CHAPTER 6

AIRCRAFT FIREFIGHTING (LPD/ACS)

Although helicopters are the primary aircraft operating from amphibious transport docks (LPDs) and air-capable ships (ACS), vertical/short takeoff or landing (V/STOL) aircraft are also operated at times. Because of the helicopter’s ability to land and take off vertically, a crashed helicopter on the flight deck may not cause the entire flight deck to be disabled and, subsequently, stop flight operations until the flight deck is cleared. The ACS flight deck crash, fire, and rescue team functions as a specialized damage control party.

ACS is defined as all ships other than carrier; fixed wing aircraft, nuclear (CVN); amphibious assault ship, general purpose (LHA); and amphibious assault ship, multipurpose (LHD), which have an aircraft operating capability (i.e., landing, take-off, vertical replenishment, or hover in-flight refueling (HIFR) operations.

LEARNING OBJECTIVES

When you have completed this chapter, you will be able to do the following:

1. Recognize the air department’s crash, fire, and rescue organization aboard.
2. Identify the duties and responsibilities of assigned personnel.
3. Identify crash and salvage equipment used aboard ACS.
4. Recognize the capabilities, limitations, and requirements of crash and salvage equipment.
5. Identify aircraft firefighting equipment, operation procedure, and capabilities of firefighting equipment use aboard ACS.
6. Recognize standard firefighting equipment for ACS.
7. Identify personnel training requirements related to aircraft firefighting and crash personnel.

Organization and Operations

Air Officer (LPD)

On an LPD, the air officer has the overall responsibility for aircraft firefighting, salvage, jettison, and personnel rescue operations occurring on the flight deck and hangar. The air officer is responsible for the direction and coordination of aircraft movement on the flight deck/landing platform as required during aircraft crash and fire evolutions. He or she acts on and relays communications from the scene leader to the bridge and damage control central.

Helicopter Control Officer (Other Air-Capable Ships)

On air-capable ships other than the LPD, aircraft firefighting, salvage, jettison, and personnel rescue operations occurring on the flight deck and hangar duties are normally a function of the helicopter control officer (HCO) or the flight deck officer (FDO). The HCO/FDO, under the supervision of the damage control assistant (DCA) directs all aircraft firefighting and rescue operations on the flight deck and vicinity.

Aircraft Crash, Rescue, and Salvage Supervisor (LPD)

The aircraft crash, rescue, and salvage supervisor is responsible for the organization and training of flight deck/landing platform firefighting and rescue teams and for aircraft salvage and jettison operations. He or she is also responsible for the material maintenance readiness and operation of assigned equipment.
**Damage Control Assistant (DCA)**

In air-capable ships other than the LPD, the DCA, as directed by the engineering officer, is responsible for accomplishing the training required to establish and maintain proficiency in the fundamentals of aircraft firefighting and rescue operations. The DCA shall ensure that each station is fully equipped, that each item of equipment is in working order, and that assigned personnel are familiar with the exact stowage location and proper use of the equipment.

**NOTE**
DCA shall attend helicopter firefighting team training course (#J-495-0414) when assigned to an air-capable ship (to include LPD class ships).

**Weapons Officer**

The weapons officer shall keep the air officer/HCO continually updated as to type/quantity of ordnance being used.

**Manning**

**Crash, Salvage, and Rescue Team**

The crash team is also the flight deck/landing platform repair team. It serves to fight aircraft fires on the flight deck, affect the rescue of personnel as required, and perform salvage or jettison procedures as the situation dictates.

**Team Organization during Flight Operations**

The following crash, rescue, and salvage team organization is considered minimal for effecting firefighting and rescue functions during flight operations. These duties and responsibilities are primary in nature and shall be manned for all evolutions including:

- Launch
- Recovery
- Respot (multi-spot flight decks)
- Fuel
- Defuel
- Maintenance turnups
- Vertical replenishment (VERTREP) operations
- HIFR operations

**NOTE**
One fully manned hose team shall be used for maintenance turnups without rotors engaged.

For flight operations, a primary flight quarters crash and rescue party shall be manned when an aircraft is over the deck as follows:

**LPD Minimum Requirements**

1. Aircraft crash, rescue, and salvage supervisor.
2. Two aqueous, film-forming foam (AFFF) hose teams. Only one fully manned hose team is required for maintenance turnups when rotors are not engaged. A third hose team shall be manned for weapons cooling (as required).

3. Two rescue persons (hot suitmen).

4. Medical personnel.

5. Two AFFF station/outlet operators (plug men). The third hose team member assigned to each hose may be designated to perform this function. Upon the occurrence of a casualty and activation of the hose, the plug man moves up to handle the hose while minimizing additional personnel exposed to hazards.

6. Messengers/phone talkers (as required). The commanding officer (CO) shall determine the mode of communication based on ship’s configuration. The requirement for phone talkers may be eliminated if communications can be established and maintained by using other reliable means.

7. AFFF proportioner station operator.

**Air-Capable Ship Minimum Requirements**

1. All declared in-flight emergencies, or at the CO discretion, require the manning described for Condition D below in Table 6-1. An AFFF proportioner station operator is required in accordance with (IAW) Chapter 9, page 9-24 with the NATOPS U.S. Navy Aircraft Firefighting and Rescue Manual, NAVAIR 00-80R-14.

2. Reduced manning for unmanned aerial vehicles (UAVs) is based on the hazard posed by current tactical UAVs, such as the Fire Scout or smaller. Deployment of larger UAVs would require reassessment of manning requirements.

3. The third hose team member assigned to each hose may be designated to perform the function of AFFF station/outlet operator (plug man). Upon the occurrence of a casualty and activation of the hose, the plug man shall move up to handle the hose while minimizing additional personnel exposed to hazards. This assumes availability of at least two non-collapsible hose reels for flight deck AFFF coverage. Ships without at least two reels available are required to staff to Condition D.

4. For determining messengers/phone talkers requirements, the CO shall determine the mode of communication based on ship’s configuration. The requirement for phone talkers may be eliminated if communications can be established and maintained by using other reliable means.

5. For all single AFFF hose team evolutions, the flight deck firefighting backup response team must be designated and be able to rapidly respond to any flight deck fire.

6. Self-contained breathing apparatus (SCBA) shall be worn by all personnel required to be outfitted in the proximity firefighting protective ensemble (PFFPE).

7. External ordnance aviation operations include flight evolutions that require external mounting of ordnance (air-launched guided missiles, torpedoes, rockets) on the aircraft. It also includes the external transfer (VERTEP) of ordnance onto or off of the flight deck.

8. When two AFFF hose teams are required, personnel from the flight deck crew (chock and chainmen, fuel crew) may be trained and designated to man the second hose team provided all personal protective gear is properly staged for their immediate response. Only one fully manned hose team is required for maintenance turnups when rotors are not engaged.

9. Additional hose teams shall be manned for additional weapons cooling (as required).
10. For corpsman duties and responsibilities, refer to the NATOPS U.S. Navy Aircraft Firefighting and Rescue Manual, NAVAIR 00-80R-14, pages 9-7.

11. The use of the two rescue personnel as the first hose team along with a third person attired in PFFPE will make a more aggressive first attack capability on a fire than is possible by unprotected personnel. This hose team can quickly cut a rescue path and make an aggressive interior attack if needed. The two rescue personnel can then be relieved of the hose to perform a rescue while the third person in PFFPE remains on the hose. Additional personnel can be used as needed to man the hose. In order to make an immediate attack, all the three hose team members must be fully dressed in PFFPE, including SCBAs, for all takeoffs, landings, VERTREP, and HIFR, if HIFR is performed. This is an option in order to reduce manning. Ships operating with only two sets of PFPPE available are required to staff to Condition D.

