perform duties in an official capacity according to qualifications and certification levels. Examples of duties performed include but are not limited to—fire chief, team chief, fire inspector, and firefighter while also performing technical rescue missions as part of a consequence management response force.

CARE OF EQUIPMENT AND PERSONAL PROTECTIVE EQUIPMENT

5-24. Firefighter PPE and other equipment associated with engineer F&ES activities will be used, inspected, tested, maintained, repaired, and calibrated according to the appropriate technical manuals, field manuals, and manufacturer's instructions. Users of this equipment will be instructed in the proper use, inspection, testing, maintenance, repair, and calibration requirements. Each command should establish an area where protective clothing will be laundered, inspected, tested, and issued.

HANDLING OF PERSONAL PROTECTIVE EQUIPMENT AND LAUNDERING REQUIREMENTS

5-25. Launder PPE according to manufacturer recommendations. Decontaminate and monitor protective clothing and equipment exposed to toxic materials. Two options are permissible for exposed PPE being sent to the laundry. The options are either—

- If decontaminating and monitoring to the short-term exposure limit concentration is used for clearing PPE for the laundry, then the laundry work area must be continuously air monitored real-time or near real-time for short-term exposure limit and periodic monitoring for Worker Population Limit according to the Worker Population Limit monitoring section for the laundry.
- If decontaminating and monitoring to the Worker Population Limit concentration is used for clearing perchloroethylene for the laundry, then no real-time or near real-time monitoring or Worker Population Limit monitoring section is required for the laundry work area.

5-26. Prevent cross contamination per NFPA® standards by laundering PPE separately from all other non-PPE laundry items. Laundry facilities will not attempt to repair fire protection PPE.

USER INSPECTION

5-27. Each visually inspects PPE for serviceability before use. Clearly mark unserviceable PPE so it is not mistaken for serviceable items. Do not wear serviceable PPE as a general utility item. Unserviceable PPE may be used for training provided it is clearly marked "For Training Use Only" and segregated from serviceable PPE.

Chapter 6

Fire Prevention and Inspection Actions

Engineer F&ES provide fire inspection and prevention capabilities in support of activities at a bare base, collocated operating base, forward operating location, or other deployed operating locations or aerial ports. Engineer F&ES teams are capable of providing fire inspections and limited fire prevention functions including—hazard assessments, public fire safety education, and facility plan reviews. Engineer F&ES fire departments require command and mayor cell support as well as cooperation to implement and maintain these programs. Typically, initial base activities are conducted from a bare base camp platform, but as the mission matures, functions transform into more permanent substantial facilities. As the structures mature, the published criteria for the inspection, prevention, and planning for facilities also matures. This chapter includes other considerations for fire prevention and inspection, prefire planning, and prevention procedures.

TRAINING AUXILIARY (FIRE BRIGADES) PERSONNEL

6-1. All engineer F&ES personnel can present expedient firefighting training and fire extinguisher training to the base populace as required upon request. In a conventional wartime environment, it is plausible that primary firefighters, their vehicles and equipment could engage in mission priority ARFF suppression tasks involving aircraft and weapon systems. In such situations, lesser priorities (such as structural fires) may be left unattended for significant periods of time. Additionally, this chapter provides commanders and staff the tools to build their fire prevention programs around until engineer F&ES personnel arrive. It is paramount that nonfirefighting personnel know and understand the basic firefighting skills used to avoid a catastrophe in the early stages of fire. This training provides the basic information necessary to safely carry out auxiliary firefighting duties. The following checklist (table 6-1, page 6-2), coupled with the required training, is the catalyst for a unit-based training program in a wartime environment.

Table 6-1. Engineer F&ES guide for auxiliary firefighting

AUXILIARY FIREFIGHTING CONSIDERATIONS	
General Firefighting Considerations	
□ Know the location and operation of fire extinguishers before needing them. □ Fight small fires within the limitations of the extinguisher and personal training. □ Always operate using the buddy system. Work in teams. □ Maintain a fire escape route to your back. Never allow the fire to get between you and the way out. □ For auxiliary firefighters that have been trained to use fire hoses/nozzles and fire pumps, ensure to always perform within the realms of your training. □ Always remember, if the fire gets out of control, evacuate and try to contain damage to the fire building from the outside. Limit the spread of fire to adjacent structures. □ When firefighting in MOPP 4, the chemical gas masks DO NOT filter out the products of combustion.	
Basic Firefighting Methods	
Type	***Methods***
Structural Fires	□ Do not enter the building; firefighting is very limited for untrained personnel. □ Use the appropriate fire extinguisher d to extinguish the fire if the fire is found in its very early stages of development. ***Note.*** Auxiliary firefighters with the proper training can use hose streams from the exterior in order to control the spread of fire.
Vehicle Fires	***Note.*** A fuel ignition can usually be put out with a portable fire extinguisher. □ Do not allow running fuel to flow towards you. □ Do not stand in puddles of fuel. □ Do not attempt to fight the fire if the fuel tank has ruptured. □ Remove all exposures (such as other vehicles) if this can be done safely.
Electrical Fires	□ Never use water on an electrical fire. □ Attempt to de-energize by throwing the main breaker or pulling fuses. □ Use type C fire extinguishers only. Contact the base camp engineer F&ES fire department for fire extinguisher training before it is needed.
Gas Fires (Natural/Propane)	□ Turn the gas off at the gas shut-off valve. □ Fight the fire as a structural or tent fire.
Tent Fires	□ Fire spreads with alarming speed in a tent city. By the time adequate resources are available, the entire compound may be engulfed in flames. □ Drop all tents in the immediate area and wet all tents down if water is available.
Ground Cover or Brush Fires	□ Use shovels, rakes, fire brooms, and so forth.
Legend: F&ES fire and emergency services MOPP mission-oriented protective posture	

FIRE PREVENTION AND INSPECTION PLANNING PHASES FOR STANDARDS OF CONSTRUCTION

6-2. Adherence to published fire safety criteria in deployed locations can be difficult. As with firefighting, occupational safety and health and all aspects of F&ES is the goal in order to meet the same criteria at deployed locations as at home stations. However, this is not practical; for example, when operating at locations for short durations and using expedient construction methods. On the other hand, once a location becomes "enduring or long-term," fire chiefs or SFOs must consider adhering to established criteria as outlined in Department of Defense instructions (DODIs), Army regulations (ARs), Unified Facilities Criteria (UFC), engineering technical letters, NFPA® codes, and other relevant engineering and prevention documents. This chapter gives basic guidance and criteria for the planning phases in a TO.

6-3. Determine risk by a probability assessment that a fire emergency event will occur, and the expected severity of such an event. In expeditionary operations, risk is higher than at a normal military installation. As the mission matures, functions transition into more substantial facilities that meet current published criteria intended primarily for permanent construction at U.S. and overseas bases. The key to a successful fire prevention and protection program is both training and code enforcement. Categorize these stages as outlined in the paragraphs below.

STANDARDS OF CONSTRUCTION

6-4. There are three construction standards for base camps: initial (arrival to 6 months), temporary (up to 2 years possibly 5 years), and semipermanent (more than 2 years but less than 10 years). The time periods for each standard are derived from the expected design life, not how long a facility may actually be used.

INITIAL/TEMPORARY CONSTRUCTION

6-5. Initial and temporary construction standards (see table 6-2) are defined by the following types: organic, initial, and temporary.

Table 6-2. Fire safety planning guide for tent/cantonment areas

Note. Use this table as a general guideline for inspecting and planning tent city/cantonment areas.
1. Cantonment layout. a. Dispersed configuration. (1) Six meters between tents in a row (5 tents per row). (2) Nine meters between tent rows (2 rows per group). (3) Eighteen meters between tent groups (10 tents per group). b. Facility group areas. Refer to ATP 3-34.40. c. Marking tents and facilities. Name, number and placard all tents, facilities, and rows. d. Vehicle parking. Do not allow vehicle parking within the cantonment area. Allow parking in designated areas only. e. Separation distances. Refer to the recommended distanced between functional and individual facilities (FM 3-34-400).
2. Cantonment fire inspections. a. Conduct frequent inspections. b. Include key supervisors. c. Include ground safety personnel when possible.
3. General inspection items. a. Electrical wiring, serviceability, and installation. b. Check for homemade extension cords or lighting. c. Ensure units use only 60 watt or smaller bulbs for tent lighting to prevent pyrolysis of tent material and possible fire. d. Ensure placement of air conditioning/heating units, generators, and similar equipment is far enough away from tents to maximize safety. e. Ensure electrical equipment is properly grounded. f. Ensure there is proper aisle space inside tents. g. Ensure two means of exit are maintained in all tent facilities. Travel distance from any point in a structure to at least one exit will not exceed 150 feet. h. Develop and post a written evacuation plan for cantonment occupants. Include assembly points, headcount procedures, and emergency firefighting and notification procedures. i. Enforce a “No Smoking” policy in all tents. j. Ensure occupants have a proper and fully operational fire extinguisher. Minimum range 2A:10 B,C. k. Ensure occupants empty tent trash receptacles daily. l. Identify and eliminate self-help projects that create life safety/fire protection hazards. m. Ensure all vegetation and trash around the cantonment area is controlled. n. During cold weather, when using oil/gas fired heaters, ensure they receive proper service, no fuel lines leak, and keep combustibles at a safe distance. o. Ensure battery-operated smoke detectors have properly installed batteries for each tent/facility used as sleeping areas. Mount the detector on the center beam of the tent.

Table 6-2. Fire safety planning guide for tent/cantonment areas (continued)

p. Ensure supply maintains at least a 10 percent back stock of battery-operated smoke detectors. q. Ensure no open burning occurs (such as bonfires, grills, and so forth) within the cantonment area. r. Ensure the city mayor monitors open burning waste receptacles (latrines).
4. Special hazards areas unique to bare base activities. a. Field kitchens. (1) Locate burner refueling 50 feet from tents/facilities and lighting/generator equipment. Ensure fire extinguishers remain readily available. (2) Watch for grease accumulation on tent surfaces. (3) Ensure grease disposal areas remain at least 8 feet from the tent. (4) Ensure as a minimum, two fire extinguishers with a rating of 2A: 40 B,C remain for cooking areas. Locate extinguishers at the entrances to the cooking areas. (5) Ensure location of the electrical distribution panel remains at least 6 feet from the kitchen tent and is of the protected connector type. (6) Ensure positions of electrical generators are at least 15 feet from the tent wall. Position fuel tanks as remote as possible from generators and diked with the fuel lines protected. (7) Set portable hot water heaters at least 20 feet from the dispersing area. (8) Ensure enforcement of "no smoking" inside the tent. (9) Ensure maintenance of adequate aisles and exits. b. Generators. (1) Ensure fuel bladders are located as far as practical from other facilities. ***Note.*** Fuel bladders require earth berms to contain any spillage/leak. Earthen berms should be capable of containing 125 percent of the tank capacity. (2) Ensure proper grounding of all generators. (3) Ensure availability of an extinguisher with a minimum rating of 2A:10 B, C in the area. (4) Ensure posting of "no smoking" signs around fuel storage areas. (5) Ensure implementation of vegetation control in generator and fuel storage areas. c. Medical facilities. In addition to general inspection areas, ensure availability of a minimum of one 150-AB halon flight line fire extinguisher for air evacuation/helipad activities.
5. Fire reporting. a. Place at least one local signaling device in/near each tent grouping to warn personnel of a fire (possibly a warning triangle or blow horn with a unique sound). Other distinct signaling devices are also authorized. b. Ensure availability of a bullhorn or public address system at the CQ office for use in the event of a fire. c. Provide a telephone or radio link to the Fire Communication Center from the CQ if designated fire reporting telephone lines are not available (such as 911 or 117). d. See the general fire prevention and reporting procedures tab for additional details.
Note. Post this checklist in a readily accessible, highly visible area. The senior member ensures all assigned personnel are familiar with the contents and their responsibilities of these checklists. **Legend.** CQ charge of quarters

Organic Standard Construction

6-6. Organic standard construction is a subset of initial standard construction. Organic standard construction is set up on an expedient basis with no external engineer support, using unit organic equipment and systems or host nation resources. It is intended for use up to 90 days, and it may be used for up to 6 months. It typically provides for initial force presence and maneuver activities until force flow supports the arrival of engineer resources. Conduct typical initial airfield/base camp activities from a bare base platform consisting of runways and tents. Initial emphasis of prevention efforts are—

- Providing for life safety.

