

# **CERTIFICATION CURRICULUM MANUAL**

## **CHAPTER TWO**

### **BASIC AIRCRAFT RESCUE FIRE SUPPRESSION**

**NFPA1003, 2010 Edition**

**EFFECTIVE JANUARY 1, 2012**



**Texas Commission on Fire Protection**  
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**CHAPTER TWO  
BASIC AIRCRAFT RESCUE FIRE SUPPRESSION  
CURRICULUM OUTLINE**

<b>SECTION</b>	<b>SUBJECT</b>	<b>RECOMMENDED HOURS</b>
200 5.1	General	18
200 5.2	Response	20
200 5.3	Fire Suppression	48
200 5.4	Rescue	34
	<b>TOTAL RECOMMENDED HOURS*</b>	<b>120</b>

\* The recommended hours for training include time for skills evaluation and are based on 12 students. Hours needed depend on the actual number of students.

**Performance Standards Evaluation Forms are located at the end of Chapter Two.**

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## REFERENCE LIST FOR THE BASIC AIRCRAFT RESCUE FIRE SUPPRESSION CURRICULUM

Certified Training Facilities approved to teach this curriculum must have the following reference materials:

AC 150/5200-12B, Fire Department Responsibility in Protecting Evidence at the Scene of an Aircraft Accident, September 3, 1999: [www.airweb.faa.gov](http://www.airweb.faa.gov)

AC 150/5200-31A, Federal Aviation Administration Airport Emergency Plan, September 30, 1999: [www.airweb.faa.gov](http://www.airweb.faa.gov)

AC 150/5210-6D, Aircraft Fire Extinguishing Agents, July 8, 2004: [www.airweb.faa.gov](http://www.airweb.faa.gov)

AC 150/5210-14 B, Aircraft Rescue Fire Fighting Equipment, Tools and Clothing, September 30, 2008: [www.airweb.faa.gov](http://www.airweb.faa.gov)

AC 150/5210-17A, Programs for Training of Aircraft Rescue and Firefighting Personnel, April 28, 2006: [www.airweb.faa.gov](http://www.airweb.faa.gov)

*Aircraft Rescue and Fire Fighting*. (5<sup>th</sup> edition) (2009). Stillwater, OK: Fire Protection Publications. International Fire Service Training Association (IFSTA)

*Code of Federal Regulations, 14 CFR, Part 139, Subpart A, Certification of Airports: General*. (January 1, 2007 edition) U.S. Department of Transportation, Federal Aviation Administration <http://www.gpoaccess.gov/cfr/retrieve.html>

*Code of Federal Regulations, 14 CFR, Part 139, Subpart D, Certification of Airports: Operations*. (January 1, 2007 edition) U.S. Department of Transportation, Federal Aviation Administration <http://www.gpoaccess.gov/cfr/retrieve.html>

*Code of Federal Regulations, 14 CFR, Part 139.311 Marking, signs and lighting* (January 1, 2007 edition) U.S. Department of Transportation, Federal Aviation Administration <http://www.gpoaccess.gov/cfr/retrieve.html>

*Code of Federal Regulations, 14 CFR, Part 139.325 Airport emergency plan*: (January 1, 2007 edition) U.S. Department of Transportation, Federal Aviation Administration <http://www.gpoaccess.gov/cfr/retrieve.html>

*Code of Federal Regulations, 14 CFR, Part 139.329, Pedestrians and ground vehicles* (January 1, 2007 edition). U.S. Department of Transportation, Federal Aviation Administration <http://www.gpoaccess.gov/cfr/retrieve.html>

*Code of Federal Regulations, 49 CFR, Part 175.310 Transportation of flammable liquid fuel; aircraft only means of transportation* (October 1, 2006 ed.). U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration <http://www.gpoaccess.gov/cfr/retrieve.html>

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*Code of Federal Regulations, 49 CFR, Part 830.10 Preservation of aircraft wreckage, mail, cargo, and records (October 1, 2006 edition)* U.S. Department of Transportation, National Transportation Safety Board <http://www.gpoaccess.gov/cfr/retrieve.html>

*Essentials of Fire Fighting and Fire Department Operations.* (5<sup>th</sup> edition)(2008). Stillwater, OK: Fire Protection Publications. International Fire Service Training Association (IFSTA)

National Transportation Safety Board Accident Reports, <http://www.nts.gov>.

*NFPA 402: Aircraft Rescue and Fire-Fighting Operations, (2008 edition).* Quincy, MA: NFPA Publications. National Fire Protection Association

*NFPA 1003: Standard for Airport Fire Fighter Professional Qualifications, (2010 edition).* NFPA Publications Quincy, MA: NFPA Publications. National Fire Protection Association

*NFPA 1403: Standard on Live Fire Training Evolutions, (2007 edition)* NFPA Publications Quincy, MA. National Fire Protection Association

*NFPA 1500: Standard on Fire Department Occupational Safety and Health Program, (2007 edition)* NFPA Publications Quincy, MA: NFPA Publications. National Fire Protection Association

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## SUPPLEMENT TO THE BASIC AIRCRAFT RESCUE FIRE SUPPRESSION CURRICULUM

This supplement is provided as a general guide for both instructors and students to locate information pertaining to the specific objectives in the TCFP Curriculum. This supplement is **not** an all-inclusive list and does not in any way limit TCFP development and use of questions to test the objectives of the curriculum.