12. A high personnel evolution is defined as five or more personnel onboard an aircraft.

13. The use of two personnel attired in PFFPE as part of the first hose team will make a more aggressive first attack capability on the fire than is possible by unprotected personnel and allows for protection during overhaul.

NOTE
During takeoff and landing, to the greatest extent possible, the flight deck crew (i.e., chock and chainmen, fuel crew), where designated as flight deck fire party, shall be located in a position that allows for visual observation of the flight deck but provides protection in the event of a crash and allows immediate access to AFFF hoses and handling equipment.

NOTE
Ships with aluminum flight decks must have a fully operational flush deck sprinkler system in accordance with the NATOPS U.S. Navy Aircraft Firefighting and Rescue Manual, NAVAIR 00-80R-14, pages 9-25. When the system is not being fully operational, an additional hose team shall be manned in accordance with the NATOPS U.S. Navy Aircraft Firefighting and Rescue Manual, NAVAIR 00-80R-14, pages 9-26.
<table>
<thead>
<tr>
<th>Condition</th>
<th>Aviation Type</th>
<th>Required Tasks</th>
<th>Required Manning</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Unmanned/No External Ordnance</td>
<td>Fight Fire</td>
<td>Four (4) persons: consisting of one scene leader, one three-man AFFF hose team (two of the hose team personnel shall be in PFFPE), plus additional messengers/phone talkers, as required. Note: this scenario excludes rescue persons.</td>
</tr>
<tr>
<td>B</td>
<td>Unmanned/External Ordnance</td>
<td>Fight Fire, Cool Ordnance</td>
<td>Seven (7) persons: consisting of one scene leader, two three-man AFFF hose teams (two personnel on one of the hose teams shall be in PFFPE), plus additional messengers/phone talkers, as required. Note: this scenario excludes rescue persons.</td>
</tr>
<tr>
<td>C</td>
<td>Manned/No External Ordnance</td>
<td>Fight Fire, Crew Rescue</td>
<td>Seven (7) persons: consisting of one scene leader, two AFFF hose teams (3-personnel each, one hose team in PFFPE), plus additional messengers/phone talkers and corpsman as required. Note: ships operating with only two sets of PFPPE available are required to staff to condition D.</td>
</tr>
<tr>
<td>D</td>
<td>Manned/External Ordnance/High Personnel Evolutions</td>
<td>Fight Fire, Cool Ordnance, Crew Rescue</td>
<td>Nine (9) persons: consisting of one scene leader, two rescue persons in PFFPE, two three-man AFFF hose teams, plus additional messengers/phone talkers and corpsman as required.</td>
</tr>
</tbody>
</table>

**Background Assistance Detail**

Additional backup fire party personnel shall be designated for emergency response. This team shall be designated on the ship’s watchbill and respond immediately upon sounding of the flight deck crash alarm or emergency flight quarters. This team may be comprised of air detachment personnel when aboard ship due to their proximate location to the flight deck. The background assistance detail is as follows:

1. Background assistance leader
2. One AFFF hose team (typically manning a hose rigged with an in-line inductor for a backup hose)
3. Messengers/phone talkers (as required). The CO shall determine the mode of communication based on ship’s configuration. The requirement for phone talkers may be eliminated if communications can be established and maintained by using other reliable means.

4. One AFFF station or eductor operator (plug man).

Duties and Procedure Requirements

The following aircraft firefighting team organization and duties are essential to meet the training and procedure requirements contained herein.

Scene Leader

The scene leader is a designated trained individual in the vicinity of an incident who understands the requirements of the emergency and accepts responsibility for directing all available firefighting assets at the scene.

Background Assistance Leader

The background assistance leader supports the scene leader, anticipating personnel and equipment requirements. The background assistance leader should be positioned so that the entire flight deck or crash scene is in view. Responsibilities shall include but are not limited to:

- Ensuring flow of messengers to the scene leader
• Effecting the removal of aircraft near the scene (multispot ships only, LPD, landing ship dock (LSD))
• Providing stretcher bearers for casualty removal
• Providing one manned AFFF hose (for a backup hose)
• Ensuring external power is secured to the aircraft involved
• Knowing the locations of all required equipment (e.g., tool roll, extra hoses, and portable extinguishers)
• Ensuring fuel repair, medical, and maintenance personnel are available
• Assembling and positioning support personnel not required at the scene to combat any additional fires and to provide support to the scene leader, as needed
• Ensuring adequate supply of AFFF concentrate where eductors are employed

**Hose Team/Deployment**
AFFF hoses shall be deployed to the scene using maximum personnel participation. When in place, a hose team shall consist of the AFFF hose with a minimum of five persons (maximum seven) on each 2-1/2-inch hose and a minimum of three persons (maximum five) on each 1-1/2-inch hose.

**NOTE**
- Hose teams should be minimally manned to reduce exposure to ordnance hazards.
- All personnel on the hose team should be positioned on the outside of the hose in relation to the aircraft to aid in mobility, communication, and decrease interference between hose team members.
- All personnel shall wear leather gloves during firefighting evolutions.

**Hose Team Leader**
Hose team leader is positioned directly behind the nozzleman and is responsible under the direction of the scene leader for his or her hose team.

**Messengers**
Messengers are responsible for relaying information between the scene leader and appropriate control centers.

**Rescue Personnel**
The rescue personnel shall be available and properly attired in PFFPEs, including SCBA. Rescue personnel should always work in pairs as directed by the scene leader.

**AFFF Hose Station Operator (Plug Man)**
This person activates the station and charges the hose. Upon the occurrence of a casualty and activation of the hose, provided hose is not being fed AFFF via a portable eductor, the plug man shall assist in manning the hose.
EOD/Weapon Personnel

Personnel properly equipped and trained in weapons handling shall be available to respond to the scene to provide technical assistance, weapons cooling temperature checks, and weapons disposal as required.

Medical Personnel

These individuals shall be positioned with the background assistance detail near the background assistance leader upon sounding of the flight deck crash alarm or announcement of emergency flight quarters to provide medical assistance as required. When flight quarters are set, the corpsman will ensure the space designated for the collection and treatment of those injured on the flight deck is prepared, that needed equipment is staged, and report same to the ship’s designed control station (i.e., tower, bridge). The corpsman may continue routine medical duties while remaining ready to respond immediately when an emergency or injury occurs on the flight deck.

Aviation Fuel Personnel

These individuals shall respond to the background assistance detail and be available to provide technical assistance and systems repair.

Air Wing/Helicopter Detachments (Ships with Aircraft Embarked)

Air wing/helicopter detachments shall provide a senior maintenance representative for technical assistance. Additionally, all squadron personnel shall provide immediate assistance in all firefighting or training evolutions.

Equipment

A general description of firefighting agents and equipment is found in Naval Ships’ Technical Manual (NSTM), Surface Ship Firefighting, Chapter 555. Additionally, the Air-Capable Ship Aviation Facilities Bulletin, Number 1(series), specifies minimum equipment requirements to support flight operations.