- Protecting mission capability.

6-7. All personnel at deployed locations play a critical role in providing fire prevention and protection by—

- Ensuring that maximum fire safety actions are practiced.
- Performing initial firefighting actions to control and extinguish the fire.
- Training auxiliary fire protection personnel on basic tasks.

6-8. Marking tents and facilities should include identifying the tent by its name, number, and also placard.

6-9. When an absence of any specific guidance occurs as far as billeting configuration, the following guidelines applies. The number of personnel in any billeting configuration should never exceed—

- Single tent group/billeting block (288 persons).
- Other service grouping (such as dining or medical) is normally divided by a fire separation.
- The distance from any point in the configuration to an exterior space and will not exceed the distance in a single tent group to a fire separation.

6-10. Minimum separations between expeditionary structures and other structures will be—

- One hundred feet (30 meters).
- Clear zone of 50 feet (15 meters) immediately adjacent to tension fabric structure.

6-11. Clear zones—

- Cannot be used for storage.
- Must be clear of vegetation.
- May be used as a street or a driveway.
- Cannot be used for vehicle parking.

Initial Standard Construction

6-12. Characterize initial standard construction by austere facilities requiring minimal engineer effort and the ease of material transportability or availability. Initial standard construction is intended for immediate use by units upon arrival in theater for up to 6 months. Typical to transient mission activities, it may require system upgrades or replacement by more substantial or durable facilities during the course of activities.

Temporary Standard Construction

6-13. Characterize temporary standard construction by minimum facilities and effort with material transportability or availability. Temporary standard construction is intended to increase the efficiency of activities for use extending to 24 months, but may fulfill enduring phase standards and extend to 5 years. It provides for sustained operations and may replace initial standard construction in some cases where mission requirements dictate and require replacement during the course of extended operations.

6-14. Fire prevention guidance begins to move from handbook and standing operating procedures guidance to recognized codes and standards. Emphasis of prevention efforts includes fire and life safety. Begin a plans review of the following:

- Work orders.
- Renovations and modifications of existing facilities.
- Construction of temporary facilities.
- Contract facilities (Army and Air Force Exchange Service, concessionaires, and morale, welfare, and recreation facilities).

6-15. As bare base activities evolve to a more sustained operation, additional services become necessary. During the transition to an enduring presence, facilities change to become more permanent and hardened. Among the first enduring facilities are site-built structures, such as hardback tents, huts, (typically plywood structures), and site modified shipping containers. The same layout and the site used for tents applies to site-built structures. Guidelines for sustainment operations include:

- When used for billeting, groups/blocks will not house more than 288 persons.

- When facilities are located inside another structure (such as a K-span, existing warehouse, existing hangar, and so forth), the exit paths from within the tents, huts, and so forth must be preserved. Typically, this means an exit at each remote end.
  - One exit must access a path to the exterior not less than 30 feet wide (10 meters).
  - The other must access a path to the outside of not less than 10 feet wide (3 meters).
- The first substantial structures in theater are metal buildings, either shipped in pieces to the operating location or on-site rolled/formed metal, such as K-span and automated building machine structures.
  - All these structures are essentially Type II buildings and should follow the International Building Code for location and separation.
  - Preengineered structures shipped into theater generally support subsequence fire protection systems without problems.
  - K-span and automated building machine on-site rolled buildings can be rolled to support future fire protection systems if the rolling machine computer is given that information up front.
- Manufactured structures are usually the next type of facility arriving in theater. When these types of structures are—
  - Used as single units, continue following the guidance for tents.
  - Connected together to form a single-story building of greater square footage, egress requirements must comply with NFPA 101®.
- Detection requirements must comply with NFPA 101® except—
  - Detection system may be wireless.
  - Detection system does not have to report to a constantly attended location unless a fire reporting system has been installed at the location.
  - Suppression requirements may be met by using a two-head design requirement of NFPA® 13D.
  - Materials and design methods in NFPA® 13D are approved for use in these structures regardless of occupancy or use.

Note. The more stringent requirements of NFPA® 13 and NFPA® 13R sprinkler standards are approved for use.

6-16. These are typically either trailers, mobile homes, and mobile modular buildings, or they are international organization for standardization containers or constructed in international organization for standardization container frames.

6-17. All such facility combinations can be ordered and constructed with various fire protection features, including, but not limited to—

- Noncombustible interior finishes.
- Standard egress hardware.
- Egress marking.
- Egress lighting.
- Detection features.
- Sprinkler protection.

6-18. As the mission becomes more enduring, there may be a continuing need to use preexisting structures (see table 6-3). Use preexisting structures if the need is anticipated—

- To be of short duration.
- To be more long-term (follow the guidance in fire prevention requirements for enduring operations).

Table 6-3. Force bed-down and base camp development

Organic construction standards—

- Support an expedient basis with no external engineer support.
- Use unit organic equipment and systems and/or host nation resources.
- Provide for initial force presence and maneuver activities until force flow supports arrival of engineer resources.

Note. The mission duration is typically 1 to 90 days.

Initial construction standards—

- Are characterized by austere facilities requiring minimal engineer effort.
- Are intended for immediate operational use by units upon arrival for a limited time, ranging up to 6 months.
- May require replacement by more substantial or durable facilities during the course of activities.

Temporary construction standards—

- Are characterized by austere facilities requiring additional engineer effort above that of initial construction standard facilities.
- Are intended to increase the efficiency of activities for use up to 24 months.
- Provide for sustained operations.
- Replace initial construction standards in some cases, where mission requirement dictates. The temporary construction standard may be used initially if so directed by the combatant commander.

Type of Construction	***Organic***	***Initial***	***Temporary***
Site work	Minimal to no site work; maximized use of existing facilities.	Clearing and grading for facilities (to include drainage, revetments, or petroleum, oil, and lubricants ammunition storage, and aircraft parking), aggregate for heavily used hardstands, and soil stabilization.	Engineered site preparation, including paved surfaces for vehicle traffic areas and aircraft parking, building foundations, and concrete floor slabs.
Troop housing	Unit tents	Tents (may have wood frames and flooring)	Wood frame structures, relocatable structures, and modular building systems.
Electricity	Unit tactical generators	Tactical generators: high- and low-voltage distribution.	Nontactical or commercial power and high or low voltage.
Water	Water points and bladders	Water point wells and/or potable water production and pressurized water distribution systems.	Limited pressurized water distribution systems that support hospitals, dining halls, firefighting, and other large users.
Cold storage	Contracted or unit purchased	Portable refrigeration with freezer units for medical, food, and maintenance storage.	Refrigeration installed in temporary structures.
Sanitation	Unit field sanitation kits and pit latrines.	Organic equipment, evaporative ponds, pit or burnout latrines, lagoons for hospitals, and sewage lift stations.	Waterborne to austere treatment facilities; priorities are hospitals, dining halls, bathhouses, decontamination sites, and other high-volume users.
Airfield pavement ***Note.*** The type of airfield surfacing used is based on soil conditions and the expected weight and number of aircraft involved in activities.		Tactical surfacing to include matting, aggregate, soil stabilization, and concrete pads.	Conventional pavements
Fuel storage	Bladder	Bladder	Bladders and steel tanks

ENDURING

6-19. Categorize enduring phase facilities by the following two types:

- **Semipermanent.** This facility is designed and constructed with finishes, materials, and systems selected for moderate energy efficiency, maintenance, and life cycle cost. Semipermanent standard construction has a life expectancy of more than 2 years, but less than 10 years. The types of structures used depends on the duration. It may be used initially if directed by the combatant commander after carefully considering the political situation, cost, quality of life, and other criteria.
- **Permanent.** This facility is designed and constructed with finishes, materials, and systems selected for high-energy efficiency, low maintenance, and life cycle cost. Permanent standard construction has a life expectancy of more than 10 years. The combatant commander must specifically approve permanent construction.

6-20. Enduring operations can be from 5 to 10 years. Toward the end of the first year, base planning involves semipermanent facilities. With the mission becoming at a more permanent basis, an increase occurs to both population and mission capabilities, increasing the total number of structures. With a personnel and facilities increase, consider the need for more engineer F&ES inspection and prevention personnel.

6-21. A critical factor to consider in the construction of permanent facilities is who is the intended long-term user occupant and how well the installation infrastructure supports the facility. Construct facilities intended to support permanent or long-term basing of U.S. forces according to UFC 3-600-01. This applies to facilities constructed as stand-by or contingency facilities to support force projection or other needs as well as full-time use facilities.

6-22. After the mission grows to the enduring stage, identify the emphasis of fire prevention in the following areas:

- Life safety.
- Fire safety deficiencies.
- Fire hazards.
- Full implementation of codes and standards.

6-23. The key to enduring operational success for facility fire prevention is to—

- Catch deficiencies before they are built.
- Correct current hazards and deficiencies.

PERMANENT STANDARDS COMPLIANCE

6-24. Current published criteria are intended primarily for permanent programs and construction requirements at U.S. and overseas bases where the Army projects a permanent long-term presence. Published regulatory criteria are as follows:

- International Building Code.
- UFC 3-600-01.
- National Fire Codes (NFPA® publisher).
- AR 420-1.
- DODI 6055.06.

6-25. Simply preparing detailed reports of noncompliance with standard criteria, such as UFC 3-600-01 and NFPA® standards, is of little value during initial bed-down activities unless used to evaluate potential enhancements.

6-26. The above mentioned regulatory criteria and local fire prevention regulations and guidelines must be available to all engineer F&ES personnel. An installation's fire marshal prepares local fire regulations in coordination with the fire chief or SFO along with the fire inspector in the headquarters team. They define the fire protection functions for all areas on an installation, such as tenant units, assigned detachments, family housing, and quarters. Local regulations include the following items:

- A statement on the importance of fire prevention.
- The responsibilities of people in fire prevention. Include people at all levels on an installation.
- The fire safety areas, which include the location of fire exits, first-aid stations, and fire extinguishers. Also include fire reporting and firefighting procedures.
- The policies concerning smoking, fire inspections, storage areas, electrical wiring and appliances, static electricity, flammable liquids, flammable compressed gases, explosive atmospheres, and maintenance activities.

GENERAL FIRE INSPECTION, PREVENTION, AND REPORTING PROCEDURES

6-27. Firefighting personnel have a responsibility both to themselves and to the base populace with respect to safety. Major firefighting activities are dangerous and must be undertaken only by skilled personnel familiar with the hazards involved. The most pronounced fire safety problem during wartime is the conflagration resulting from an enemy attack on the base. In such situations, the engineer F&ES fire department's task is one of containment and suppression rather than education, prevention, and oversight. Fire safety features such as instructing personnel on extinguisher use, maintaining fire safety distances during bed-down construction, and enforcing proper storage and warehousing practices aid in limiting the spread of postattack fires and loss of military hardware and equipment.

FIRE REPORTING

6-28. General fire reporting procedures include—

- At least one local signaling device in or near each tent grouping to warn personnel of a fire (warning triangle, blow horn with a unique sound, or other distinct signaling devices).
- A bullhorn or public address system available at the mayor's tent or office to use in the event of a fire.
- A telephone or radio link to the Fire Communication Center from the mayor's tent or office if designated fire reporting telephone lines are not available (such as 911 or 117).