<b>Objective</b>	<b>Reference</b>	<b>Page Number</b>
200-5.1	NFPA 1003: <i>Standard for Airport Fire Fighter Professional Qualifications</i> (2005 ed.)	Chapter 5, 6.1
200-5.1.1	NFPA 1003: <i>Standard for Airport Fire Fighter Professional Qualifications</i> (2005 ed.) <i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009	Chapter 5, 5.1.1 15
200-5.1.1.1	NFPA 1003: <i>Standard for Airport Fire Fighter Professional Qualifications</i> (2005 ed.) <i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009	Chapter 5, 5.1.1.1 15
200-5.1.1.2	NFPA 1003: <i>Standard for Airport Fire Fighter Professional Qualifications</i> (2005 ed.)	Chapter 5, 5.1.1.2
200-5.1.1.3	NFPA 1003: <i>Standard for Airport Fire Fighter Professional Qualifications</i> (2005 ed.) <i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009  NFPA 402 <i>Guide for Aircraft Rescue and Fire Fighting Operations</i> (2008 ed.)	Chapter 5, 5.1.1.3  9,17,49-50,58,79,81,84-87, 91-97,111-116,123-124, 127-128,130-137,140-142, 150,180-183,187-190,207, 222-224,233,270,302,309, 314-320, 323-324,343-344, 364,368-370,426,429-432 Chapter 7 (7.5.8)
200-5.1.1.4	NFPA 1003: <i>Standard for Airport Fire Fighter Professional Qualifications</i> (2005 ed.) AC 150/5210-17A, Airport Firefighter Rescue Personnel.	Chapter 5 2-6
200-5.1.2	NFPA 1003: <i>Standard for Airport Fire Fighter Professional Qualifications</i> (2005 ed.) NFPA 1500: <i>Standard on Fire Department Occupational Safety and Health Program</i> Authority Having Jurisdiction (AHJ)	Chapter 5 Chapter 5
200-5.2	NFPA 1003: <i>Standard for Airport Fire Fighter Professional Qualifications</i> (2005 ed.) AHJ	Chapter 5, 5.2

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200-5.2.1	NFPA 1003: <i>Standard for Airport Fire Fighter Professional Qualifications</i> (2005 ed.) <i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009  AHJ AC 150/5230-4, Aircraft Fuel Storage, Handling, and Dispensing. AC 150/5220-4, Water Supply Systems for Aircraft Fire and Rescue Protection. NFPA 402 <i>Guide for Aircraft Rescue and Fire Fighting Operations</i> (2008 ed.)	Chapter 5, 5.2.1  18,23-24,30-39,40-43,46-48,220,302-308,356,360-363,367-368  All  All  Chapter 3
200-5.2.2	CFR, 14 CFR, Part 139.325 Airport Emergency Plan. <i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009  NFPA 402 <i>Guide for Aircraft Rescue and Fire Fighting Operations</i> (2008 ed.)	All 33,50-52,57-59,65,70,77,80,85,89,91,94,116-121,150,160-169,171-173,220,302-304,310,322,324,337,340,356,360,362-363,367-368,376 Chapter 5
200-5.2.3	<i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009 AHJ	161,165,168-169,171-172
200-5.2.4	<i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009 AHJ CFR, 14 CFR, Part 139.325, Airport Emergency Plan NFPA 402 <i>Guide for Aircraft Rescue and Fire Fighting Operations</i> (2008 ed.)	48,50-52,77,124-125,128-129,151-152,329,339-359 All  Chapter 12
200-5.3	NFPA 1003: <i>Standard for Airport Fire Fighter Professional Qualifications</i> (2005 ed.)	Chapter 5, 5.3
200-5.3.1	<i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009 NFPA 402 <i>Guide for Aircraft Rescue and Fire Fighting Operations</i> (2008 ed.)	126-128,187,207-208,344 Chapter 10
200-5.3.2	<i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009  AHJ	127-128,182-185,190-194,196,201-203,232,344,370
200-5.3.3	<i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009  NFPA 402 <i>Guide for Aircraft Rescue and Fire Fighting Operations</i> (2008 ed.) CFR, 14 CFR, Part 139.317, Airport Rescue and Firefighting: Equipment and Agents	127,182,187,205-206,222-223,233-234,237,290-291 Chapter 10  20
200-5.3.4	<i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009  NFPA 402 <i>Guide for Aircraft Rescue and Fire Fighting Operations</i> (2008 ed.)	142,150,160,175,180-181,187,190-191,201-202,207,210,345 Chapter 10
200-5.3.5	<i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009  NFPA 402 <i>Guide for Aircraft Rescue and Fire Fighting Operations</i> (2008 ed.)	62,112,122,128,211,232,247,339-340,350-352,353-354,369,375,405 Chapter 11