AFFF Hose Outlets

Helicopter landing platform AFFF outlets are located port and starboard adjacent to the landing area. The station normally consists of one 1½-inch hose (reel/station) or one 2½-inch hose outlet. A pushbutton control is located adjacent to each AFFF hose station. Some ships are equipped with helicopter hangars. AFFF hose outlets are normally located within the hangar area. For initial response, the 1½-inch AFFF hose reel station can be activated and firefighting efforts initiated by one person until help arrives. Emergency lighting is provided at each hose reel station; controls are located in primary flight control (PRIFLY)/helo-control and on the navigation bridge.

Hose Outlets

Hose outlets shall be of quantity and location to permit reaching all areas, on weather deck and below from at least two outlets.

The routing of fire hoses through hatches and scuttles is not permitted. The routing of fire hoses through doorways will be permitted where there is a positive mechanical means of securing the door in the open position and the helicopter operations bill specifies that, when required, the door must be secured in the open position to permit the hose to pass through.

NOTE

Exceptions to the above requirements are permitted where, by ship design, hose reels serving the flight deck must be routed through hatches.
Equipment for AFFF and Saltwater Hose Outlets in Air Operations Areas

- Hose outlet valves
- Vari-nozzles
- Hoses
- Spanner wrenches (2)
- One carbon dioxide (CO2) and one purple-k-powder (PKP) extinguisher (AFFF outlet only)

## Vari-Nozzles and In-Line Eductors

Vari-nozzles are used on all AFFF and saltwater hose lines. Flow rates are 250 gallons per minute (gpm) for all 2½-inch hose lines. Nozzles on 1½-inch AFFF hoses on flight and hangar decks are the 125 gpm units (unless an foam ratio protein (FP) 180 proportioner supplies two 1½-inch hard lines, then use 95 gpm nozzles). Nozzles on 1½-inch and 1¾ -inch saltwater lines and those used with AFFF in-line eductors are 95 gpm models. All nozzle gpm ratings are based on 100 pounds per square inch (psi) pressure at the nozzle inlet. The portable in-line eductors are stowed in repair lockers and are used to mix salt water and AFFF concentrate from 5-gallon containers to produce AFFF solution for combating fires. This in-line eductor may be placed anywhere in the hose line but is recommended to be near or on the saltwater outlets, as a minimum of 100 psi at the inlet is optimum for proper proportioning. Hose downstream of the eductor is typically limited to 150 feet on the same deck or one deck above the saltwater outlet. Locating the eductor at the outlet allows the plug man to handle transferring the pickup tube between AFFF containers and moves this activity off to the side.

### NOTE

- Helicopter operations require two additional CO2 15-pound portable units with 5- or 7-foot insulated extension wands.
- All ships operating the V-22 shall maintain V-22 wands as part of flight deck equipment.

### Flight Deck Extinguishers

One CO2 and one PKP extinguisher shall be mounted at each AFFF hose station servicing the flight deck and hangar and shall be readily available to all flight deck and hangar areas. Two additional CO2 extinguishers shall be provided for the flight deck on all air-capable ships and shall be permanently fitted with insulated extension pipes 5 or 7 feet long. For all V-22 operations, extinguishers shall be equipped specifically with the V-22 extension wand with appropriate mounting hardware. Extinguishers on weather deck shall not have tags or labels of any kind which could be caught by air currents and present a hazard to aircraft and personnel. Crash and salvage tool inventories containing the firefighting/rescue tools and equipment is listed in *Table 6-2*. 

### NOTE

Where saltwater fireplugs with eductors are used as primary firefighting or weapons cooling hoselines, a minimum of 25 gallons of Type-3 or 50 gallons of Type-6 AFFF concentrate, as appropriate for the installed eductor, shall be positioned at each applicable plug during flight quarters. This will provide an immediate supply of AFFF concentrate until a continuous resupply can be provided.
Crash Tool Inventory

### Table 6-2—Crash and salvage tool inventory

<table>
<thead>
<tr>
<th>TOOL</th>
<th>QTY</th>
<th>National Stock Number (NSN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axe, crash/fire</td>
<td>2</td>
<td>5110-00293-2336</td>
</tr>
<tr>
<td>Cutters, cable (14-inch)</td>
<td>1</td>
<td>5110-00-224-7053</td>
</tr>
<tr>
<td>Halligan tool</td>
<td>1</td>
<td>5120-00-009-5044</td>
</tr>
<tr>
<td>Hammer, ball peen (1 1/2-pound)</td>
<td>2</td>
<td>5120-00-061-8545</td>
</tr>
<tr>
<td>Pliers, 8 1/2-inch locking (vice grip)</td>
<td>2</td>
<td>5120-00-277-4244</td>
</tr>
<tr>
<td>Pliers, lineman</td>
<td>2</td>
<td>5120-00-239-8251</td>
</tr>
<tr>
<td>Pliers, rib joint, water pump (10-inch) (channel locks)</td>
<td>1</td>
<td>5120-00-278-0352</td>
</tr>
<tr>
<td>Pliers, side cutting (8-inch)</td>
<td>2</td>
<td>5110-00-224-1532</td>
</tr>
<tr>
<td>Pliers, 10-inch (slip-joint)</td>
<td>2</td>
<td>5120-00-223-7398</td>
</tr>
<tr>
<td>Pliers, 6-inch (slip-joint)</td>
<td>2</td>
<td>5120-00-223-7396</td>
</tr>
<tr>
<td>Pliers, long nose (needle nose)</td>
<td>2</td>
<td>5120-00-247-5177</td>
</tr>
<tr>
<td>Punch, drift (8-inch)</td>
<td>2</td>
<td>5120-00-240-8898</td>
</tr>
<tr>
<td>Safety flashlight</td>
<td>2</td>
<td>6230-00-299-3035</td>
</tr>
<tr>
<td>Saw, hack, frame</td>
<td>2</td>
<td>5110-00-289-9657</td>
</tr>
<tr>
<td>Saw, hack blades 6 blades per frame</td>
<td></td>
<td>5110-00-277-4589</td>
</tr>
<tr>
<td>Screwdriver, Phillips #2</td>
<td>2</td>
<td>5120-00-234-8913</td>
</tr>
<tr>
<td>Screwdriver, Phillips #3</td>
<td>2</td>
<td>5120-00-234-8912</td>
</tr>
<tr>
<td>Screwdriver, flat tip 3/16-inch tip, 6-inches long</td>
<td>2</td>
<td>5120-00-227-7356</td>
</tr>
<tr>
<td>Screwdriver, flat tip 5/16-inch tip, 10 inches long</td>
<td>2</td>
<td>5120-00-278-1283</td>
</tr>
<tr>
<td>Strap cutter (rescue knife)</td>
<td>3</td>
<td>4240-01-568-3219</td>
</tr>
<tr>
<td>Vacuum, high efficiency (.3 micron filter) (LPD only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOOL</td>
<td>QTY</td>
<td>National Stock Number (NSN)</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----</td>
<td>----------------------------</td>
</tr>
<tr>
<td>Wrench, 12-inch adjustable</td>
<td>1</td>
<td>5120-00-264-3796</td>
</tr>
<tr>
<td>Wrench, 8-inch adjustable</td>
<td>1</td>
<td>5120-00-240-5328</td>
</tr>
<tr>
<td>Wrench, fire hose, spanner</td>
<td>2</td>
<td>5120-00-018-1519</td>
</tr>
<tr>
<td>Tool roll</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Ladder with a minimum straight length capability of 12 feet (available from crash locker or other shipboard department provided it’s readily accessible to the flight deck). Ladder shall meet the requirements of NFPA 1931 or have at least an OSHA duty rating of Type 1A, industrial extra heavy duty, with a minimum working load of 300 pounds.