6-29. Refer to the general fire prevention checklist located in table 6-4, page 6-10, for additional details.

Table 6-4. General fire prevention and reporting procedures

GENERAL FIRE PREVENTION AND REPORTING PROCEDURES

TENT CHIEFS: The senior member assigned to each tent or facility is the tent chief and has the following responsibilities:

- Ensures familiarity of all personnel assigned to the tent with this checklist and the fire prevention and reporting responsibilities.
- Ensures this checklist is posted, available and visible in each tent, for use in the event of an emergency.

FIRE REPORTING AND EVACUATION:

1. Sound the alarm: Yell FIRE, FIRE, FIRE.
   a. Evacuate the facility or tent area immediately.
   b. Get far enough away to ensure safety.
   c. Take a head count ensuring that everyone evacuated safely.
   d. Do not reenter a burning structure for any reason.
2. Report the fire.
   a. Use the designated fire telephone number or locally established fire reporting procedures.
   b. Provide the following information when reporting a fire:
      - The name and telephone number or radio call sign where you can be reached.
      - The size and location of the fire.
      - The type of fire.
      - Other pertinent information, such as the number of victims.
   c. Contact the FACC as soon as possible or designate someone to notify the FACC. If a CQ tent is available, the CQ can handle the fire reporting responsibilities, but do not rely on the CQ to do so automatically.

   Note. Always follow-up to ensure the fire was reported.

   d. The FACC in turn notifies the emergency operations center who dispatches the firefighters.

   Note. Firefighters may not be able to respond due to priority commitments. In this event, auxiliary firefighting may be the only method of intervention available. See table 6-1, page 6-2, for auxiliary firefighting procedures and checklist.

3. Fight the fire with the appropriate fire extinguisher.
   a. Use fire extinguishers only if properly trained.
   b. Do not attempt to fight the fire unless you are sure you can proceed safely.
   c. **Remember—**while fighting fire in MOPP 4, the chemical mask will not protect you from the products of combustion. Stay upwind and always have an exit at your back.
4. Evacuate adjacent tents or facilities if necessary.
5. Drop adjacent tents if safely possible.
6. Tent chiefs ensure proper posting of this checklist with other pertinent checklists.

Note. Do not use 911 for exercises.

Legend.

CQ	charge of quarters	MOPP	mission-oriented posture
FACC	Fire Alarm Communications Center		

BILLETING AREAS

6-30. General inspection items include the following:

- Check electrical wiring, serviceability, and installation.
- Check for homemade extension cords or lighting.

- Ensure a maximum of 60-watt light bulbs are used in tent lighting to prevent pyrolysis of tent material and possible fire.
- Ensure heating, ventilating, and air conditioning units, generators, and similar equipment is positioned far enough away from tents to maximize safety.
- Check for the proper grounding of electrical equipment.
- Check for the proper aisle space inside tents.
- Ensure the two means of exit are maintained in all tent facilities (travel distance from any point in a structure to at least one exit will not exceed 150 feet).
- Develop and post a written evacuation plan for tent city occupants; include assembly points, head count procedures, and emergency firefighting and notification procedures.
- Enforce the "no smoking" policy in tents.
- Ensure designated smoking areas are established and have proper disposal receptacles.
- Ensure a fully operational fire extinguisher is provided with a minimum rating 2A:10 BC.
- Ensure tent trash receptacles are emptied daily.
- Identify and eliminate self-help projects that create life safety or fire hazards.
- Ensure vegetation and trash around the tent city area is controlled.
- During cold weather, when using oil or gas fired heaters, ensure heaters are properly serviced, fuel lines are not leaking, and combustibles are kept at a safe distance.
- Ensure the proper installation of battery-operated smoke detectors for each tent/facility used as sleeping quarters. The detector should be mounted on the center beam of the tent.
- Maintain at least a 10 percent bench stock of battery-operated smoke detectors.
- Ensure open burning (such as bonfires and grills) within a tent city is not allowed.
- Ensure open burning waste receptacles (latrines) are monitored by the tent city mayor.

SPECIAL HAZARD AREAS

6-31. Special hazard areas include field kitchens, generator use areas, and medical facilities. These are discussed below.

FIELD KITCHENS

6-32. Field kitchen safety guidelines include the following:

- Locate burner refueling 50 feet from tents—facilities and lighting—generator equipment to ensure that fire extinguisher is readily available.
- Ensure that no grease accumulation is on the tent surfaces.
- Locate grease disposal areas at least 8 feet from the tents.
- Ensure a minimum of two fire extinguishers with a rating of 2A: 40 BC are provided for cooking areas, with extinguishers located at entrances to cooking areas.
- Locate the electrical distribution panel at least 6 feet from kitchen tent and of protected connector type.
- Position electrical generators at least 15 feet from tent walls. Position fuel tanks as remotely as possible from generators and diked with the fuel lines protected.
- Ensure portable water heaters are at least 20 feet from serving area.
- Maintain adequate aisles and exits.

GENERATOR USE AREAS

6-33. General safety guidelines for generators include—

- Locating fuel bladders as far as practical from other facilities.
- Ensuring fuel bladders are earth-bermed to contain any spillage or leaks and earthen berms capable of containing 125 percent of tank capacity.
- Ensuring all generators are grounded properly.

- Ensuring an extinguisher with a minimum rating of 2A:10 BC is available in the area.
- Posting "No Smoking" signs around fuel storage areas.
- Controlling vegetation in the generator and fuel storage areas.

MEDICAL FACILITIES

6-34. General safety guidelines for hospital areas include the general inspection areas, and ensuring at least one 150-pound Halon flight line fire extinguisher is available for air evacuation or helipad activities.

EXISTING BUILDINGS AND CODES

6-35. Using existing structures quickly provides operational advantages and capabilities while specialized expeditionary assets move in and set up. Some facilities may have suffered structural damage. The building may be constructed of several combinations of standards. Guidelines for using existing codes include the following:

- International Building Code, chapter 7.
  - Used to compare the construction of existing buildings found in-theater with traditional construction types found in the United States.
  - The more inherently fire resistant the material of construction, the more flexibility is afforded to commanders in using preexisting structures.
- Every occupied space should have not less than two means of escape, one of which is direct to the exterior.
- The path (route of escape) through interior spaces will not exceed 100 feet (30 meters).
- The path (route of escape through interior spaces) will not exceed 50 feet (15 meters) if the space does not have a direct means of escape to the outside.
- Exits from a structure must accommodate 100 percent of the occupant load of the building.
- Each exit in buildings, other than assembly uses, with four or more exits are permitted to serve not less than 33 percent of the occupant load.
- Base occupant load on twice the minimum occupant load in NFPA 101® or an actual count (whichever is greater).
- Evaluate all preexisting facilities based on the possible uses. If a facility meets or exceeds the minimum requirements of NFPA 101® it is acceptable.
  - Does the structure have direct exits from every room or space to the exterior? (NFPA 101® 3.3.70)
  - Does each exit have an exit discharge path to a point of safety? (NFPA 101® 3.3.72 and NFPA® 3.3.186)
  - Does the structure have a direct means of escape from every room or space without a direct exit? (NFPA 101® 3.3.152)
  - Do each means of escape comply with either windows for rescue (NFPA 101® 14.2.11.1) or secondary means of escape? (NFPA 101® 24.2.2.3)
  - Do each means of escape have a discharge path to a point of safety? (NFPA 101® 3.3.186)
  - Does each exit serving an occupant load of over 100 persons have panic hardware or remain unlocked and unlatched when the area is occupied?
  - Is the latching or locking of the means of escape under the control of the occupants of the room or space?
- If a facility does not meet the minimum requirements of NFPA 101®, refer to the preexisting facility evaluation matrix.

6-36. The acceptability of preexisting facilities changes as the mission becomes more enduring and the evaluation of these structures must be an on-going process. It may be necessary to harden preexisting buildings to the protect mission capability.

PLANS DESIGN AND REVIEW

6-37. Fire safety in the expeditionary environment is the highest priority for engineer F&ES. Conduct a typical initial airfield or airbase activity from a bare base platform, such as runways and tents, then, as the mission matures, transition functions into more substantial facilities. Current published criteria in UFC 3-600-01, National Fire Codes (published by the NFPA®), and the Loss Prevention Data Sheets (published by FM Global) are intended primarily for permanent activities in the United States and at overseas bases where the Army is projecting a permanent or long-term presence. The changing nature of expeditionary force projection results in a new range of construction requirements based on maximum force flexibility at a minimum investment requiring a different criterion for fire prevention and safety. These criteria provide guidance to commanders and their staffs in providing for managing the risk associated with operating at an expeditionary environment. An aggressive fire protection engineering program complete these criteria.

LIFE SAFETY REQUIREMENTS DURING SUSTAINMENT OPERATIONS

6-38. When no fire protection engineer is employed for plans review, the task may be given to engineer F&ES fire inspectors, who must prepare before attempting to examine any plans. Inspectors must meet the minimum certification level along with being qualified to perform this function. Inspectors must have a thorough knowledge of construction techniques, applicable codes, and the knowledge of their use. For military projects, a fire inspector may be asked to oversee and review plans for technical guidance dealing with fire protection and life safety issues.

PREFIRE PLANS

6-39. Engineer F&ES fire departments are organized so fire personnel can protect life and property from fire. All personnel must study their area to know what problems exist. After analyzing the problems, they can devise prefire plans to handle the problems. Engineer F&ES personnel consider the following:

- **Area one, an installation's layout.** This layout includes the streets, roads, and alleys from a fire station to a fire scene; the location of the water supply and the available volume and pressure; and the buildings' exposure.
- **Area two, the availability of equipment.** This area includes the types of apparatus, vehicles, and mechanical and motorized equipment on an installation.
- **Area three.** Area three consists of the available personnel.

6-40. Prefire plans include information on the different types of aircraft handled at an installation. TO 00-105E-9 provides emergency response information on all United States and most coalition and civilian aircraft likely encountered.

6-41. Prefire plans must be flexible to allow for changes in personnel and equipment availability. The areas considered are the—

- Location of flammable storage, hazardous activities areas, and areas that could be a fire's point of origin.
- Location of hydrants and other water sources, with the readings of the available amounts and pressures.
- Lengths of ladders and the proper placement spots to reach all required areas.
- Horizontal or vertical openings, (hallways, open stairways, shafts, false ceilings, or attics) that would be good ventilation openings.
- Best and most available apparatus for responding to a fire, approaching buildings, conducting hose-laying procedures, and placing water streams.
- Location of the utilities and who shuts them off and how.
- Effects of weather changes on building accessibility and response time.
- Installed fire protection or detection systems, including locations and procedures for connecting pumpers to installed extinguishing systems.

AIRCRAFT

6-42. Prefire plans for aircraft crash or rescue actions require more flexibility than prefire plans for structural fires. Because the exact crash location is unknown, only make general plans as to the likely crash sites. When developing prefire plans, remember the location, mission, climate, and terrain of the installation.

6-43. Prefire plans include information on the different types of aircraft handled at an installation. Table 4-3, details several Army aircraft. The control tower obtains specific information (number of personnel, amount of fuel, amount and type of ordnance on board, nature of an emergency) at the time of the emergency.

6-44. The weather, terrain, runway conditions, amount of available equipment and remaining fuel, and crash location are some factors that govern placing equipment at an aircraft's crash action. Prefire plans can only cover general placement procedures and should allow for flexibility, based on the situation. Other factors considered include an aircraft's landing speed, the wind direction and speed, and an aircraft's stopping distance. Prefire plans also include provisions for acquiring additional equipment.