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200-5.3.6	<i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009 AHJ NFPA 402 <i>Guide for Aircraft Rescue and Fire Fighting Operations</i> (2008 ed.)	92,196,202,204,207,346-348  Chapters 10 & 11
200-5.3.7	<i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009 NFPA 402 <i>Guide for Aircraft Rescue and Fire Fighting Operations</i> (2008 ed.)	81,342-344 Chapter 7
200-5.3.8	<i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009	232,341,346,348,351-353
200-5.3.9	<i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009 NFPA 402 <i>Guide for Aircraft Rescue and Fire Fighting Operations</i> (2008 ed.) AC 150/5220-4B, Water Supply Systems for Aircraft Fire and Rescue Protection AHJ	48,225,236-238,292, Chapter 10  All
200-5.3.10	<i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009 NFPA 402 <i>Guide for Aircraft Rescue and Fire Fighting Operations</i> (2008 ed.) AC 150/5200-12B, Fire Department Responsibility in Protecting Evidence at the Scene of an Aircraft Accident	104-105,374-376 Chapter 3  All
200-5.3.11	AC 150/5200-12B, Fire Department Responsibility in Protecting Evidence at the Scene of an Aircraft Accident NFPA 402 <i>Guide for Aircraft Rescue and Fire Fighting Operations</i> (2008 ed.) <i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009	All  Chapter 13  128,185-186,190,203,258,346, 351-352, 358,,375
200-5.4	NFPA 1003: <i>Standard for Airport Fire Fighter Professional Qualifications</i> (2005 ed.)	Chapter 5, 5.4
200-5.4.1	<i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009  NFPA 402 <i>Guide for Aircraft Rescue and Fire Fighting Operations</i> (2008 ed.)	73-75,79,81-82,84,97,99,101-104,130-131,141-146,150,226,235,250-257,341,351,356,368-369,375 Chapter 9
200-5.4.2	<i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009  NFPA 402 <i>Guide for Aircraft Rescue and Fire Fighting Operations</i> (2008 ed.)	133,138-139,244,248-250,253-255,341,355,374 Chapters 10 & 13
200-5.4.3	NFPA 402 <i>Guide for Aircraft Rescue and Fire Fighting Operations</i> (2008 ed.) <i>Aircraft Rescue and Fire Fighting</i> , IFSTA, 5 <sup>th</sup> ed., 2009 AHJ	Chapter 3  371,373

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## COURSE INSTRUCTOR INFORMATION BASIC AIRCRAFT RESCUE FIRE SUPPRESSION

### Overview

The Basic Aircraft Rescue Fire Suppression curriculum is designed to provide clear guidance that ensures adequate presentation of the information required to meet the Job Performance Requirements (JPRs) of National Fire Protection Association (NFPA) 1003, *Standard for Airport Fire Fighter Professional Qualifications*, 2010 edition.

The Basic Aircraft Rescue Fire Suppression curriculum is Chapter 2 of the Texas Commission on Fire Protection (TCFP) Curriculum Manual.

Certification Level	TCFP Section Number	NFPA 1003 Chapter
Basic Aircraft Rescue Fire Suppression	200	5

### Layout

The NFPA numbering sequence is mirrored to allow easy correlation between this document and the NFPA Standard. For example, 200-5.1.2 identifies the section in Basic Aircraft Rescue Fire Suppression that corresponds to NFPA section 5.1.2.

### TCFP Standards Manual

It is critical that the Course Instructor review the chapters in the TCFP Standards Manual that apply to this curriculum. Of primary importance are the following chapters: Chapter 421, Standards for Certification; Chapter 437, Fees; Chapter 423, Subchapter B - Minimum Standards for Aircraft Rescue Fire Fighting Personnel. These chapters do not address every issue that could impact this curriculum; therefore, the Course Instructor is encouraged to become familiar with the TCFP Standards Manual.

### Supplemental Information

Instructors are expected to provide supplemental information if the main reference text does not provide adequate information to ensure successful completion of the Job Performance Requirements as listed in the curriculum.

### Components of the Curriculum

Each section of the curriculum identifies the NFPA Job Performance Requirement (JPR) and subdivides the requisite knowledge requirements into learning components. For example:

Curriculum	Explanation
<b>200- 5.2.1</b> This duty involves the timely arrival at an incident or accident and the capability to perform emergency functions. The duty also includes responding to hazardous conditions and performing standby operations.	<b>Section Number and NFPA JPR</b>
<b>Requisite Knowledge:</b> Airport familiarization, including runway and taxiway designations, frangible gate	<b>Requisite Knowledge</b>

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locations, airport markings, lights, instrument landing system (ILS) critical areas, critical rescue and fire-fighting access areas, designated isolation areas, vehicular traffic controls on airfield, bridge load limits, controlled access points, aircraft traffic patterns and taxi routes, fuel storage and distribution locations, airport and immediate local area topographic layout, drainage systems, water supplies, and airport facilities.	<b>Statement</b>
Airport familiarization, including: 1. Runway and taxiway designations	<b>First part of Requisite Knowledge</b>
a. Runway identification i. Designation 1. Compass heading 2. Numbers and letters	<b>Associated learning components</b>
2. Frangible gate locations	<b>Second part of Requisite Knowledge</b>
a. AHJ b. Gate controlled access c. Alternate response route	<b>Associated learning components</b>

**Skills**

NFPA Requisite Skill requirements are addressed in the corresponding Skill Sheets.