**Tool Roll**

A crash and rescue tool roll containing a minimum of one each of the tools listed below shall be immediately available for use by the crash, rescue, and salvage team. The tool roll shall be inspected daily (prior to flight quarters) for completeness and to ensure that tools are usable. Ships shall ensure that tools are engraved with the ship’s hull number. Requirements for the tool roll will be assembled from tool inventory listed in Table 6-2 crash tool inventory section.

**Table 6-2 — Tool Roll**

<table>
<thead>
<tr>
<th>TOOL</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pliers, locking (vice grip), 8-inch</td>
<td>1</td>
</tr>
<tr>
<td>Pliers, side cutting, 8-inch</td>
<td>1</td>
</tr>
<tr>
<td>Pliers, 10-inch (slip-joint)</td>
<td>1</td>
</tr>
<tr>
<td>Pliers, 6-inch (slip-joint)</td>
<td>1</td>
</tr>
<tr>
<td>Pliers, long nose (needle nose)</td>
<td>1</td>
</tr>
<tr>
<td>Punch, drift (8-inch)</td>
<td>1</td>
</tr>
<tr>
<td>Saw, hack frame with 6 spare blades</td>
<td>1</td>
</tr>
<tr>
<td>Screwdriver, Phillips #2</td>
<td>1</td>
</tr>
<tr>
<td>Screwdriver, Phillips #3</td>
<td>1</td>
</tr>
<tr>
<td>Screwdriver, flat tip 3/16-inch tip, 6 inches long</td>
<td>1</td>
</tr>
<tr>
<td>Screwdriver, flat tip 5/16-inch tip, 10 inches long</td>
<td>1</td>
</tr>
<tr>
<td>Wrench, 8-inch adjustable</td>
<td>1</td>
</tr>
<tr>
<td>Halligan tool</td>
<td>1</td>
</tr>
<tr>
<td>Strap cutter (rescue knife)</td>
<td>2</td>
</tr>
<tr>
<td>Tool Roll</td>
<td>1</td>
</tr>
</tbody>
</table>
Firefighting Clothing Requirement

PFFPEs shall be provided according to the following quantities:

1. LPD — Four complete sets
2. Other air-capable ships — Two or more complete sets (there shall be a PFFPE for each hot suitman required for flight quarters)

SCBAs shall be provided according to the following quantities:

1. LPD — Four SCBA and four spare cylinders
2. Other air-capable ships — Two or more SCBA with a spare cylinder for each (there shall be an SCBA for each hot suitman required for flight quarters)

Self-Contained Breathing Apparatus Requirements

The SCBA shall be made available at the scene to all firefighters/salvage personnel required in the immediate vicinity of an aircraft mishap.

Training Requirements

All personnel assigned duties incidental to flight deck operations shall attend a formal aviation firefighting school as directed by Surface Ship Survivability Training Requirements Chief of Naval Operations Instruction, (OPNAVINST) 3541.1(series).

Embarked On-the-Job Training Requirements

The air officer on an LPD or the DCA on other air-capable ships shall be responsible for conducting a continuous training program for all personnel assigned to flight operations (including embarked aviation activity personnel). All preplanning and training should be directed toward a “worst case” scenario. At a minimum, training shall include the following:

- Organization and leadership of crash, fire, and rescue team fire
- Reporting procedures
- Communications
- First-aid and self-aid
- General firefighting
- Hazardous ordnance/weapon cooling
- AFFF and saltwater station operation on flight deck and hangar
- Portable CO2, PKP, and halon 1211 extinguishers (operation and location)
- Appropriate firefighting actions to perform until assistance arrives
- Basic handling of composite materials and hazardous materials produced after a crash or fire

**Crash, Rescue, and Salvage Crewmember Training**

Personnel assigned as crash, rescue, and salvage crewmembers to include primary and background fire teams assigned to air-capable ships and LPDs shall attend (as a team) the Helicopter Firefighting Team Training Course (J-495-0414) once during a 24-month cycle or whenever the team experiences a greater-than-40-percent turnover. They shall also receive additional in-depth training to include the following:

- Aircraft familiarization
- Personnel rescue procedures
- Mobile crash-handling vehicles (when assigned)
- Crash dollies (when assigned)
- Aircraft salvage procedures
- Aircraft jettison procedures
- Maintenance of mobile equipment (when assigned)
- At least one formally trained/certified individual from ship’s force should be designated to assist the crash and salvage rescue team with basic oxygen, acetylene, and arc welding when necessary
- Aircraft entry (normal, forcible, and emergency)
- Crewmember release (normal, forcible, and emergency)
- High-efficiency vacuum cleaner
- SCBA training
- Hazardous material
- Weapons cooling

**Hazardous Material Training**

COs should ensure that all personnel assigned to the crash, fire, and rescue organization receive in-depth training on hazardous materials to ensure they are capable of handling hazardous materials produced after a crash or fire.

**Fire-Involved Ordnance Training**

The cooling of fire-involved ordnance is one of the most important aspects of aircraft firefighting operations. Crash crews and flight deck personnel should familiarize themselves with the various types of ordnance carried by embarked aircraft, as depicted in Chapter 5 of the manual.
Aircraft Fire Training Drills

All aircraft fire training drills should incorporate various types of simulated fire-exposed ordnance; receipt and reporting of relevant ordnance information; on-scene identification and cooling procedures of dedicated hose teams; and communication among flight deck control, the on-scene leader, and explosive ordnance disposal (EOD)/weapons personnel at the scene.

Drills

Drills shall be conducted with sufficient frequency to maintain the level of proficiency in the fundamentals of aircraft firefighting and salvage operations as specified in training and operational readiness information services (TORIS)/training figure of merit (TFOM).

Conduct of Drills

The following information shall be provided to the scene leader by the exercise observer when conducting drills.

1. Class of fire, location, and aircraft damage
2. Casualties (personnel and material)
3. Types of ordnance hazards
4. Fire under control (after all minimum response equipment and personnel are at the scene)
5. Fire extinguishment

Drill Sequence of Events

For training purposes, the scene leader shall utilize the following checklist when fighting a fire (simulated) on the flight deck. This sequence, combined with the procedures outlined in, aircraft firefighting tactics and procedures should be followed to the maximum practicable extent in combating actual fires are as follows (quotes marks indicate report to be made):

1. “Initial firefighting personnel/equipment at the scene”
   a. Scene leader
   b. Hose team leaders
   c. Two manned AFFF hoses
2. Nozzles on/Move in “hose teams moving in”

   ⚠️ WARNING ⚠️
   Personnel shall step over all firefighting hoses to avoid personal injury.