MISSILE AND SPACE VEHICLE

6-45. Fire-protection personnel at missile and space vehicle test or launch sites deal with different hazardous situations. The prefire plans must include procedures for safely storing, handling, and disposing of the liquid and solid propellants used in missile engines. Plans include the—

- Number, type of configuration, and operation of missiles or space vehicles and related launch facilities.
- Layout of the launch site, including access roads, terrain, and water supplies.
- Number, type, and location of support facilities.
- Location and configuration of the various propellant storage areas, the nature of the stored materials, and the extinguishing agents which are the safest and most effective for each type of propellant.
- Health hazards that could result from the fuels, oxidizers, other chemicals, and additives to fuels or coolant water. Firefighters may have to wear special protective clothing, reduce or control exposure time, monitor instruments, or perform special procedures.

DISTRIBUTION OF FIRE EXTINGUISHERS

6-46. During initial activities, fire extinguishers are required as follows:

- **Mess tents.** Two 20-pound ABC extinguishers.
- **POL.** Four 20-pound ABC extinguishers per 15,000 gallons of POL.
- **Heaters.** One 2 1/2-pound BC extinguisher or equivalent.
- **Vehicles.** As per AR 385-10.
- **Maintenance tents.** Two 20-pound ABC extinguishers per tent.
- **Sleeping tents.** One 2 1/2-pound dry-chemical extinguisher, minimum, if the tent contains any heat-producing device or open flame.

Chapter 7

Structural Firefighting

This chapter addresses many of the basic priorities and procedures used throughout the rest of this manual for other firefighting purposes. The structural firefighting mission includes responding to all fire incidents that involve structures (including TO structures), tents, warehouses, multistory buildings, and hangers. Proper prefire planning along with a good incident action plan aids the firefighting team in making better tactical decisions on the fire ground.

Structural firefighting includes all actions from the time an emergency call comes into an FACC to the after action review conducted following an incident. Factors considered when responding to a structural firefighting scene are—rescue, exposure, confine, extinguish, overhaul, ventilate, and salvage (RECEOVS) along with shutting down the required utilities before making entry and terminating the incident. The success or failure of a firefighting action depends on the skill and knowledge of the personnel in the initial attack team.

STRUCTURAL FIREFIGHTING

7-1. When the SFO arrives at a fire scene, he must be able to make good tactical firefighting decisions in a short amount of time. One tool the SFO can use to make decisions is the RECEOVS decision making model. The RECEOVS model can be adopted for use in all types of hazardous situations. Use the decision making model with up-to-date information about the emergency incident.

7-2. The initial size-up includes gathering the following information:

- Preincident survey results about a particular structure, facility, or hazard.
- Nature of the incident details provided in the alarm dispatch.
- Visual indicators that the officer sees upon arrival.

7-3. Besides establishing the NIMS incident command system, performing size-up, and developing an incident action plan, the SFO implements the operational plan by determining the operational goals and objectives, selecting the form of command to assume, and the operational mode to use. Correct placement of the apparatus is necessary to the implementation of any operational mode. Improper placement may place the apparatus and personnel in a hazardous location and results in time lost if the apparatus must relocate. After correctly employing all actions, it is necessary to properly terminate an emergency incident. The incident is not terminated until after returning the property to the possession of the owner and releasing all emergency responders from the scene.

RESCUE

7-4. Every firefighter's most fundamental duty is to protect life and property from fire. Although they perform many different types of rescues, the most common type is the structural fire ground rescue. Structural rescue procedures involve the systematic rescue and possible extrication of both victims and possibly rescuers in a structure.

7-5. While searching for possible victims in a structure fire, the firefighters consider their own safety. Incident commanders consider the hazards presented to firefighters when conducting rescue actions in a structural firefighting environment. The term rescue is not limited to just the occupants; it also includes emergency responders possibly injured in the structure. The firefighter's life safety is the most important

consideration because if a responder is disabled by an injury, that responder will not be available to rescue victims or occupants involved in the incident.

7-6. The SFO never allows their personnel to sacrifice themselves by taking unnecessary risks at an emergency incident scene. All personnel must conform to NFPA®1500 and OSHA requirements for two-in, two-out (a sufficient number of responders must be available for emergency rescue outside when responders are inside a structure) and initial rapid intervention crew procedures.

7-7. Life safety is the first and highest priority in any emergency which takes precedence over any and all other considerations. Firefighters never risk a life to save property. The SFO on-scene makes difficult decisions regarding any rescue action. In some situations, fire suppression efforts may be delayed to give rescuers time to rescue victims in a structure. A decision may need to be made on whether to shelter in-place instead of evacuation. Some structures may have the necessary facilities to protect people, such as pressurized stairwells.

7-8. In some "unique or complex rescue situations," there may be a need for a specialized or technical rescue team to perform a rescue. The SFO, along with all firefighters, should be educated and be able to recognize situations in which a technical rescue team is needed. Nontechnical rescue certified firefighting personnel may assist in the rescue action under the supervision of a rescue technician.

EXPOSURE PROTECTION

7-9. The term exposure protection describes the need to limit the fire or other emergency to the property or area of origin where the fire or emergency began. This concept is similar to the idea of sacrificing to facilitate a rescue—limiting the problem to the building or property of origin by taking defensive actions in order to save adjacent uninvolved or slightly involved structures. If the first-arriving teams have only enough resources to perform a defensive attack, then their efforts focus on keeping the fire from spreading to uninvolved properties until additional resources arrive.

CONFINEMENT

7-10. Confinement is the ability to confine a fire or other problem to the smallest possible area within the property of origin. In a structure fire, confinement can be broken down into compartments such as a room, or the area of a floor, or the structure involved. The fire must first be confined before it can be extinguished.

EXTINGUISHMENT

7-11. The extinguishment phase of firefighting action is simply putting the fire out. Every structure fire differs in size, material involved, and other factors determining the proper strategies used to attack and extinguish the fire.

OVERHAUL

7-12. Overhaul activities restore the incident scene to as nearly normal a condition as possible. In this phase of fire suppression efforts, find and extinguish any and all hidden fires, remove smoldering contents or debris, and turn off utilities.

VENTILATION

7-13. Ventilation is the means of controlling or modifying the environment and spread of fire within a structure. Ventilation helps reduce the possibility of back draft or flashover conditions and improves the chances of affecting a rescue by reducing super-heated gases and poisonous smoke. Ventilation consists of actions needed to replace a contaminated or heated atmosphere with normal air. Ventilation can be performed through mechanical (positive pressure ventilation; heating, ventilating, and air conditioning) or natural means (opening windows, vertical roof openings) or a combination of the two.

7-14. Large areas, high rises, and cellar fires present unique ventilation problems. Crews should consider whether or not ventilation can be addressed sufficiently and what the impact on firefighting conditions are.

Note. Ventilation should not be performed unless attack lines are in place and ready.

SALVAGE

7-15. Salvage activities begin as soon as possible to minimize damage and potential loss to the structure and its contents. Remove, secure or protect any salvageable or sensitive items to avoid unnecessary damage due to water, smoke, or falling debris. Repair or cover openings made to aid with ventilation or forcible entry to protect the property from further damage by the elements and illegal entries.

PERFORMING SIZE UP

7-16. Size up is the ongoing mental evaluation process performed by the SFO in charge of an incident evaluating all influencing factors. It is used to develop objectives, strategy, and tactics before committing personnel and equipment to a specific course of action.

7-17. To accomplish the incident priorities, the SFO must know the type of emergency incident to which the team has been assigned and gather as much information as possible to make good tactical and command decisions. Size up is the ongoing process of evaluating an emergency situation to determine the following facts:

- What has happened?
- What is happening?
- What is likely to happen?
- What resources will be needed to resolve the situation?

7-18. The size up process actually begins before an incident is reported and continues throughout the incident. The size up process includes the application and theory to describe three specific time periods—preincident, on arrival, and during the incident. Size up results in a plan of action that may be adjusted as the situation changes.

PREINCIDENT

7-19. Preincident is the process begins well before an incident is reported. Conduct this type of planning before the incident whenever there is no hurry and information can be gathered and carefully reviewed, analyzed, recorded, and distributed. These plans aid the SFO and provide facts helping them make the best tactical decisions based on the information gathered.

7-20. Each day, the SFO conducts a general size up of factors observed or recorded during the next 24-hour period. These factors may include—

- Response time slowed by weather conditions.
- High winds, ice, snow, or rain.
- Low humidity and heat affect wildland fires.
- Extreme temperatures for firefighters and or victims.

WHILE RESPONDING

7-21. When an incident occurs, the size up process continues during the response. The SFO considers the time of day the incident takes place and how the need for a rescue is affected by certain factors, including—

- Burn conditions due to weather in the morning versus the afternoon.
- Occupants that are at home or at work.
- Occupants that are sleeping if it is at night.
- Traffic affecting the response times.

UPON ARRIVAL

7-22. The most important part of the size up process may occur whenever the team arrives at the incident scene. The SFO takes charge of the scene making sure the engineer F&ES teams can safely perform and affect both a rescue and fire suppression effort without delay or being impeded by bystanders. Immediately after securing the scene, the SFO transmits a condition or arrival report by radio to the FACC. This report is used as a simple, first impression of the current hazardous conditions, and reports the initial tactical actions taken by the SFO and the engineer F&ES teams. Key items to cover in an initial size up include—

- Construction type and number of stories.
- Type of occupancy.
- Conditions upon arrival.
- Assignments for units already on-scene.
- Assignments for responding units.
- Additional resources needed, if known.
- Name and location of incident command post.

7-23. The initial report provides other responding units an idea of what they may encounter upon arrival. It also gives a clear understanding of what the overall strategy will be when units arrive on the scene.

OPERATIONAL IMPLEMENTATION

7-24. With the size up complete, the SFO implements the operational decisions made. He establishes goals and objectives, assigns appropriate resources, and considers the need for any additional resources. The SFO determines the best form of command to assume and implements most effective operational mode. The SFO continually reevaluates the incident and determines if the goals and objectives are being met and if the scene is progressing in a safe, efficient manner.

GOALS AND OBJECTIVES

7-25. Strategic goals are the overall plans for controlling an incident. They are broad, general statements of the final outcomes to be achieved. The three overall priorities of life safety, incident stabilization, and property conservation dictate these goals. Appling to all emergency scenes, strategic goals are based on the RECEOVS decision making model.

TACTICAL OBJECTIVES

7-26. Tactical objectives are statements of measurable outcomes. Achieving tactical objectives leads to the completion of strategic goals. Tactical objectives are less general and more specific than strategic goals. Examples of common tactical objectives are as follows:

- Provide a water curtain to protect exposures.
- Initiate search and rescue.
- Contain a hazardous material spill.
- Ventilate the roof with a saw.

7-27. Use tactical objectives to meet important tactical benchmarks during a fire. These benchmarks are important tasks needing completion to have a successful outcome. Announce tactical benchmarks over the radio to all units. This allows the fire communication center to log the time the benchmark was completed for reports and any after action reviews. These benchmarks include—

- Primary search completed.
- Secondary search completed.
- Ventilation addressed.
- Fire under control. This indicates the fire is at a point that there should be no further extension and hose lines in place can handle it.
- Fire is out. This indicates there is no active fire.

- Loss stop. All overhaul and other activities are ceased and no further damage to the structure will occur. Loss estimates can be made at this point and the property is ready to be secured or turned over to the owner.

PERSONNEL ACCOUNTABILITY REPORT

7-28. An on-scene accountability system is required at all emergency scenes according to NFPA®1500. The system identifies all personnel on-scene and their assigned unit. Use the accountability system in conjunction with personnel accountability reports to ensure all personnel are safe and accounted for. It also gives the incident commander an idea of where crews are within the structure and what task they are currently working on.