**Description of Certification Level  
 Basic Aircraft Rescue Fire Fighting Personnel**

An Airport/Aircraft Rescue Fire Fighter (ARFF) shall have met all of the job performance requirements and certification requirements of Fire Fighter II as detailed in NFPA 1001 *Standard for Fire Fighter Professional Qualifications* and NFPA 1003 *Standard for Airport Fire Fighter Professional Qualifications*, Code of Federal Regulations (CFR) Title 14, Part 139, and US Department of Transportation (US DOT) Federal Aviation Administration (FAA) Advisory Circulars (AC) specific to the role of ARFF Personnel.

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## **SECTION 200**

### ***BASIC AIRCRAFT RESCUE FIRE SUPPRESSION***

#### **Basic Aircraft Rescue Fire Fighting Personnel**

The Fire Fighter II who has demonstrated the skills and knowledge necessary to function as an integral member of an aircraft rescue and fire fighting (ARFF) team.

#### **200-5.1      General**

##### **200-5.1.1      Qualifications**

To be qualified as an airport fire fighter, the candidate shall meet the requirements for Texas Commission on Fire Protection (TCFP) certification as Fire Fighter II, as defined in NFPA 1001, *Standard for Fire Fighter Professional Qualifications*; first responder operational level defined in NFPA 472, *Standard for Professional Competence of Responders to Hazardous Materials Incidents*; and TCFP certification standards as defined in NFPA 1003, *Standard for Airport Fire Fighter Professional Qualifications*.

##### **200-5.1.1.1      Duties**

These requirements shall be divided into three major duties: response, fire suppression and rescue.

##### **200-5.1.1.2      Function**

The primary function of the airport fire fighter shall be to execute fire suppression and rescue activities.

##### **200-5.1.1.3      General Knowledge Requirements**

Fundamental aircraft fire-fighting techniques, including the approach, positioning, initial attack, and selection, application, and management of the extinguishing agents; limitations of various sized hand lines; use of personal protective equipment (PPE); fire behavior; fire-fighting techniques in oxygen-enriched atmospheres; reaction of aircraft materials to heat and flame; critical components and hazards of civil aircraft construction and systems related to ARFF operations; special hazards associated with military aircraft systems; a national defense area and limitations within that area; characteristics of different aircraft fuels; hazardous areas in and around aircraft; aircraft fueling systems (hydrant/vehicle); aircraft egress/ingress (hatches, doors, and evacuation chutes); hazards associated with aircraft cargo, including dangerous goods; hazardous areas, including entry control points, crash scene

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perimeters, and requirements for operations within the hot, warm, and cold zones; and critical stress management policies and procedures.

- 1) Fundamental aircraft fire-fighter techniques of approach
  - a. Size up
  - b. Weather
  - c. Terrain
  - d. Debris trail
  - e. Exposures
  - f. Aircraft
    - i. Size/type
    - ii. Fire
      1. Absence
      2. Presence
    - iii. Souls on Board (SOB)
    - iv. Fuel on board
- 2) Fundamental aircraft fire-fighter techniques of positioning
  - a. Weather
  - b. Terrain
  - c. Exposures
  - d. Aircraft
    - i. Size/Type
    - ii. Fire
      1. Absence
      2. Presence
  - e. Impact
    - i. High
    - ii. Low
  - f. Non-impact
    - i. Fire
      1. Interior
      2. Exterior
    - ii. No fire
  - g. Egress routes
  - h. Wreckage
    - i. Intact
    - ii. Fragmented
    - iii. Debris trail
    - iv. Upside down
  - i. Scene preservation
  - j. Hazardous areas

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- i. Fuel
    - ii. Engines
      - 1. Jet turbine
      - 2. Propellers
      - 3. Rotors
    - iii. Military ordnance/armament
    - iv. Collapse zones
    - v. Dangerous goods
  - 3) Fundamental aircraft fire fighter techniques of initial attack
    - a. Rescue of occupants
      - i. Isolation
      - ii. Insulation
    - b. Fire control
      - i. Interior
      - ii. Exterior
    - c. Loss control
  - 4) Fundamental aircraft fire fighter techniques of fire extinguishing agents
    - a. Selection
      - i. Water
      - ii. Foaming agents
      - iii. Dry chemicals
      - iv. Halogenated agents and halon replacements
      - v. Dry powders
    - b. Application
      - i. Turret
      - ii. Hand line
      - iii. Hand held extinguishers
      - iv. Special appliance(s)
    - c. Management
      - i. Conservation of agent
      - ii. Replenishment
  - 5) Limitations of various sized hand lines
    - a. Diameter
    - b. Discharge
    - c. Length of hand line
    - d. Reach of agent application
  - 6) Use of personal protective equipment(PPE)
    - a. Donning
    - b. Doffing
    - c. Care
    - d. Cleaning