3. “Weapons cooling in progress”/“Fire under control”

   NOTE
   Clock starts for weapons cooling, provided weapon is no longer exposed to fire.
4. Effect rescue
   a. “Rescue in progress”
   b. “Rescue complete”
   c. “Number of casualties”
5. “Fire’s out”/Continue weapons cooling until 15-minute requirement is met.
6. “Back out, nozzles off”
7. “EOD/Weapons personnel to Scene”/“Weapons safe” or “continue to cool”
8. Download and jettison weapons
9. Overhaul of residual fire/disconnect battery
   a. “Overhaul in progress / complete”
   b. “Battery disconnected”
10. Set reflash watch
    a. “Reflash watch set by Hose team #____”
11. “Estimated time to ready deck is ____”
12. Conduct foreign object debris (FOD) walkdown. Hazardous material shall be brought to the attention of the background assistance leader, who will delegate its removal to cognizant personnel.
13. “Ready deck”
14. Debrief

Aircraft Firefighting Tactics and Procedures

Flight and hangar deck aircraft firefighting, crash, and rescue techniques are well defined, but no two fire situations will be identical. Success will continue to depend on training, planning, leadership, and teamwork by both ship’s company and embarked air wing personnel. Supervisory personnel and fire parties should take advantage of every opportunity to drill and acquire knowledge of their ship’s fixed and mobile firefighting equipment, aircraft configurations, fuel and weapons loads, and firefighting procedures specified within this manual. The following procedures discuss certain additional situations not discussed in detail elsewhere in the manual.

NOTE
The following suggested procedures are recommended for training purposes.

Notification

Reporting of a mishap should be accomplished by the most expeditious method IAW the ship’s operating instructions. In the event of a pending emergency, the air officer shall notify flight deck personnel by use of the flight deck announcing systems and flight deck warning alarm. The accident alarm shall be sounded to notify flight deck personnel of an actual on-deck aircraft mishap.
Approaching and Entering a Burning Helicopter

The on-scene leader shall assess the severity of the helicopter fire and direct the fire parties to approach the fire as rapidly as possible with the wind to their backs. The objectives are to cool ordnance (if involved), rescue the occupants, and extinguish the fire. The hose team provides clearance for the rescue personnel to approach the aircraft.

When directed by the on-scene leader, the rescue persons shall work (as a team) to evacuate the aircrew and passengers. Each team of rescue persons shall maintain a two-man buddy system throughout the rescue. In multiple casualty rescues, the team shall concentrate on evacuating one person at a time. During removal of the occupants, the on-scene leader shall continue to direct extinguishment of the fire.

The initial AFFF stream should be swept back and forth across the leading edge of the fire, moving the nozzle from side to side for maximum distribution. As the fire line recedes, move forward while directing the nozzle at the base of the flame from waist level. A fog pattern of AFFF should be used on burning fuel. Additional information concerning aviation fuels is contained in Chapter 2 of the NATOPS U.S. Navy Aircraft Firefighting and Rescue Manual, NAVAIR 00-80R-14.

Cockpit Entry

The fastest entry point and evacuation route for the pilot and copilot rescue is through their respective entryways, as shown in the NATOPS U.S. Navy Aircraft Emergency Rescue Information Manual, NAVAIR 00-80R-14-1. The rescue person should enter the cockpit and release the pilot/copilot lap belt and shoulder harness. If difficulty is encountered in operating the harness quick release, the V-blade knife should be used to cut the straps. The pilot’s helmet intercockpit communication system (ICS) cord should be disconnected at the cable assembly junction (pigtail) or, if necessary, cut. The rescue person removing the pilot from the cockpit should carefully lower him to another rescue person.

Cabin Entry

The aircrew and passengers in the cabin can best be evacuated through the cabin door. Locations are shown in the NATOPS U.S. Navy Aircraft Emergency Rescue Information Manual, NAVAIR 00-80R-14-1.
Forced Entry

Forced entry into a burning helicopter should be the last resort in attempting to rescue occupants. This maneuver is time-consuming and dangerous. Special caution should be exercised when effecting forced entry in the vicinity of passenger or crew stations and fuel cells.

Engine Compartment Fires

A fire guard shall be posted for all engines starts. He shall have a halon 1211 handheld extinguisher or a CO2 fire extinguisher with the appropriate 5- or 7-foot extension wand. Should an engine wet-start fire occur, the director shall signal the pilot to increase engine rpms in an effort to blow the fire out. If the fire is not extinguished, the fireguard, upon direction, shall direct the agent into the engine so that it enters the compartment slots in the gaseous form. If the fire persists, the on-scene leader should instruct the fire party to direct AFFF into the engine compartment to extinguish the fire.

NOTE

Keep the 5-foot or 7-foot extension clear of the rotor blades.

Battery Fires

The nickel-cadmium battery, installed in helicopters, may experience a condition known as “thermal runaway.” For specific instructions regarding battery fires, refer to Chapter 2 of the NATOPS U.S. Navy Aircraft Firefighting and Rescue Manual, NAVAIR 00-80R-14.

Ordnance

Combating aircraft fires involving ordnance and the prevention of ordnance cook off is paramount. Enlarging the control area to encompass the location of the ordnance stores will be necessary. Many variations exist in factors causing cook off of conventional ordnance, such as type of explosive, thickness of container, heat subjection, and others. It is, therefore, necessary to simultaneously control a fire quickly and cool the ordnance. For more detailed information concerning ordnance, refer to Chapter 2 of the NATOPS U.S. Navy Aircraft Firefighting and Rescue Manual, NAVAIR 00-80R-14.

WARNING

The scene leader shall make an immediate appraisal regarding the presence of hazardous ordnance and request confirmation from helicopter control. He shall direct firefighting teams in weapon cooling as specified in Chapter 2 of the NATOPS U.S. Navy Aircraft Firefighting and Rescue Manual, NAVAIR 00-80R-14.

Flight Deck AFFF Sprinkler System

The flight deck AFFF sprinkler system is designed to rapidly extinguish an aviation fuel spill fire prior to heat buildup sufficient to initiate weapons cook-off conditions. It shall be activated for any aircraft crash onboard that causes a rupture of a fuel bladder and/or when a fuel spill fire is detected. The station may be activated from any available location upon direction of the air officer, HCO, landing signalman enlisted (LSE), on-scene leader, or other supervisor as designed by the CO.

Hangar Fires

The following additional procedures for aircraft fires in the hangar shall be followed immediately upon detection of a fire:

1. Close all doors and hatches from the hangar to the interior of the ship.
2. Close all weapons elevator doors/hatches.
3. Open the hangar door fully open to ventilate heat and smoke unless there is an aircraft on spot.

4. Initial response personnel without SCBA shall be immediately relieved by the repair party personnel with SCBA and firefighting ensemble.

5. Activate appropriate zones of the hangar AFFF sprinkler system for any fire judged to be beyond the capability of the hose teams or, if determined necessary, to minimize collateral damage.

**NOTE**
Additional actions by the damage control organization will be necessary in conjunction with these actions, such as establishing fire boundaries and cooling adjacent spaces.

**NOTE**
The emergency techniques and procedures outlined herein shall be utilized commensurate with equipment assigned.

**Emergency Techniques**
Reporting of a mishap to the CO should be accomplished by the most expeditious method IAW the ship operating instructions. In the event of a pending emergency, the air officer/HCO shall notify flight deck personnel by use of the flight deck announcing system and flight warning alarm. The accident alarm shall be sounded to notify flight deck personnel of an actual on-deck aircraft mishap.

**Minimum Initial Response**
All preplanning and training shall be directed toward providing the following minimum initial response personnel and equipment to an actual mishap or drill:

- Scene leader.
- Background assistance leader.
- Two AFFF hose teams (a minimum of three AFFF hose teams if ordnance cooling is required).
- Two rescue persons.
- Corpsman.
- Messengers/phone talkers (as required). The CO shall determine the mode of communication based on ship's configuration. The requirement for phone talkers may be eliminated if communications can be established and maintained by using other reliable means.
- AFFF proportioner station operator.
- Two spare hoses.
- Crash and rescue tool roll.
- Two portable extinguishers (halon 1211, PKP, or CO2).