7-29. When a personnel accountability report is called for, each unit gives a brief report of their unit number, location, assignment, and the number of personnel on hand. Split crews give separate personnel accountability reports for each team.

7-30. While a personnel accountability report can be called for at any time, they are usually performed at regular intervals (every 20 minutes) or whenever a tactical benchmark is completed. It is also used whenever strategies change from offensive to defensive, or there is a Mayday or emergency traffic on-scene (for example, partial collapse or lost firefighter).

COMMAND ACTIVITIES

7-31. After establishing priorities and a decision making model is ready, the SFO must be ready to take command of the situation. Implement the incident command system anytime there are two or more units assigned to a scene. The first arriving fire officer or SFO has the following three optional command activities available:

- **Investigation.** Use investigation when nothing is showing or further investigation is required prior to assigning resources.
- **Mobile command.** Mobile command is also called fast attack and used when the SFO on-scene determines they are better used assisting with the initial fire attack. This does not relieve the SFO of the overall responsibility of the scene and command must be formally transferred to the next arriving SFO.
- **Command.** Command is when the SFO assumes overall incident command and establishes an incident command post. The incident command post can be as simple as a vehicle and the location should be announced for all units on-scene.

OPERATIONAL MODES

7-32. The first and most important part of the incident action plan deals with life safety. Implement this part as soon as possible. Addressing life safety involves a series of decisions the incident commander must make. One of the first decisions relates to choosing one of the first two possible modes of action—offensive or defensive. Use the third mode, transitional, when it is necessary to shift from an offensive to defensive mode. It is important that the incident commander continually evaluates the incident action plan to determine if it is necessary to change operational modes for safety reasons.

OFFENSIVE OPERATIONAL MODE

7-33. The offensive operational mode involves taking direct action to solve a problem, such as suppressing a structure fire or performing a rescue. The incident commander decides how to best deploy available resources in the most effective manner. Offensive actions are incidents can be controlled by those resources available.

7-34. The offensive operational mode at a structure fire means conducting an aggressive interior attack by one or more firefighting teams. Each scenario or situation differs depending on the size and scope of the incident. Before starting an offensive attack, the incident commander considers NFPA®1500 and OSHA 29 CFR 1910.134(g)(4) requirements for “two-in, two-out” in setting up an initial rapid intervention crew.

DEFENSIVE OPERATIONAL MODE

7-35. A defensive operational mode is intended to isolate or stabilize an incident and prevent it from expanding or becoming larger. The incident commander makes defensive operational mode decisions for a variety of different reasons. At a structure fire, a defensive mode may mean not using assets on a building on fire in order to save uninvolved structures. A defensive mode is generally an exterior activity chosen because not enough resources are available to conduct a safe and effective offensive attack, or the structure or area is too well involved to make a successful offensive attack. Many times, the decision to go defensive is based on the lack of structural stability due to fire conditions.

TRANSITIONAL ACTIONS

7-36. Transitional actions are generally used when moving from a defensive to offensive mode. A prime example would be multistory fires. A fire on the third floor of a large structure takes time to get attack lines in place. Using fire streams from the exterior into windows on the third floor darkens and delays a fire's progression, thus allowing interior attack crews time to advance hose lines to the fire room for an interior attack.

ADDITIONAL RESOURCE ALLOCATION

7-37. Regardless of the nature of an incident, the incident accident plan anticipates the need for calling additional resources if it appears that the incident will be protracted or has the potential to be a long-term activity. It is acceptable to call for additional resources when all on-scene resources are tasked. Additional resources can come from other base camps or other stations in the AO. These additional resources may be held in reserve and used to relieve fatigued crews in rehabilitation, or assigned other tactical objectives at the scene. Hold additional resources in a staging area ready to be assigned an operational objective. Request other resources such as military police, medical transport, and facilities or utilities engineers as soon as the need is identified.

7-38. Large scale or prolonged activities require a personnel rehabilitation station and SCBA reservice point on-scene. Establish these resources as soon as possible and make available throughout the incident.

HIGH-RISE INCIDENTS

7-39. Incidents in multistory high-rise buildings can be challenging. They require additional firefighters and fire apparatus to affect rescue and firefighting. Develop and train a high-rise standard operating guidelines as soon as possible, based upon the resources and the structures in the AO. Some of the key items to cover in high-rise standard operating guidelines are—

- Number of initial units responding.
- Assignments of initial units.
- Lobby and elevator control.
- Heating, ventilating, and air conditioning and fire suppression systems support.
- Fire attack group coordination.
- Staging areas.

INCIDENT TERMINATION

7-40. Once mitigated or the incident scene is at a point it can be turned over to the property owner or outside agencies, command can be terminated. The incident commander announces the termination of command over the radio for the fire communication center to log. All units released from the incident refit on-scene as soon as possible and announce their status when back in service.

7-41. If turning the scene over to another agency or the structure owner, both the incident commander and the person taking responsibility for the property fill out and sign a chain of custody or property release form. If and investigation will occur, the lead investigator assumes responsibility and does not release the

property until they completed the investigation of the scene. If a fire watch is necessary, the SFO determines whether or not to release the property in case that crews need to reenter the structure.

INVESTIGATION AND RETURN TO SERVICE

7-42. Investigating a fire involves looking for and safeguarding evidence that could determine the cause of a fire. This procedure could occur during control, extinguishment, and overhaul activities. If fire personnel suspect arson, they inform fire investigators team and ensure perform no unnecessary actions that would damage or disrupt potential evidence. Fire investigations follow AR 420-1, and are coordinated with the Criminal Investigation Division, Federal Bureau of Investigation, or installation/garrison base camps, if applicable.

INITIAL INVESTIGATION

7-43. Take colored photographs of the entire fire scene. If suspecting arson, label items, such as gasoline cans, cotton trails, film trails, candles, oil-soaked rags, cleaning-fluid containers, matches, and cigarettes. Labels include the name of the person who found the item and where and when the item was found. Take notes on the following items:

- The number of people present when fire personnel arrived.
- The number of fires burning when fire personnel arrived.
- The color and aroma of smoke.
- The color of the flame and from where it was coming.
- Where the doors were locked (inside or outside).
- The condition of the contents and if they were disarranged.
- The nature of the burning material.
- The wind direction, humidity, temperature, and general weather conditions.
- The direction of the fire's spread.
- The condition of the area where the fire may have started.
- The statements from observers who may have seen unusual occurrences before the fire broke out.

7-44. Make detailed sketches of the area. These sketches may be needed during a board of inquiry or investigation proceedings, especially if an arsonist is brought to trial.

7-45. If the fire building contained classified documents or equipment (reels of film, models, drawings, files), the SFO requests guards posted over the area until the classified material is moved to a secure location. Since firefighters are not authorized to examine classified materials, they must be careful during salvage and overhaul activities. They should set aside classified items in a designated area for proper authorities to examine.

7-46. Fire team personnel that responded should write detailed accounts of what they saw and did as soon as possible. Turn these accounts over to the fire investigator and include in any required fire reports.

7-47. Before returning to the station, the SFO gathers all the facts necessary to complete the required fire report form. This report includes the—

- Type of alarm.
- Location of the fire.
- Building number.
- Description, origin, cause, and confinement of the fire.
- Property damage.
- Hazardous material (type, amount, path of released substances).
- Containment measures taken during and after firefighting.
- Agents used.
- Time required to extinguish the fire.

- Number of personnel near the burning structure.
- Mileage traveled.
- Weather.
- Remarks made by people around the burning structure.

ORIGIN OF A FIRE

7-48. In a serious fire (loss of life, extensive property damage), the Criminal Investigation Division (CID), fire marshal or another person from higher engineer F&ES headquarters may assist in the investigation as an impartial party. The investigators may collect more detailed information than required. The information may include the—

- Reasons for delay in the alarm.
- Extensive spread of the fire.
- Heavy property loss.
- Inability of occupants to escape.
- Firefighting methods used.
- Adequacy of the water supply.
- Correction of previously noted deficiencies.

7-49. In a less serious fire, the information recorded on the fire report is sufficient. However, until all evidence is examined, you may not accurately account for a fire's origin and cause and the damage estimates.

7-50. To locate a fire's origin, walls may have to be reconstructed, loose boards and doors replaced, or furniture rearranged. Obtain as much information as possible about the types of materials that were in an area. Examine the remains because they can indicate the direction of the heat flow. However, factors such as drafts can also affect a fire's spread and heat flow. The condition of metals, glass, wood, plastics, and other materials are good indications of the temperatures at certain spots.

WOOD

7-51. Char depth indicates the length of time that wood burned. Most woods char at the rate of 1 inch per 40 to 45 minutes of burn time at 1,400°Fahrenheit (F) to 1,600°F. Demarcation lines between charred and uncharred material indicate of the type of heat involved. For example, if you chop or saw through charred boards located near a fire's origin, there should be sharp, distinct lines between charred and uncharred wood. This occurs if the fire was fast and intense and extinguished quickly. The wood shows a gradation of char and a flat, baked appearance throughout, if a fire was long and slow.

GLASS

7-52. Glass is composed principally of silicon and lime. Glass softens at 1,200°F to 1,400°F and becomes molten above 1,600°F. Examining the glass provides information as to how a fire's heat reacted on the glass or if other forces acted on the glass.

- **Heat.** The following explains how heat can react on glass:
  - Broken pieces from windows in clear, irregular, block-shaped pieces indicate a rapid, intense buildup of heat in a 1 to 5 minute time frame.
  - Heavily glazed pieces with little or no stain indicate an intense heat with a slow buildup.
  - Heavily stained pieces with no glazing indicate a slow buildup with considerable smoke. Half-moon checks on a stained side indicate the glass was still in the frame during a fire and water splashed on the glass.
  - Unstained or heat-checked pieces found on the floor indicate the glass was broken by intense heat early in a fire.
- **Other forces.** The following lists glass reactions from other forces:

- Clear, long, rectangular pieces inside a building indicate some other force (forced entry) broke the glass.
- Radial cracks in glass emitting from the point of impact and concentric cracks around the point of impact indicate the glass was broken by a blow from a hard object. The glass near the break comes out in rectangular-or triangular-shaped pieces.
- Thermal cracks in glass have no pattern and pieces are odd-shaped. High-intensity explosives (dynamite) cause glass to sliver.
- Low-intensity explosives (dust or gas) cause glass to break off in chunks.

METAL

7-53. Most chromium or shiny metal surfaces, such as light fixtures, toasters, and irons turn different colors when subjected to intense heat. The color variance could indicate the progress of a fire.

CAUSE OF A FIRE

7-54. When investigating the cause of a fire, first consider common causes, such as discarded cigarettes, overheated or defective stoves or flues, faulty electrical appliances, and slag or sparks from welding and cutting machines. If none are the cause of a fire, question all the people at the fire scene (mainly building occupants), the people present at the time of or immediately before the discovery of the fire, and the people who left the building and may have returned. When investigating a fire's cause—

- Reconstruct all the areas as much as possible.
- Determine the heat path and the fire's point of origin.
- Determine the approximate burning time.
- Evaluate the combustion characteristics of the materials involved.
- Compare similar materials and situations, if possible.
- Fit the known facts to the various possibilities.
- Compare the information from the occupants and neighbors as to the activities before the fire.

7-55. High property loss fires or those involving loss of life require extensive investigations. Appointed officials, assisted by the fire marshal and appointed aides, usually conduct these investigations. Before moving or shoveling out any material, carefully examine the layers of material as you work to the floor. This method could show the sequence of materials burned from the point of origin. In a fire, aluminum and similar alloys melt fairly early, splash or run on other materials, solidify at lower temperatures, and protect the material from further damage.