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- e. Inspections
  - f. Limitations
  - g. Maintenance
    - i. Replacement
    - ii. Storage
    - iii. Components of ARFF proximity protective personal equipment (PrPPE)
      - 1. Helmet with reflective bonnet, reflective shield and neck shroud
      - 2. Coat
        - a. Reflective outer shell
        - b. Thermal barrier
        - c. Vapor barrier
      - 3. Pants
        - a. Reflective outer shell
        - b. Thermal barrier
        - c. Vapor barrier
      - 4. ARFF boots
      - 5. Gloves
        - a. Reflective outer shell
        - b. Thermal barrier
        - c. Vapor barrier
      - 6. Reflective SCBA covers
- 7) Fire behavior
- a. Class A fires
    - i. Aircraft interior
    - ii. Aircraft cargo
    - iii. Airport structures
  - b. Class B fires
    - i. Pooled fuel
    - ii. Three-dimensional
  - c. Class C fires
    - i. Avionics
    - ii. Wiring
  - d. Class D fires
    - i. Landing gear
    - ii. Engine components
- 8) Fire-fighting techniques in oxygen-enriched atmospheres
- a. Recognizing an oxygen enriched atmosphere
  - b. Defensive tactics to reduce oxygen concentration
- 9) Reaction of aircraft materials to heat and flame

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- a. Aluminum and aluminum alloy
  - b. Steel
  - c. Magnesium and magnesium alloy
  - d. Titanium
  - e. Advance aerospace (composite) materials
  - f. Wood
- 10) Critical components and hazards of civil aircraft construction and systems related to ARFF operations
- a. Pinching and limb severing hazards
  - b. Propeller dangers
  - c. Helicopter hazards
  - d. Jet-Engine hazards
  - e. Evacuation hazards
  - f. Ballistic recovery systems
  - g. Landing gear
  - h. Wheel assemblies
  - i. Electrical systems
  - j. Hydraulic systems
  - k. Advanced aircraft composite materials
  - l. Fuel systems
  - m. Radar systems
  - n. Pressurized cylinders
  - o. Oxygen supply systems
  - p. Protruding devices
  - q. Ram Air Turbine (RAT)
- 11) Special hazards associated with military aircraft systems
- a. Pinching and limb severing hazards
  - b. Propeller dangers
  - c. Helicopter hazards
  - d. Jet-engine hazards
  - e. Evacuation hazards
  - f. Ejection seats
  - g. Landing gear
  - h. Wheel assemblies
  - i. Electrical systems
  - j. Hydraulic systems
  - k. Advanced aircraft composite materials
  - l. Fuel systems
  - m. Special or exotic fuels
  - n. Radar systems
  - o. Pressurized cylinders

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- p. Oxygen supply systems
  - q. Protruding devices
  - r. RAT
  - s. Weapons and weapon systems
  - t. Aircraft emergency systems
- 12) A national defense area and limitations within that area
- a. Department of Defense (DOD) designation
  - b. Exclusion area for ARFF
- 13) Characteristics of different aircraft fuels
- a. Civilian
  - b. Military
- 14) Hazardous areas in and around aircraft
- a. Hazard areas in the aircraft
    - i. Cockpit/flight deck
    - ii. Cargo area
    - iii. Galley
    - iv. Avionics area
    - v. Energized electrical area
  - b. Hazardous areas around the aircraft
    - i. Propellers
    - ii. Engines
    - iii. Military armament
    - iv. Collapse zones
    - v. Wheel assembly
    - vi. Aircraft radar
    - vii. RAT
- 15) Aircraft egress/ingress (hatches, doors, and evacuation chutes)
- a. Aircraft egress
    - i. Doors
    - ii. Hatches
    - iii. Slides
    - iv. Door height
    - v. Stairs
    - vi. Emergency exits
    - vii. Emergency rafts
    - viii. Flight deck windows
  - b. Aircraft ingress
    - i. Doors
    - ii. Hatches
    - iii. Door height

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- iv. Stairs
  - v. Ladders
  - vi. Emergency exits
  - vii. Air stairs
- 16) Hazards associated with aircraft cargo, including dangerous goods
- a. Laws and regulations
    - i. Classifications of dangerous goods
    - ii. Shipment of dangerous goods
  - b. Product identification
    - i. Identification
    - ii. Verification
    - iii. Information gathering
  - c. Personal Protective Equipment (PPE)
    - i. NFPA levels of protection
      - 1. Structural gear
      - 2. Proximity gear (PrPPE)
      - 3. Chemical protective clothing
        - a. Vapor protective
        - b. Liquid splash protective
    - ii. Environmental Protection Agency (EPA) levels of protection
      - 1. Level A
      - 2. Level B
      - 3. Level C
      - 4. Level D
  - d. Dangerous goods operations
  - e. Agricultural applications
- 17) Hazardous areas, including entry control points, crash scene perimeters, and requirements for operations within the hot, warm, and cold zones
- a. Hazardous areas
  - b. Entry control points
  - c. Crash scene perimeters
  - d. Operational Zones
    - i. Hot Zone (Restricted Zone)
    - ii. Warm Zone (Limited Access Zone)
    - iii. Cold Zone (Support Zone)
- 18) Critical stress management policies and procedures
- a. Policies
    - i. Authority Having Jurisdiction (AHJ)
  - b. Procedures

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- i. Coping with stress
- ii. Critical Incident Stress Debriefing (CISD)

#### **200-5.1.1.4 General Skills Requirements**

Don PPE; operate hatches, doors, and evacuation chutes; approach, position, and initially attack an aircraft fire; select, apply, and manage extinguishing agents; shut down aircraft systems, including engine, electrical, hydraulic, and fuel systems; operate aircraft extinguishing systems, including cargo area extinguishing systems.

**200-5.1.2** The job performance requirements of this chapter shall be accomplished in accordance with the requirements of the authority having jurisdiction and NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*.