The individual actions that should occur on initial response are discussed in the following paragraphs:

**Air Officer/HCO**

- This officer assesses the fire situation, advises the CO, and requests assistance commensurate with the severity to the incident.
Scene Leader

- The scene leader assumes command and directs available firefighting assets with guidance from the air officer or HCO.

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Exercise extreme caution when approaching an aircraft mishap prior to engine/rotor blade shutdown.

NOTE

The scene leader shall evaluate the fire and make recommendations to the bridge for maneuvering the ship to provide favorable wind conditions.

AFFF Hose Teams

- These teams extinguish the fire and/or cool personnel and ordnance as directed by the hose team leaders.

Rescue Personnel

- Rescue personnel shall be available for immediate response and properly attired in PFFPEs and SCBAs. Rescue personnel should always work in pairs as directed by the scene leader.

NOTE

In each hangar bay, PFFPEs shall be available for a minimum of two SCBA-equipped hot suitmen.

Messengers/Phone Talkers

These individuals position themselves directly behind the scene leader or as required. The CO shall determine the mode of communication based on ship’s configuration. The requirement for phone talkers may be eliminated if communications can be established and maintained by using other reliable means.

Rescue Path

When adequate fire protection is provided, the scene leader will direct the rescue of personnel. He or she reports the commencement and completion of the rescue and the number of casualties.

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Adequate fire protection shall be maintained for rescue persons during rescue evolutions.

NOTE

Rescue and firefighting evolutions should be conducted simultaneously if fire protection is provided.

When adequate fire protection is provided, the scene leader will direct the rescue of personnel. He or she reports the commencement and completion of the rescue and the number of casualties.
Rescue Personnel

1. Rescue team personnel should work in pairs throughout the rescue and salvage effort. Each rescue effort should be directed toward evacuating one incapacitated person at a time.

   NOTE
   • Trained rescue personnel shall affect the rescue of air crews and passengers.
   • Information on aircraft entry, engine shutdown procedures, ejection seat safety, and personnel removal may be found in *NATOPS U.S. Navy Aircraft Emergency Rescue Information Manual, NAVAIR 00-80R-14-1*.

2. Investigate the surrounding area (e.g., catwalks, gun tubs) for additional casualties.

Background Assistance Personnel

The background assistance personnel will provide immediate first aid to casualties and evacuate them. They will also investigate the surrounding area (e.g., catwalks, gun tubs, etc.) for additional casualties.

Weapons Cooling

Hose teams shall cool weapons involved in the fire for a minimum of 15 minutes or until the ordnance has been reported to be at a safe ambient temperature by EOD/weapons personnel.

AFFF Ordnance Cooling Teams

As AFFF hose teams arrive on the scene, they shall knock down fire and smoke to enable identification of fire-exposed ordnance. Once fire-exposed ordnance is identified, the hose team shall lock their agent on that particular weapon or weaponry as a weapons cooling team. They shall remain locked on the weaponry until relieved by other cooling teams or the on-scene leader.

WARNING

The cooling of fire-exposed weapons shall continue for 15 minutes after all residual fire/smoke has ceased or until EOD/weapons personnel have determined that weapons have reached safe ambient temperatures. All weapons shall be accounted for.

Completion of Rescue

Upon completion of rescue, the scene leader continues to direct the fire teams until the fire is extinguished and then reports fire out.

Overhaul Team Personnel

1. The scene leader directs two personnel attired in complete PFFPE and SCBAs to ensure no residual fire exists. The senior firefighter shall have a halligan tool/crash axe. The junior firefighter shall have a portable fire extinguisher with a positive agent check.

2. Overhaul starting point shall be determined by the location of the battery access panels.

3. Overhaul team will disconnect battery.
4. The location of residual fires can be identified by feeling with the back of the hand or thermal imager.

5. Every attempt should be made to access all compartments/panels on the aircraft.

6. If residual fire is located and it is not in the area of a fuel cell or access panel, a small hole can be made in order for an extinguishing agent to be directed in.

7. The senior firefighter shall lead the junior firefighter away from the aircraft in such a way the junior can continue to face the overhaul area at all times.

8. The senior firefighter shall report the completion of overhaul of aircraft battery disposition to the scene leader.

**Salvage Operations**

The aircraft crash, rescue, and salvage supervisor/scene leader proceeds with the restoration of equipment and area based on the condition at the scene and operational requirements. Crash and salvage teams on air-capable ships shall have a designated welder assigned and welding equipment available.

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**NOTE**

After an aircraft fire has been extinguished and overhauled, the aircraft should be secured to the deck to assist the aircraft mishap investigation board.

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Local procedures for salvage operations shall be included in the ship operating instructions based upon assigned equipment and IAW NATOPS U.S. Navy Aircraft Crash & Salvage Operations Manual, NAVAIR 00-80R-19(afloat).

**Background Assistance Detail**

This detail assembles to commence FOD walk down, restore gear, and provide personnel to the on-scene leader.

**Mass Casualty/CONFLAG**

In the event of mass casualties or a conflaguration station (CONFLAG) on the flight deck, many additional requirements must be considered in establishing procedures for life safety, damage control, and extinguishment of fire. The decision to commit these assets will normally be made by the CO via the air officer/HCO/DCA.

**Aircraft Debris Pile/Running Fuel Fires**

This type of three-dimensional fire normally results during catastrophic aircraft crashes when the fuselage and wing fuel cells have been torn open. Often one or more aircraft may be involved. These situations allow aerated fuel to rain downward and into deep-seated aircraft debris, which often shields the fire from direct attack by AFFF hose teams. These debris pile-running fuel-type fires can easily become self-generating; as more fuel is fed from ruptured tanks, more fire is generated to further degrade and open additional fuel cells. This results in a higher, hotter fire of growing intensity and very high radiant heat. Containing, controlling, and combatting this type of fire requires a highly organized effort among the scene leader and hose teams along with effective use of the ship’s fixed AFFF flush deck systems.
As containment of the fire is achieved, the scene leader should assemble his hose teams close together for a coordinated attack on the weakest and most advantageous point of approach to the debris fire. The teams should be directed in their approach to provide both high-point cooling and low-point AFFF firefighting coverage. This is best accomplished with two nozzles on a wide fog pattern to block the radiant heat and two nozzles on a narrow fog pattern to knock down and extinguish the fire. Their approach should be dedicated to getting as close to the seat of the running fuel fires as possible. This is accomplished by a coordinated advance combined with a methodical sweeping of the fire area.

When the hose teams have achieved their close-in attack positions, and the intensity and high radiant heat of the fire have been diminished, crash crewman with portable halon 1211 or PKP extinguishers may enter between the two center low-point AFFF hose teams and expel a full charge of halon 1211 or PKP directly into the seat of the fire. This procedure may be repeated, as necessary, until the fire is extinguished.

**Aircraft Engine Wet Start Fires**

These fires are caused when accumulated residual fuel ignites within the engine or tail assembly area. Depending upon the amount of ignited fuel and wind direction, fire, smoke, and heat may exit from the intake or exhaust areas of the aircraft. A fire of this type more often occurs during initial engine startup.