LOSS ESTIMATE

7-56. Calculate loss estimates after completing salvage activities and declaring loss stop. Inventory all remains and compare that list with a prefire inventory list. Loss includes damages from smoke, heat, water, and fire. Installation engineers often assist in estimating loss value. The fire chief examines the fire scene and writes a brief description of the extent of the physical damage.

7-57. On an installation, the organization that is responsible for construction contracts estimates partial losses of Army structures. Total structural loss is the structural value taken from a recent prefire real property report. Because construction costs fluctuate, evaluators make an estimate based on current restoration costs. Determine vehicle and aircraft losses by replacement in kind for partial losses and recorded inventory value less salvage for total losses.

7-58. When preparing a preliminary report, the fire chief should not go into detail in a loss estimate. If available, the fire chief uses the estimate the evaluators provide. If the two estimates vary greatly, a further investigation may be necessary. Either party may have overlooked important evidence during their evaluation, which would account for a discrepancy.

FINAL ACTION

7-59. In large fire actions, the SFO obtains as much information as possible, such as the names of witnesses, statements, photographs, a sketch of the building, and the location of apparatus and hose lines. Firefighters not involved in salvage and overhaul activities return to the station. The SFO double checks the area ensuring all the equipment and tools are back on the fire apparatus.

7-60. Before leaving, reload hose lines in the bed of the fire truck in case another emergency occurs before returning to the fire station. If only a few sections were used, roll and stack the hose line on the tailgate. Secure the scene prior to departure.

RETURN TO QUARTERS

7-61. Once back at the station, the SFO reports on the status of the truck to the alarm room operator. He also notifies the alarm room operator when the truck is back in service. Fill out the proper forms and reports immediately or as soon as possible. The SFO completes the required fire reports and makes entries in the daily log book. Firefighters are responsible to—

- Check the fire apparatus.
- Wash the tires and inspect them for cuts, nails, and other damages.
- Check and resupply the fuel, oil, and water levels in the radiator and booster tank.
- Replace the used hose lines with clean, dry hose lines.
- Wash the dirty hose lines and place them on racks to dry.
- Roll clean, dry hose lines.
- Wash wet salvage covers, inspect them for cuts and tears, and hang them to dry.
- Inspect the ladders for damages.
- Clean and dry all dirty and wet tools and appliances.
- Apply a light coat of oil on the metal surfaces that might rust.
- Wash the entire fire apparatus to remove mud, dirt, and carbon.

7-62. After completing all clean-up activities, the SFO conducts a general discussion with all fire personnel involved in the action. The overall goal of the after action review should be to identify if current guidelines are sufficient or if there are areas that require improvement. The SFO reviews the entire activity, pointing out negative and positive aspects of the firefighter's actions. Before conducting a general discussion, the SFO administers private reprimands as a means of correcting individuals who committed serious mistakes. If the entire crew needs improvement, the SFO conducts training sessions and drills.

Chapter 8

Aircraft Rescue Firefighting

The engineer F&ES teams provide ARFF support to Army, Air Force, Navy, Marine, allied, host nation, and civil aviation assets in support of Army operations. Engineer F&ES teams providing ARFF services may be assigned under direct supervision of the airfield activities division. These are critical functions that must be closely coordinated with all the branches of the airfield activities division. AR 420-1 establishes basic procedures and responsibilities for ARFF actions at airfields under DA jurisdiction.

ACTIONS

8-1. ARFF actions provide 24-hour emergency response capabilities for the following scenarios:

- Aircraft incidents, accidents, and mishaps.
- Search and rescue of injured, sick, or entrapped personnel either on board or ejected from an aircraft.
- Initial emergency medical care of victims.
- MEDEVAC standby actions.
- Maintenance standby actions.
- "Hot" refueling/rearming actions (FARP actions).
- Operations level (defensive) response to airfield incidents involving hazardous material.
- Emergency response to fires and incidents on the airfield that endanger adjacent aircraft or related facilities.

8-2. ARFF actions also include the following ongoing activities in support of the airfield management team:

- Assist the airfield commander in drafting, testing, and implementing airfield emergency plans.
- Perform the incident command function during emergency response periods on and around the airfield.
- Train, supervise, and direct the activities of emergency responders from outside the engineer F&ES teams.
- Conduct fire prevention, inspection, and education programs intended to lessen risk to aircraft, airfield facilities, and personnel.

PLANNING

8-3. The responsibility for maintaining an effective organization of trained personnel and adequate, reliable equipment resides with the commander holding jurisdiction over an airfield. The commander ensures that the airfield provides emergency protective services for flight activities and the types of aircraft operating at that airfield. These services include publishing detailed procedures for emergency firefighting, crash rescue, and handling of hazardous cargo and defueling activities as outlined in AR 420-1. Post these procedures at each location where emergency calls are received.

8-4. Engineer F&ES headquarters teams typically provide the command and control necessary to mitigate the ARFF planning process. However, in cases where engineer F&ES teams deployed without an engineer F&ES headquarters, the SFO of the AB team provides the command and control functionality in ARFF planning and activities.

8-5. Engineer F&ES teams provide 24-hour ARFF emergency response capabilities by using a variety of proven planning techniques, doctrinal standards, and procedures. The following references contain the baseline response requirements and regulatory guidance from which senior engineer F&ES personnel draw upon and cross reference while employing the military decisionmaking process in the planning of ARFF actions:

- DODI 6055.06.
- AR 420-1.
- NFPA® 403.
- NFPA®405.
- NFPA®1003.
- Various other DOD, DA, Joint, and civilian regulatory publications listed in the references section of this publication.

PREINCIDENT PLANNING

8-6. Preincident plans for ARFF actions require more flexibility than preincident plans for structural fires. Because the exact incident location may be unknown, engineer F&ES teams only make general plans as to likely incident sites. When developing preincident plans, consider mission, enemy, terrain and weather, troops and support available, time available, and civil considerations (METT-TC) relating to the assigned airfield.

8-7. Preincident plans include information on the different types of aircraft handled at an airfield. The air traffic control tower obtains specific information (number of personnel, amount of fuel, amount and type of ordnance onboard, nature of the emergency) at the time of the emergency. Preincident plans also include provisions for acquiring additional manpower and equipment.

8-8. Weather, terrain, runway conditions, amount of available equipment and remaining fuel, and incident location are some factors that govern placement of equipment during an ARFF action. Preincident plans can only cover general placement procedures and should allow for flexibility, based on the situation.

8-9. Firefighters encounter many different types of aircraft in theater. The armament and hazards of these aircraft can be varied, extensive, and lethal. Engineer F&ES teams must acquire and maintain knowledge of the aircraft particular to their AO. Make a copy of TO 00-105E-9 available to ARFF crews. This manual contains information on most fixed-wing and rotary-wing aircraft, crash/rescue data, and aircraft specifications for all services.

Note. Users of the above Web site must register with a valid .mil or .gov e-mail address in order to be granted access to the United States Air Force system.

COMMUNICATIONS

8-10. Engineer F&ES teams maintain a minimum of two methods for receiving notification of airfield emergencies. While the installation tactical operations center or emergency operations center communicates with the fire communications center regarding nonaviation related emergencies, the nature of aviation emergencies require direct communication from the air traffic control tower. The following methods are the most common place means of emergency notification for aviation emergencies:

- A primary crash line is a direct two-way communication line between the control tower and the engineer F&ES fire department activated from either location. Other facilities that should be on a primary crash line are medical and security assets, base operations, tactical operations center, emergency operations center, and headquarters (commander's staff).
- A secondary crash line is any other two-way communications system between the tower and the engineer F&ES fire department. A two-way radio or regular telephone lines are normal. A secondary system is a back-up system to the primary one in case of damage or failure.
- A light signal system is a system of light codes (no vocal communications) that a tower uses to signal vehicles and aircraft on an airfield.

- Use an airfield-flag method when vehicles do not have warning lights but may be equipped with high-visibility flags so aircraft can see them on an airfield. Airfield operations issue flags to vehicle operators once they receive clearance to be on an airfield.

NOTICE OF EMERGENCY

8-11. When notified of an emergency, the control tower immediately contacts the engineer F&ES fire department. The engineer F&ES fire department then dispatches the required response crews and notifies the subordinate support units and other emergency response personnel. The control tower supplies as much of the following information as possible:

- Location and nature of the emergency.
- Type of aircraft.
- Amount of fuel on board.
- Number of personnel on board.
- Types of hazardous cargo (explosives, radioactive, flammable, and/or toxic).
- Estimated time of arrival.
- Other information as required (wind direction/speed, call-sign, and so forth).

8-12. The control tower relays and updates this information to the engineer F&ES fire department as it becomes available. The engineer F&ES fire department transmits the information to the responding crews. ARFF crews then proceeds to predetermined standby positions alongside, but clear of, the designated runway. Drivers and crews must be ready to reposition as required.

STAND-BY ACTIVITIES AND ALERT LEVELS

8-13. During emergencies and hazardous conditions, station ARFF equipment and crews in the immediate vicinity of an aircraft or its anticipated landing point. While on standby status, personnel prepare the equipment to maneuver and discharge the extinguishing agent. ARFF crews provide standby service according to the degree of risk involved. The degree of risk and the response involved are as follows:

- **ALERT I (mild risk).** No standby required. ARFF crews maintain an alert status within the fire station. Situations at this level can include helicopter autorotation exercises, routine flight activities, routine maintenance activities, engine starts, and small fuel spills (under 5 gallons).
- **ALERT II (moderate risk).** One firefighting vehicle and crew responds or stands by. Situations at this level include medium fuel spills (5 to 100 gallons), continuous fuel leaks, MEDEVAC aircraft activities, loading munitions, welding aircraft, and working on open fuel cells.
- **ALERT III (severe risk).** All firefighting and rescue assets respond immediately. Situations at this level include aircraft crashes or serious accidents, emergency landings, and large fuel spills (over 100 gallons).

AIRCRAFT INCIDENT EMERGENCY TEAMS

8-14. Aircraft incident response teams should be made up in three separate groups. The following lists the personnel in each group:

- **Group I.** Personnel are required to participate in actions immediately. This group consists of firefighters and medical personnel.
- **Group II.** Personnel are required to perform related supportive services as circumstances develop. This group consists of maintenance and wrecker personnel, a provost marshal, military police or ground personnel, explosive ordnance disposal personnel, photographic personnel, and an aviation safety officer.
- **Group III.** Personnel are required to attend if their specific duty performance is needed. This group consists of an airfield or base camp commander, an installation fire marshal, aircraft accident personnel, chaplains, investigation personnel, and public affairs personnel.

AIRFIELD FAMILIARIZATION AND GRID MAPS

8-15. Each flight operations office provides local area grid maps to the engineer F&ES fire department and other emergency responders. The maps should be of suitable scale and cover at least a 15-nautical-mile radius center on an airfield. Post copies of the grid maps in each location where emergency calls are received. Place additional maps in each responding vehicle assigned to emergency crews and in all supporting vehicles and aircraft identified in the airfield emergency plan.

8-16. Acquaint all personnel assigned to emergency response elements with the terrain surrounding an airfield as part of the training program. This includes becoming familiar with the locations and bearing capacity of the roads, bridges, culverts, trails, and other significant terrain features within a 15-nautical-mile area of the airfield. Personnel do this through map orientation and personal inspection.

8-17. When notified of an incident, personnel receive the location or section on the grid map. They clearly identify the area and repeat the information back to the dispatcher. Emergency personnel then locate the site on the grid map and respond. All emergency crew personnel must read and locate points on a grid map and navigate to those points proficiently.

EMERGENCY RESPONSE (ON AIRFIELD)

8-18. When a potential or an actual emergency occurs on an airfield, emergency crews respond accordingly. Vehicles receive clearance from the control tower before proceeding onto a runway. Taxiing aircraft stop and will not proceed without clearance from the tower.