#### **200-5.2 Response**

This duty involves the timely arrival at an incident or accident and the capability to perform emergency functions. The duty also includes responding to hazardous conditions and performing standby operations.

**200-5.2.1** Respond to day and night incidents or accidents on and adjacent to the airport, given an assignment, operating conditions, a location, a grid map, a vehicle, and a prescribed response time, so that the route selected and taken provides access to the site within the allotted time.

**Requisite Knowledge:** Airport familiarization, including runway and taxiway designations, frangible gate locations, airport markings, lights, Instrument Landing System (ILS) critical areas, critical rescue and fire-fighting access areas, designated isolation areas, vehicular traffic controls on airfield, bridge load limits, controlled access points, aircraft traffic patterns and taxi routes, fuel storage and distribution locations, airport and immediate local area topographic layout, drainage systems, water supplies, airport facilities and security.

Airport familiarization, including:

- 1) Runway and taxiway designations
  - a. Runway identification
    - i. Designation
      1. Compass heading
      2. Numbers and letters
    - ii. Markings
      1. White

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- 2. Yellow
    - iii. Signage
    - iv. Lighting
      - 1. White
      - 2. Amber
      - 3. Red
      - 4. Green
  - b. Taxiway identification
    - i. Designation
      - 1. Phonetic alphabet
      - 2. Name
    - ii. Markings
    - iii. Signage
    - iv. Lighting
      - 1. Blue
      - 2. Green
- 2) Frangible gate locations
  - a. AHJ
  - b. Gate controlled access
  - c. Alternate response route
    - i. Weather
    - ii. Location
    - iii. Terrain
    - iv. Topography
- 3) Airport markings
  - a. Aircraft operations area (AOA)
    - i. Pavement markings
      - 1. White
      - 2. Red
      - 3. Yellow
    - ii. Signs
      - 1. Mandatory instruction
      - 2. Runway hold position
      - 3. Location signs
      - 4. Direction signs
      - 5. Destination signs
      - 6. Information signs
      - 7. Runway distance remaining signs
  - b. Non aircraft operations area
    - i. AHJ
    - ii. Department of Transportation (DOT)

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- 4) Lights
  - a. Surface lighting
    - i. Blue lights
    - ii. White lights
    - iii. Green lights
    - iv. Red lights
    - v. Amber or yellow lights
- 5) Instrument landing system (ILS) critical areas
  - a. Locations per AHJ
  - b. Identification
  - c. Interference
  - d. Alternate response routes
  - e. Hazards
- 6) Critical rescue and fire fighting access areas (CRFFAA)
  - a. Location in relation to grid map (AHJ)
  - b. Size
    - i. Departure and approach area
    - ii. Distance from runway centerline
- 7) Designated isolation areas (AHJ)
  - a. Predetermined area designed for temporary parking for aircraft experiencing hazardous cargo problems
  - b. Know isolation location for your airport (AHJ)
  - c. Hijacking
  - d. Bomb threat
  - e. Terrorist attack
  - f. Bio-Hazards
    - i. Cargo
    - ii. Passengers
  - g. Weapons of Mass Destruction (WMD)
- 8) Vehicular traffic controls on airfield
  - a. Navigational Aids (NAVAIDS)
  - b. Construction
  - c. Airport markings
    - i. Hold bars
    - ii. Safety zones
  - d. Airport ramps
  - e. Fences and gates
  - f. All weather roads
- 9) Bridge load limits (AHJ)
  - a. Road weight limits
  - b. ARFF apparatus weight

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- c. Local area bridges in the response area covered by AHJ
- d. Alternate routes
- 10) Controlled access points
  - a. Solid red marking
  - b. Fences and gates
  - c. Mandatory signs
- 11) Aircraft traffic patterns and taxi routes (AHJ)
  - a. Patterns used by aircraft in the vicinity of the airport
  - b. Emergency declarations for aircraft
  - c. Components of the pattern
    - i. Crosswind leg
    - ii. Downwind leg
    - iii. Base leg
    - iv. Final approach
  - d. Designated routes for aircraft to final destinations
- 12) Fuel storage and distribution locations (AHJ)
  - a. Airport fuel operations
    - i. Fuel storage
    - ii. Supply methods
    - iii. Fuel distribution systems
    - iv. Aircraft fueling methods
  - b. Airport fuel operation locations
  - c. Emergency fuel operation shut-down
  - d. Preplanning for emergencies
  - e. Fire fighting systems
- 13) Airport and immediate local area topographic layout
  - a. Airport layout
  - b. Airport markings
  - c. Length and width of runways
  - d. Taxiway identification
  - e. Streets and highway within the emergency response area on airport, and off airport
  - f. Grid map
  - g. Local terrain features
  - h. Response area off airport property
  - i. Bodies of water
  - j. Airport structures
- 14) Drainage systems (AHJ)
  - a. Drainage system dynamics
  - b. Drainage system openings
  - c. Fuel/water separator