Wet starts are normally brought under control by the director signaling the pilot to increase engine rpms to blow the fire out. Aircraft residual fires on shutdown can often be controlled by wind-milling the engine.

If the above procedures are not successful, use CO2 or halon 1211 to attack the fire from the windward side of the aircraft, introducing CO2 or halon 1211 directly into the intake. Attack at tailpipe may be attempted if engine is not turning.

**NOTE**

AFFF and PKP should be utilized for control and extinguishment of aircraft engine wet start/residual fires only if CO2 or halon 1211 is unavailable or unsuccessful.
Aircraft Jettison

In the event that a helicopter fire becomes uncontrollable, thus endangering the ship, jettison of the helicopter may be required. There is no established procedure for jettison of the helicopter under these circumstances. Methods that can be considered are presented below:

1. The ship using a high-speed, full-rudder turn to create centrifugal forces of sufficient magnitude to roll the helicopter over the side of the ship.

   **NOTE**
   Only the CO may authorize the jettison of aircraft.

2. A forklift, where available.

   **WARNING**
   The jettison of a burning helicopter is an extremely dangerous evolution. Attempt to extinguish the fire first.

3. A 3/4-inch cable around three sides of the periphery of the deck with the bitter end secured at one corner of the deck and the other end attached to a capstan. Taking up the cable will pull the helicopter to the side of the ship and overboard.

Local procedures for jettison shall be included in the ship operating instructions based upon assigned equipment and IAW *NATOPS U.S. Navy Aircraft Crash & Salvage Operations Manual*, NAVAIR 00-80R-19 (afloat).

Installed or Fixed Fire Fighting Protection Systems/Flight Quarters preparation

**AFFF Proportioning Stations**

A typical station consists of a 300-gallon AFFF concentrate tank (some ships may have 50-gallon tanks with 5-gallon cans stowed at the station), a proportioning unit, and ancillary piping and controls. Air-capable ships vary in system capacity and available 5-gallon cans stowed at the station. Saltwater and AFFF flow is controlled by hydraulically operated valves that are controlled by solenoid operated pilot valves. The pilot valves are activated by pushbuttons. The most important element in the system is the proportioning unit. Following are some of the types of proportioners used aboard ships.

**CAUTION**

3 percent and 6 percent concentrates are not interchangeable.

**Balanced Pressure Proportioners**

Balanced pressure proportioners are installed on LPDs, guided missile destroyer (DDG) 51 class, LSD 49 class and most air-capable ships. The balanced pressure proportioner mixes AFFF concentrate with saltwater at a nominal appropriate foam concentration, 6 percent or 3 percent over a wide range of flows. Excess AFFF concentrate from the pump is diverted back to the AFFF concentrate tank, as necessary, to maintain a nominal 3- or 6-percent AFFF solution.

**Two-Speed Pump**

The two-speed pump (LSD 41 Class) injects AFFF concentrate into the saltwater supply line at one of two rates (27 or 65 gpm), depending on the demand. The low-rate output serves AFFF handlines and small sprinkler system demands. The hangar bay sprinkler system and other large sprinkler systems are served by the high-speed output.
The aircraft crash, rescue, and salvage supervisor or the DCA shall inspect their flight operations areas when flight quarters is sounded to ensure the readiness and availability of firefighting equipment. They shall report the results of the inspection to the CO via the air officer or HCO, respectively. Discrepancies shall be reported to the bridge as soon as they are detected. A decision to conduct flight operations when discrepancies are known to exist in firefighting equipment shall be made only by the CO.

**AFFF Flight Deck Fire Extinguishing System**

Air-capable ships’ flight decks have an AFFF firefighting system consisting of flush deck and/or deck edge nozzles (nozzles also used for countermeasure wash down). Push button controls are located in the helicopter control station and typically at a second location in the flight deck area or on the navigation bridge.

**NOTE**
The flight deck AFFF sprinkler system is designed to rapidly extinguish an aviation fuel spill fire prior to heat buildup sufficient to initiate weapons cook-off conditions. It shall be used for any aircraft crash on board that causes a rupture of a fuel bladder and/or when a fuel spill fire is detected.

**Hangar Deck AFFF Sprinkler System**

AFFF sprinkler systems are installed in the overhead of the hangar in air-capable ships having hangars for embarked helicopters. Sprinkler on/off controls are typically located inside and outside the hangar, and in helicopter control on some ship classes.

**Flight Deck Weapons Staging Area (Bomb Farm) AFFF Sprinkler System (LPD)**

The designated weapons staging area is protected by an AFFF sprinkling system discharging through deck edge nozzles. The number and spacing of nozzles are of a design that provides adequate coverage regardless of the placement of bomb skids and carts. The system is used to rapidly extinguish an aviation fuel spill fire prior to heat buildup sufficient to initiate weapons cook-off. In the event of a bomb farm/weapons staging area conflagration or activation of the weapons staging area sprinkling system, immediate employment of AFFF handlines should be initiated to assist with fire extinguishment and simultaneous weapons cooling. Control switches to start and stop flow are in PRIFLY and on the superstructure.

**AFFF System**

The following manning of the AFFF system during flight quarters shall be observed:

1. All AFFF stations shall be filled and aligned for remote control operation IAW daily planned maintenance system (PMS) maintenance requirement card (MRC).
2. AFFF proportioning stations shall be manned when an emergency occurs on the flight deck, hangar deck, or in the HIFR or VERTREP area. Word of such an emergency shall be passed on via the ship’s (1 MC) announcing system.

**Reporting**

**Flight Quarters**

The following inspection and reporting procedures shall be observed during all periods of aircraft operation.

- As early as possible before the first launch, the cognizant officer shall advise the air officer, HCO, or DCA of the status of AFFF services.
Nonflight Quarter Posture

- During this period, the system readiness requirements are applicable to those AFFF services within areas of the flight deck used to park the aircraft. The capability to perform system maintenance should be considered during this period.

Services Defined

In specifying the readiness requirements for AFFF systems, a service is defined as one AFFF “outlet” (for example, a group of flight deck nozzles or a hose station supplied by one group control valve from the fire main is one “outlet”).

Flight Deck Services

The types of services installed for flight deck VERTREP/HIFR area protection are:

- Hose stations
- Flush-deck nozzles
- Deck-edge nozzles

Hangar Services

The types of services installed for hangar protection are:

- Hose stations (one 1½-inch hose)
- Overhead AFFF sprinkling group

Conditions for Operable AFFF Services

An AFFF system service shall be considered operable if the following requirements are met:

1. The flight deck or hangar service and the associated fire main services are aligned properly (valves and electrical power) and the AFFF tank is full (top of the sight glass) of AFFF concentrate and either the provision of item 2 or 3 below is fully implemented and the provision of item 4 is met.

2. PMS checks and post repair testing have been satisfactorily completed, indicating that the service can be successfully actuated from all local and remote-control stations.

3. PMS checks or post repair testing indicates that a service will not operate from all remote-control stations but can be actuated manually or from another remote-control station. In this case, the service must be continuously manned at the inoperable remote-control station and at the local or remote-control station. Communications must be established among all manned stations.

4. For flight deck AFFF nozzle groups to be operable, at least 90 percent of the nozzles must be unplugged, except for ships with aluminum flight decks. On ships with aluminum flight decks, any loss of flush deck or deck edge nozzles constitutes an inoperable service.