8-19. For ALERT II notifications—

- Designated emergency response crews respond immediately.
- ARFF crews preposition vehicles near the runway at predetermined points for prompt action. Place emergency equipment along a runway based on the nature of an aircraft emergency and the type of aircraft involved. Crash/rescue aircraft may start and fly to standby positions.

8-20. For ALERT III notifications—

- ARFF crews respond to the crash site immediately after an aircraft impacts. They approach the site cautiously, watching for injured personnel and casualties.
- During ALERT III emergencies, group II emergency responders respond automatically to the scene of the incident and stage as directed by the incident commander (SFO).

EMERGENCY RESPONSE (OFF AIRFIELD)

8-21. When a potential or an actual emergency occurs off an airfield, personnel involved in the action respond accordingly. However, in theaters of operation, METT-TC existing outside the secure confines of the airfield and/or base compound the difficulty of the response.

8-22. Emergency crews responding to off airfield incidents should consider the following:

- An armed security force will likely have to escort emergency equipment and personnel to the incident site.
- In addition to ground security, make all efforts should to provide aerial security in the form of spotter or attack rotary-wing aircraft.
- Security at a site may be harder to maintain requiring a larger security force.
- Emergency responders carry their assigned individual weapons while en route to off airfield emergencies. The security force escorting emergency responders secures individual weapons while responders work the emergency scene.

8-23. Engineer F&ES personnel can conduct RAMS operations with aviation personnel and assets in the event of a base incident. If so, they perform rescue and lifesaving procedures from an aircraft and/or with an aircrew.

INCIDENT RESPONSE CONSIDERATIONS

8-24. Rescuing aircraft crash victim's takes precedence over all other activities until no further life hazards are involved. After rescuing victims, firefighters extinguish fires and limit further damage to an aircraft. Each rescue situation is different, and the SFO has the authority to change procedures and use all the equipment and resources available to complete a rescue. All installations create and enact airfield emergency plans to handle crash and rescue emergencies.

8-25. Responding crews must approach a crash scene cautiously. Aircraft personnel may have been thrown clear or escaped from the aircraft. When responding to an aircraft emergency, all crew members on the emergency vehicle should observe for potential victims.

8-26. Aircraft frequently develop minor difficulties while in flight. Even though appropriate action occurs on board to correct the problem, a standby ARFF crew is required on the airfield when the aircraft arrives. Types of emergency situations that fire crews deal with are listed below:

- **Wheel, brake, and tire fires.** These problems occur in fixed-wing aircraft. Wheels and brakes are compounds of combustible metals. Fire crews must know the procedures for suppressing fires consisting of these metals. During a fire, pressure builds in the tires. Fire crews approach tires from the front, back, and never from the side.
- **Wheels-up landings.** These landings result from hydraulic-system failure or pilot error. This type of emergency may or may not produce a fire. Extreme heat from the friction between the aircraft and the ground and the ruptured fuel tanks and the lines could produce a fire.
- **Water crashes.** Fuel floating around an aircraft could come in contact with hot engine parts and ignite, making rescue of personnel difficult. Trapped air may keep the aircraft afloat, so make any attempt to enter it from under the waterline.
- **Building crashes.** These crashes present several problems. Problems include the following:
  - Fire spreading rapidly due to excessive fuel leakage over a wide area.
  - Rescue actions involve the aircraft and the building.
  - Search and evacuate the area around the building.
  - Fuel could enter storm drains and the fuel vapors could surface in other areas, creating other hazards.
- **Hillside crashes.** With these crashes, the aircraft could disintegrate or, if it hits obstructions, cartwheel and cause structural components to break away. Also, aircraft personnel may be thrown from the wreckage. Reaching these crashes is the main problem for rescue personnel.
- **Helicopter crashes.** Helicopters are of light construction and usually break up in a crash. The rotor system, undercarriage, and tail disintegrates, leaving the cabin or fuselage. Fuel leaks are the main concern. Most of the helicopter's controls are cable systems, and in a crash, these cables could entangle the crew and occupants.
- **No-fire crashes.** With these crashes, fuel spills or leaks are present but have not ignited. Protective clothing should be worn and all nonessential personnel clear the area. As soon as possible, fire crews apply a foam blanket (AFFF), stop leaks, and secure or remove the ignition sources from the area.
- **Nose-dive crashes.** The impact from a nose-dive crash is so disastrous there is usually not much chance for rescue actions.

Note. Only medical personnel (physicians) or mortuary affairs personnel can declare a victim as deceased. Firefighters extricate and recover victims regardless of signs of life, so long as doing so does not endanger the rescuer.

INCIDENT HAZARDS

8-27. ARFF crews must be able to identify the different categories of rockets, missiles, bombs, and cannons to identify explosive hazards. However, other hazards exist which are explosive and can be just as lethal as any bomb or rocket. These are aircraft ejection seats, canopy jettisons, and explosive canopies. Almost all Air Force fighters have canopy jettisons and/or ejection seats. The AH-64 Apache and AH-1

Cobra helicopters have explosive charges built into the canopies. The aircrew or rescue crew can activate the charge. Both of these hazards require firefighters become familiar with the procedures to disarm them or place them on safe. Sometimes the situation is out of a rescue crew's hands. They may be subject to dangerous fragments when a pilot detonates the canopy or the force of a crash jettisons a seat. See TO 00-105E-9 for more information on how to handle these devices safely.

AIRCRAFT SYSTEMS

8-28. Many of the systems in an aircraft are potential fire hazards. Component systems in an aircraft include the following:

- Fuel.
- Installed fire extinguishers.
- Electrical.
- Hydraulic.
- Oxygen.
- Anti-icing.
- Canopy jettison.
- Seat ejection.
- Escape.
- Ordnance.

AIRCRAFT ENGINES

8-29. Fixed-wing aircraft have an opposed-cylinder or turboprop, single- or multiple-engine configuration. Helicopters have a gas turbine, single- or multiple-engine configuration. A turboprop engine creates the same type of thrust that a jet engine creates; therefore, do not approach the aircraft from the rear or around the exhaust. Short circuits in the electrical systems and broken fuel and oil lines are the main sources of fires in gas engines. During start-up and shutdown of a gas engine, watch for fuel being drained or pumped through the engine.

ORDNANCE

8-30. Ordnance in or on aircraft (small-arms ammunition, missiles, rockets, flares, or bombs) can be cargo or armament. Identify aircraft carrying ordnance to prevent injuries during firefighting and rescue actions. Classify hazardous munition cargo and armament by their reaction characteristics. Ordnance materials are stored in various areas on aircraft. The following lists some general locations for specific aircraft types:

- Under the wings and inside or along the fuselage in a fighter.
- In the forward or aft fuselage in a cargo plane.
- Under the wings and in the bomb bay in a bomber.
- Under the wings and in the nose in a helicopter.

FLAMMABLE MATERIALS

8-31. Flammable materials commonly found in aircraft can cause problems for firefighters. These materials include—

- Aviation gasoline, jet fuel, and hypergolic fuel mixtures.
- Hydraulic fluids.
- Bottled gas (oxygen).
- Anti-icing fluids.
- Pyrotechnics, ammunition, and other ordnance.
- Metals (magnesium).

8-32. Upon impact, aircraft fuel tanks may fail, creating fuel mists. The fuels readily ignite under aircraft impact conditions. Under these conditions, fuel mist is as equally flammable as fuel vapors. A constant

threat of resignations (flashback) in fires involving large amounts of aviation gasoline or jet fuels exists. Firefighters must be aware of flashback possibilities.

HAZARDOUS MATERIALS

8-33. The following list describes some hazardous material associated with aircraft:

- Liquid and gaseous oxygen.
- Hydrazine.
- Beryllium.
- Magnesium.
- Depleted uranium.
- Ammonia.
- Liquid hydrogen.
- Nitrogen tetroxide.
- Carbon-graphite composite fibers.
- Sulfurhexaflouride gas.
- Triethylborine.
- Lithium thionylchloride.
- Inert liquid.

GENERAL AIRCRAFT RESCUE AND FIREFIGHTING RESPONSE PROCEDURES

8-34. The SFO at the emergency incident decides where to position fire trucks. The normal pattern is for turrets to cover the escape and rescue paths and hand lines cover the secondary paths. If the aircraft is carrying armament or has explosive jettison-type canopies, the SFO must be careful and cautious when deciding where to position the fire apparatus. When only one truck responds, the lead firefighter decides where to position the vehicle.

8-35. The most effective method of a quick attack is a mass application of extinguishing agents through large-volume turrets, with minimum use of hand lines. The priority in the initial attack is to open and secure rescue and escape paths and to keep any spilled fuel from igniting during rescue actions. When available, two rescue personnel are at each entry point. They enter and exit through paths maintained by the turrets and hand lines.

8-36. The quickest way into an aircraft is through normal entrances. When this is not possible, rescue personnel use emergency entrances or make cut-in entrances. Some aircraft have escape hatches or escape panels made of thermoplastic polymer or metal. The hatches usually have an external release handle with the location and operating procedures marked on the adjacent surface of the fuselage. If the handle is inoperable or inaccessible, rescue personnel use a crash ax and drive the pointed edge through the escape hatch or panel close to the corner or edge. They continue to use this procedure to knock out a section large enough for a swift entry.

8-37. Identify cut-in areas by broken yellow lines. These areas should be free of obstacles so that rescue personnel will not cut through heavy structural members or rupture fuel, electrical, or oxygen lines. Rescue personnel should cut fuselage skin carefully to prevent igniting fuel vapors. They along three sides of the yellow lines and use the bottom as a hinge to pull the section outwardly.

8-38. After gaining entrance, rescue personnel locate and determine the condition of injured victims. If they cannot control hazards, they evacuate the victims immediately. If evacuation is not possible, rescue personnel attempt to keep the fire away from trapped victims. Be careful when removing victims pinned in wreckage to prevent aggravating existing injuries or causing additional ones. If possible, they obtain medical advice before moving injured victims.

8-39. All Army aircraft have seat belts and many have shoulder harnesses. Seat belts and shoulder harnesses are constructed of strong, webbed material and are difficult to cut. Rescue personnel must be familiar with the release mechanisms of these belts and harnesses.

8-40. Extinguishment usually occurs after rescue personnel complete rescue actions. Tankers or backup crash trucks assist in applying water or extinguishing agents. Use light and air units and wreckers or cranes when necessary. Rescue personnel must overhaul all aircraft, even if fire does not occur. Overhauling includes—

- Inspecting the aircraft thoroughly to ensure that no hidden dangers remain.
- Securing the electrical system and disconnecting the batteries.
- Tagging, removing, and relocating bodies. (Medical authorities usually perform this function.)

MISCELLANEOUS AIRCRAFT RESCUE FIREFIGHTING

SCHEDULED AEROMEDICAL EVACUATION

8-41. At installations where firefighting crews and equipment are available, fire crews will—

- Be notified of aeromedical evacuations in advance to permit mobilization. At least one fire truck with crew responds.
- Take a strategic position for rapid response in case of a landing or a takeoff accident.
- Stand by in the immediate area of an aircraft when incapacitated patients are onboard and during loading and unloading.
- Ensure an aircraft is not fueled when patients are onboard except when absolutely necessary.
- Be stand by during takeoff, landing, loading, and unloading of patients and during refueling activities. Crew members position the fire trucks to provide maximum fire protection to personnel and the aircraft.
- Follow an aircraft during takeoff to the run-up area and remain there until it is airborne. A crash crew remains on alert status until an aircraft clears the traffic pattern.
- Follow an aircraft from the ramp to the parking area during landing. The fire crews position themselves to provide maximum coverage of the rescue paths, personnel, and aircraft. Fire crews remain on standby until all patients are loaded or unloaded.