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- d. Containment for drainage
  - e. Run off locations
  - f. Airport without drainage system
    - i. Pre-planning for the event
    - ii. Confinement
    - iii. Containment
    - iv. Clean up and recovery efforts
- 15) Water supplies (AHJ)
- a. Sources
    - i. Wells
    - ii. Tanks
    - iii. Domestic supply
  - b. Hydrant locations
  - c. Mobile supply types
    - i. Fire apparatus
    - ii. Tankers/tenders
  - d. Mutual aid response for water supply
  - e. Pre-planning for water supply strategies
- 16) Airport facilities
- a. Terminals
    - i. Life safety concerns
    - ii. Jetways
    - iii. Baggage handling areas
    - iv. Mass transportation equipment
    - v. Hotels
    - vi. Parking garages
    - vii. Controlled access
  - b. Aircraft Maintenance Facilities
    - i. Fuel system repair
    - ii. Painting facilities
    - iii. Hazardous materials storage
    - iv. Aircraft electrical, avionics and radar systems repair locations
    - v. Welding and cutting locations
    - vi. Office locations and high occupancy areas
    - vii. Fire prevention
- 17) Security
- a. Airfield perimeter fencing/protection
  - b. Controlled access points (already stated)
    - i. Manned access points

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- ii. Unmanned access points - Radio Frequency Identification (RFID) or remote control
- iii. Manually operated gates
- iv. Frangible gates
- c. Vehicle incursion prevention systems
  - i. Tiger teeth (tire damaging systems)
  - ii. Barriers
- d. Airfield vehicle eligibility markings
  - i. Decals
  - ii. Lighting
- e. Airfield personnel eligibility identification

Requisite Skills: Read, interpret, and take correct action related to grid maps, water distribution maps, airport markings, and lights.

- 200-5.2.2** Communicate critical incident information regarding an incident or accident on or adjacent to an airport, given an assignment involving an incident or accident and an incident management system (IMS) protocol, so that the information provided is accurate and sufficient for the incident commander to initiate an attack plan.

**Requisite Knowledge:** Incident management system (IMS) protocol, the airport emergency plan, airport and aircraft familiarization, and communications equipment and procedures.

- 1) Incident management system (IMS) protocol
  - a. IMS and the functional responsibilities (AHJ)
  - b. Strategic goals
  - c. Tactical objectives
  - d. IMS Organizational Chart (AHJ)
  - e. Chain of command (AHJ)
- 2) The airport emergency plan (AHJ)
  - a. Mutual aid resources
  - b. Fire rescue resources
  - c. Emergency medical resources
  - d. Law enforcement resources
  - e. Other airport personnel
  - f. Critical stress management
  - g. Mitigation
- 3) Airport familiarization (AHJ)
  - a. Airport traffic flow systems
    - i. Aircraft

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- ii. Vehicular
  - b. Location of incident
    - i. Runways
    - ii. Taxiways
    - iii. Grid map
  - c. Access control points
  - d. Approach safety areas
  - e. Departure safety areas
  - f. National Defense area limitations
- 4) Aircraft familiarization
  - a. Aircraft types
    - i. Commercial
    - ii. General aviation
    - iii. Military aircraft
  - b. Aircraft systems
  - c. Hazards of aircraft
  - d. Aircraft fuels
  - e. Aircraft evacuation
- 5) Communications equipment and procedures
  - a. Airport communication systems
  - b. Pilot/ARFF (discrete emergency frequency)
  - c. Proper radio protocol
    - i. International Civil Aviation Organization (ICAO)
    - ii. ICAO phonetic alphabet
    - iii. Computers
      - 1. Mobile Data Terminals (MDT)
      - 2. Mobile Computer Terminals (MCT)
      - 3. Global Positioning Systems (GPS)
    - iv. Light signals
      - 1. Steady green
      - 2. Steady red
      - 3. Flashing red
      - 4. Flashing white
      - 5. Alternating red/green
    - v. Hand signals
      - 1. Recommend evacuation
      - 2. Recommend stop
      - 3. Emergency contained
    - vi. Other audible/visible signals
      - 1. Back out or retreat

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2. Apparatus is running out of agent
3. Open or close hand line
4. Change hand line nozzle/stream pattern
5. Advance with hand line
6. Back out with hand line

Requisite Skills: Operate communications systems, communicate an accurate situation report, implement incident management system (IMS) protocol and airport emergency plan, and recognize aircraft types.

- 200-5.2.3** Communicate with applicable air traffic control facilities, given a response destination on or adjacent to an airport and radio equipment, so that all required clearances are obtained.

**Requisite Knowledge:** Communications equipment and frequencies, tower light signals, aviation phraseology, and phonetic alphabet.

- 1) Communications equipment and frequencies
  - a. Tower
    - i. Ground control
    - ii. Local control or tower frequencies
    - iii. Discrete Emergency Frequency (DEF) (AHJ)
  - b. Aviation radio
    - i. Procedures
    - ii. Terminology
  - c. Fire frequency radio (AHJ)
- 2) Tower light signals
  - a. Used in the event of communication failure with air traffic control tower (ATCT)
  - b. Colors
    - i. Steady green
    - ii. Steady red light
    - iii. Flashing red light
    - iv. Flashing white light
    - v. Alternating red and green light
  - c. Meaning
    - i. Steady green - Cleared to cross, proceed or go
    - ii. Steady red light - Stop
    - iii. Flashing red light - Clear the taxiway/runway
    - iv. Flashing white light - Return to the starting point on the airport
    - v. Alternating red and green light - Exercise extreme caution

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- 3) Aviation phraseology
- 4) Phonetic alphabet

Requisite Skills: Operate communications equipment and use aviation phraseology and phonetic alphabet.