5. Flow tests demonstrate a minimum of 90 percent of the nozzles in a hangar sprinkling group are operational. Each group is one service.
General Readiness Requirements

- During flight quarters, all flight deck and hangar AFFF system services should be operable.
- When aircraft are aboard ship, referred to as nonflight quarters conditions, all flight deck and hangar AFFF system services should be operable.
- A minimum of 75 percent of the installed fire pump capacity shall be available in each of the YOKE fire main segregations to provide adequate AFFF coverage for flight quarters. This requirement applies regardless of the fire main segregation condition in effect.

NOTE
If the fire main is in ZEBRA segregation condition, it may be necessary to shift to YOKE condition for major fires involving multiple AFFF stations to assure adequate fire main capacity. The ship’s information book (damage control section) contains specific guidelines for proper fire main segregation conditions.

Flight Deck Readiness Requirements

The following are the maximum inoperable AFFF services permitted in the flight deck. During flight quarters, the criteria given below apply to the entire flight deck. During nonflight quarters conditions, the criteria apply only to the “parking area” that have installed AFFF nozzles (flush-deck/deck-edge) to contain parked aircraft. Backup mobile equipment requirements are also given for the LPD.

1. For LPDs, any combination of AFFF services (flush-deck nozzles, deck-edge nozzles, or hose stations) may be inoperable provided that completely operable adjacent services of the same type are available. Adjacent services are defined as nozzle groups sharing a common boundary or AFFF hose stations next to each other serving the flight deck and/or around the flight deck perimeter.

NOTE
Where fixed AFFF nozzle systems (flush-deck or deck-edge) consist of a single “group,” that group must be operable to meet readiness requirements.

2. For other air-capable ships, any inoperable AFFF service on the flight deck constitutes inadequate AFFF coverage to permit flight quarters.

Procedures Concerning Inadequate AFFF Coverage to Permit Flight Quarters

If the flight deck, HIFR area, or VERTREP area has inadequate AFFF coverage to permit flight quarters, initiate the following actions:

- Postpone flight quarters and flight operations until requirements can be met.
- If postponement of flight quarters is restrictive to the ship mission, the CO may elect to conduct flight quarters and permit no aircraft maintenance, aircraft fueling/defueling, or hot work in any deck area containing an inoperable AFFF service.
- Submit a casualty report indicating the conditions in the AFFF system and the planned actions.
- Accomplish repairs and retest of defective AFFF system equipment. Submit a casualty correction report when the corrective action is completed.
Requires one saltwater/AFFF eductor hoseline be manned for immediate use to replace each lost service. Minimum of 50 gallons of Type 6 or 25 gallons of Type 3 AFFF shall be immediately available for use with each eductor to allow time for additional AFFF containers to be brought to the scene.

**Procedures Concerning Inadequate AFFF Coverage During Nonflight Quarters Posture**

If the flight deck has inadequate AFFF coverage to permit parking of aircraft during nonflight quarters conditions, initiate the following actions:

- Do not permit aircraft maintenance, aircraft fueling/defueling, or hot work in any “parking area” containing an inoperable AFFF service.
- Submit a casualty report indicating the conditions in the AFFF system and the planned actions.
- Accomplish repairs and retest of defective AFFF system equipment. Submit a casualty correction report when the corrective action is completed.

**Hangar Readiness Requirements**

The following are the maximum inoperable services permitted in the hangar. The hangar overhead AFFF sprinkling system may be inoperable providing:

- Hangar AFFF hoses are operable.
- No aircraft are within the hangar.
End of Chapter 6
Aircraft Firefighting (LPD/ACS)

Review Questions
6-1. On a LPD class ship, which person is responsible for the training, supervision, and organization of flight deck/landing platform firefighting and rescue teams?

A. Air boatswain
B. Aircraft crash, rescue, and salvage supervisor
C. Air officer
D. Helicopter control officer

6-2. On a LPD class ship, who has the overall responsibility for aircraft firefighting, salvage, jettison, and personnel rescue operations?

A. Air boatswain
B. Aircraft crash, rescue and salvage supervisor
C. Air officer
D. Helicopter control officer

6-3. On ACS ships, other than LPD class ships, the helicopter control officer is under the direction of what person?

A. Air officer
B. Air boatswain
C. Aircraft crash, rescue, and salvage supervisor
D. Damage control assistant

6-4. For determining messengers/phone talkers requirements, which person will make the determination on what mode of communication will be utilized to meet minimum requirements?

A. Air officer
B. Commanding officer
C. Damage control assistant
D. Helicopter control officer

6-5. How many AFFF hose teams shall be manned for maintenance turnups without rotor engagement on LPD class ships?

A. 1
B. 2
C. 3
D. 4
6-6. On a LPD class ship, who is responsible for the direction of all aircraft movement on the flight deck/landing platform during aircraft crash evolutions?

A. Air boatswain  
B. Air officer  
C. Damage control assistant  
D. Helicopter control officer

6-7. What is the minimum working load of the ladder required by the crash and salvage tool inventory?

A. 200 pounds  
B. 220 pounds  
C. 250 pounds  
D. 300 pounds

6-8. How many crash axes are required by the crash and salvage tool inventory?

A. 1  
B. 2  
C. 3  
D. 4

6-9. How many spanner wrenches are required for each AFFF and saltwater hose station?

A. 1  
B. 2  
C. 3  
D. 4

6-10. What is the required weight of the ball peen hammer utilized in the crash and salvage inventory?

A. 1 pound  
B. 1 ½ pounds  
C. 2 pounds  
D. 2 ½ pounds

6-11. Tools in the crash and salvage inventory shall be engraved, displaying the ________.

A. division number  
B. hull number  
C. serial number  
D. work center number

6-12. What is the minimum length requirement of the ladder in the crash and salvage inventory?

A. 12 feet  
B. 15 feet  
C. 20 feet  
D. 22 feet
6-13. How many additional CO2 extinguishers shall be provided for the flight deck on all ACS’s for helicopter operations?

A. 2  
B. 3  
C. 4  
D. 5

6-14. What firefighting equipment is stowed in repair locker and is used for mixing saltwater and AFFF concentrate?

A. Eductor  
B. Hard lines  
C. Pipe  
D. Proportioner

6-15. During the overhaul stage of a fire on an LPD, the senior firefighter will have a ________.

A. CO2 bottle  
B. Halligan tool  
C. Hose  
D. PKP bottle

6-16. Aircraft engine wet start fires are caused by ________.

A. engine oil leak  
B. engine oil pressure  
C. hydraulic leak  
D. residual fuel

6-17. Who will provide immediate first aid and commence the evacuation of casualties?

A. Background personnel  
B. Medical personnel  
C. Rescue personnel  
D. Over team personnel

6-18. How many personnel are utilized for the overhaul team?

A. 1  
B. 2  
C. 3  
D. 4

6-19. On board LPD/ACS ships, what is the minimum amount of flight deck fire drills that shall be conducted monthly?

A. 2  
B. 3  
C. 4  
D. 5
6-20. Personnel assigned as crash, rescue and salvage crewmembers assigned to LPDs and ACS’s shall attend the helicopter firefighting team training course once during a ________.

A. 12-month cycle
B. 18-month cycle
C. 20-month cycle
D. 24-month cycle

6-21. Which of the following information shall not be provided to the scene leader by the exercise observer when conducting drills?

A. Aircraft damage
B. Casualties
C. Type of aircraft
D. Type of ordnance
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