FORWARD ARMING RESUPPLY POINT ACTIVITIES

8-42. Engineer F&ES teams support FARP activities as required. Security is a primary concern when operating in a forward area. Engineer F&ES crews subdue all highly visual areas on the truck with materials available. Conduct all driving under blackout conditions. Limit fire protection to rescuing personnel in the event of a crash and suppressing fires of mission-essential equipment and resources. When operating out of the immediate area of the FARP, a security force must be provided.

Chapter 9

Hazardous Materials/Explosive Detonations

The purpose of this chapter provides engineer F&ES teams with the basic requirements needed to take appropriate actions when engineer F&ES teams respond to a hazardous material/explosive detonations incident. This chapter gives limited basic information about the initial defensive and offensive actions. This chapter meets the requirements for DODI 6055.06, OSHA, NFPA®, and Office of Domestic Preparedness hazardous material responder awareness and operation levels.

SCOPE

9-1. Engineer F&ES teams initially handle hazardous material/explosive detonations incidents they encounter during activities on a base camp and stability and defense support of civil authorities. The degree of response and mitigation of the incident depends on the available required equipment, personnel, and training. The current configuration of a typical engineer F&ES team is set up to only provide protection to individuals, the environment, and property from the effects of a hazardous material release in a defensive manner to the hazardous material defensive actions level.

9-2. Engineer F&ES teams determine and establish the appropriate hazardous material response capability for each engineer F&ES mission requirement. They use the guidelines in DODI 2000.21 and DODI 6055.06 for all locations.

DEFENSIVE ACTIONS

9-3. A defensive action is the action taken by a hazardous material responder during an incident where there is no intentional contact with the material involved. These actions include elimination of ignition sources, vapor suppression, and diking or diverting to keep a hazardous material release in a confined area. Defensive actions require notification and possible evacuation, but do not involve plugging, patching, or cleanup of spilled or leaking materials.

CAPABILITY

9-4. Determine the engineer F&ES team's capability by its ability to perform initial risk assessment, emergency decontamination, confinement, and mitigation of hazardous material/chemical, biological, radiological, and nuclear releases that do not require entry into the hot zone.

MANNING REQUIREMENTS

9-5. A minimum of one engineer F&ES team consisting of at least four personnel with required PPE for incident is required on-scene to perform this mission. All personnel shall be trained and certified to at least the hazardous material operations level.

CONSTRAINTS

9-6. Engineer F&ES teams may not perform defensive actions when the risks of intervening are greater than the risks of allowing the incident to conclude naturally.

OFFENSIVE ACTIONS

9-7. Offensive actions are the actions taken by a hazardous material responder, wearing appropriate chemical protective clothing to handle an incident in such a manner that contact with the released material may result. These actions include approaching the point of release for patching or plugging to slow or stop a leak, containing a material in its own package or container, and cleanup activities that may require overpacking or transfer of a product to another container.

CAPABILITY

9-8. Perform initial risk assessment and limited rescues, select and provide decontamination procedures, and mitigate releases of hazardous material incidents/explosive detonations that require entry into the hot zone.

9-9. Determine whether the capability be delivered by the base camp engineer F&ES fire department, the base camp engineer F&ES fire department with mutual aid from the host nation support, or solely from the a mutual aid host nation source.

MANNING REQUIREMENTS

9-10. A minimum of 15 personnel is required on scene. Responding personnel are not required to be engineer F&ES personnel, but may be assigned to other installation organizations such as environmental engineering. However, responding personnel must meet the training and certification requirements specified below and be available for immediate response 24/7.

9-11. Ensure at least seven personnel on-scene are trained and certified to the hazardous material technician level. At least one person on-scene is trained and certified to the hazardous material incident commander level as well as the other required levels listed for each position. A minimum five personnel on-scene will be trained and certified to at least the hazardous material operations level. Ensure at least two personnel on-scene are trained and certified to emergency medical technician-basic life support level or higher and have on-scene medical transport capabilities.

CONSTRAINTS

9-12. The engineer F&ES team's offensive actions ability may be limited due to the following:

- The nature of the incident including, but not limited to, the product, substance or agent and the incident complexity and expected duration.
- The number of casualties or persons exposed.
- The actual number and qualifications of the required responding personnel.
- Chemical, biological, radiological, nuclear, and high-yield explosive incidents present extraordinary challenges, such as mass contamination, secondary devices or attacks, and large multiple victim extractions. These challenges are beyond the minimum response requirement and significantly limit the ability to perform offensive actions until additional resources are available. Keep local commanders informed of the engineer F&ES team's capability and notify them of any changes regarding chemical, biological, radiological, nuclear, and high-yield explosives capability.

9-13. In the event the engineer F&ES team's offensive actions are limited, every effort shall be made to conduct defensive actions.

Chapter 10

Miscellaneous Facility Based Firefighting

Miscellaneous firefighting generally refers to any firefighting activity not involving structural or ARFF firefighting. Tactical petroleum terminals, logistics bases, internment or dislocated civilian camps, and general support hospitals make up some of the special mission areas that firefighters support. These infrequently encountered, vital missions probably require firefighters to focus even harder on training because they see so little of them.

TACTICAL PETROLEUM TERMINAL

MISSION

10-1. One of the major facilities requiring engineer F&ES support in the AO is the tactical petroleum terminal. The mission of the engineer F&ES team with a tactical petroleum terminal in its AO is to—

- Position organic engineer F&ES teams.
- Conduct sustainment training of petroleum, oils, and lubricants crews to use the organic engineer F&ES equipment.
- Respond to all incidents involving the tactical petroleum terminal.

SITE DESIGN

10-2. The tactical petroleum terminal has organic engineer F&ES equipment in its design, but the equipment is a first response measure only. The fire prevention section of the AA or the AB team conducts an on-site inspection ensuring the engineer F&ES suppression sets are in the most effective locations. The tactical petroleum terminal personnel inspects within their area ensuring—

- Proper berm placement around storage areas in case of leaks or spills.
- Proper leak and spill reporting as required, including the appropriate Army safety and environmental protection functional offices.
- Areas are spaced out to control the spread of fire.

TRAINING

10-3. Personnel assigned to a tactical petroleum terminal may have little or no training on how to use fire suppression equipment. Therefore, engineer F&ES teams have to train key personnel at the terminal so tactical petroleum terminal personnel can perform in case of an emergency. Training includes—

- Putting the fire suppression sets into service.
- Conducting daily preventive maintenance checks and services of the set and their personal protective clothing.
- Using the sets effectively in an emergency.

ADDITIONAL SUPPORT

10-4. In any incident, the engineer F&ES teams responds to extinguish the fire and contain the vapors. They also ensure fire suppression sets are reserviced and back in operation in a timely manner.

10-5. When responding to fires in a tactical petroleum terminal, the engineer F&ES teams ensures they do not cause more damage than the fire. This makes prefire planning important in a tactical petroleum

terminal. Networks of piping, valves, pumps, and storage bladders are interconnected throughout the site. Note special care for shut-off valves and response routes.

10-6. If extinguishing a fully involved storage unit poses more of a threat because of vapors, the engineer F&ES teams protects the other storage areas and allows the fire to burn. Controlling runoff is very important in fighting a fire in a tactical petroleum terminal. Firefighters channel and control the runoff ensuring proper cleanup after extinguishing the fire.

LOGISTICS BASE

10-7. Engineer F&ES teams assigned to major logistics bases will be involved in emergencies with internal and external storage, bulk petroleum, oils, and lubricants products, hazardous material storage, tent cities, vehicles, and personnel incidents. Their missions include the following:

- **Fire protection and prevention.** Engineer F&ES teams assist in base planning. The AA team should be available to the commander during site planning and once the activities begin. Fire prevention should be a high priority on a commander's list. Access to storage areas must allow for movement of the firefighting apparatus, including water tankers. Place temporary water points for maximum usage in high-risk areas. Note areas storing hazardous materials on response charts, and make all crews aware of these areas. Make material data sheets available before an incident occurs for prefire planning.
- **Hazardous materials.** Engineer F&ES teams ensure that—
  - Hazardous materials are stored according to current safety and environmental protection regulations.
  - All reactive materials are stored in separate locations in case of a breach of containers.
  - All personnel, including the engineer F&ES teams working in an area where containers are stored, know the possible dangers involved with a container breech.
- **Other missions**. Engineer F&ES teams on a logistics base also assist in rescue actions and in EMS, as required.

INTERNMENT/DISLOCATED CIVILIAN CAMP

10-8. Engineer F&ES teams assigned to protect internment or dislocated civilian camps are responsible for the following:

- **Fire protection and prevention.** Fire prevention should be a high priority on the commander's list.
- **Assist in base planning.** Engineer F&ES teams assist in base planning. Members of the AA team should be available to the commander during site planning and once activities begin. They ensure access to their stations allows for movement of the firefighting apparatus, including water tankers.

GENERAL SUPPORT HOSPITAL

10-9. Engineer F&ES teams assigned to protect a hospital are responsible for the following:

- **Fire protection and prevention.** Prevention should be a high priority on the commander's list. Engineer F&ES actions must be quick and confining the fire a priority. Develop prefire plans and control points during set up or as soon as possible. The fire prevention section must monitor the storage of hazardous materials and compressed gasses.
- **Support of all medical evacuation missions.** Engineer F&ES teams assist medical personnel in evacuating the sick and injured, when required.
- **Assistance in base planning.** Members of the AA team should be available during site planning and once the activities begin. They ensure that access to their stations allows for movement of the firefighting apparatus, including the water tankers.

Glossary

The glossary lists acronyms and terms with Army or joint definitions. Terms for which FM 3-34.30 is the proponent are marked with an asterisk (*).

SECTION I – ACRONYMS AND ABBREVIATIONS

AFFF	aqueous film forming foams
AFH	Air Force handbook
AFPAM	Air Force pamphlet
AO	area of operations
AR	Army regulation
ARFF	aircraft rescue firefighting
attn	attention
CBRNE	chemical, biological, radiological, nuclear, and high-yield explosive
CDID	Capabilities Development and Integration Directorate
CFR	Code of Federal Regulations
CODDD	Concepts, Organizations, and Doctrine Development Division
CONUS	continental United States
DA	Department of the Army
DC	District of Columbia
DOD	Department of Defense
DODI	Department of Defense instruction
EMS	emergency medical service
ETL	engineering technical letter
F	Fahrenheit
FACC	fire alarm communications center
FARP	forward arming refueling point
F&ES	fire and emergency services
FM	field manual
HEMTT	heavy-expanded mobility tactical truck
HEWATT	HEMTT-based water tender
IFSTA	International Fire Service Training Association
MEDEVAC	medical evacuation
METT-TC	mission, enemy, terrain and weather, troops and support available, time available, and civil considerations
MOS	military occupational specialty
MSCoE	Maneuver Support Center of Excellence
NFPA®	National Fire Prevention Association
NIMS	National Incident Management System

No.	number
OCONUS	outside the continental United States
OSHA	Occupational Safety and Health Act
PPE	personal protective equipment
POL	petroleum, oils, and lubricants
RAMS	rescue air mobility squad
RECEOVS	rescue, exposure, confine, extinguish, overhaul, ventilate, and salvage
SCBA	self-contained breathing apparatus
SFO	senior fire official
TFFT	tactical firefighting truck
TFFT	tactical firefighting truck
TM	technical manual
TO	theater of operations
UFC	Unified Facilities Criteria
USACHPPM	United States Army Center for Health Promotion and Preventive Medicine
US&R	Urban search and rescue
USC	United States Code
U.S.	United States

SECTION II – TERMS

term

None.

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By Order of the Secretary of the Army

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