- 200-5.2.4** Perform an airport operation, given an assignment, a hazardous condition, and the airport policies and procedures, so that unsafe conditions are detected and reduced in accordance with the airport policies and procedures.

**Requisite knowledge:** Airport policies and procedures for hazardous conditions and aircraft policies and procedures for hazardous conditions.

- 1) Airport policies and procedures for hazardous conditions
  - a. Airport certification manual
  - b. Airport emergency plan
  - c. Notification of the emergency
  - d. Response
  - e. Initiation of IMS
  - f. ARFF safety
  - g. Airport structure emergencies
    - i. Terminals
    - ii. Hangars
  - h. Fuel storage and distribution
  - i. Fuel spills
  - j. Aircraft fueling operations
  - k. Aircraft maintenance areas
    - i. Welding
    - ii. Painting
  - l. Airport Environment
    - i. Construction
    - ii. Traffic
    - iii. Drainage
    - iv. Airport Topography
  - m. Designated isolation areas
    - i. Bomb threats
    - ii. Terrorists
    - iii. Hazardous materials
- 2) Aircraft policies and procedures for hazardous conditions
  - a. Airport emergency plan (AHJ)
  - b. Standardized response
  - c. Coordination with flight crew

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- d. Aircraft familiarization
- e. Aircraft emergencies
  - i. Ground emergencies
  - ii. In-flight emergencies

Requisite Skills: Recognize hazardous conditions and initiate corrective action.

### **200-5.3** **Fire Suppression**

This duty involves the attack, control, and extinguishment of fires involving aircraft, aircraft cargo, airport facilities, and other equipment related to airport operations and property conservation. The primary purpose of this duty is to protect lives and property.

- 200-5.3.1** Extinguish a 23.2 m<sup>2</sup> (250 ft<sup>2</sup>) aircraft fuel spill fire, given PPE, a minimum of a 45 kg (100 lb) dry chemical fire extinguisher, and procedures, so that the agent is applied according to procedures and the fire is extinguished in 25 seconds.

**Requisite Knowledge:** The fire behavior of aircraft fuels in spills and pools, physical properties, characteristics of aircraft fuel, agent application rates, densities, and procedures.

- 1) The fire behavior of aircraft fuels in spills and pools
  - a. Flame spread
  - b. Flashback (re-ignition)
  - c. Vapors
  - d. Flammability
- 2) Physical properties
  - a. Aviation gasoline (AVGAS)
    - i. Weight
    - ii. Specific gravity
    - iii. Vapor density
  - b. Jet-A (grade of kerosene)
    - i. Weight
    - ii. Specific gravity
    - iii. Vapor density
  - c. Other fuels
    - i. Blends
    - ii. Military grade
- 3) Characteristics of aircraft fuel
  - a. Flashpoint

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- b. Auto ignition temperature
  - c. Explosive limits
    - i. Upper
    - ii. Lower
  - d. Flame spread
  - e. Vapor pressure
- 4) Agent application rates, densities, and procedures
- a. Agent application rates - minimum 1 lb/sec.
  - b. Densities
  - c. Procedures
    - i. Fully extend extinguisher hose
    - ii. Activate extinguisher
    - iii. Open nozzle
    - iv. Direct agent at base of fire
    - v. Sweep back and forth
  - d. Types of agents
    - i. Primary agents
    - ii. Water
    - iii. Foam
      - 1. Class A
        - a. High expansion foams
        - b. Wetting agents
      - 2. Class B
        - a. Aqueous film forming foam (AFFF)
        - b. Protein foam (PF)
        - c. Fluoroprotein foam (FPF)
        - d. Film forming fluoroprotein foam (FFFP)
        - e. Polar solvent
      - 3. Complimentary agents
        - a. Halogenated agents
        - b. Dry powder
        - c. CO<sub>2</sub>
        - d. Storage (consider putting in re-supply)
        - e. Pails
        - f. Barrels
        - g. Apparatus tanks
        - h. Totes

Requisite Skills: Operate dry chemical extinguishers equipped with a hose line, including removing and operating hose and applying agent.

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**200-5.3.2** Extinguish an aircraft fuel spill fire, given PPE, an assignment, agent application procedures, an ARFF vehicle hand line flowing a minimum of 359 L/min (95 gpm) of AFFF extinguishing agent, and a fire sized to the flow rate used [AFFF flow rate divided by 4.92 L/min/m<sup>2</sup> for fire size in square meters (0.13 gpm/min/ft<sup>2</sup> for fire size in square feet)], so that the agent is applied using the prescribed techniques and the fire is extinguished in a time proportionate to, but no longer than, 90 seconds for a 73 m<sup>2</sup> (786 ft<sup>2</sup>) fire with a flow rate at 359 L/min (95 gpm).

**Requisite Knowledge:** The fire behavior of aircraft fuels in pools, physical properties and characteristics of aircraft fuel, and agent application rates and densities.

- 1) Fire behavior of aircraft fuels in pools
  - a. Flame spread
  - b. Flashback (re-ignition)
  - c. Vapors
  - d. Flammability
- 2) Physical properties of aircraft fuels
  - a. Aviation gasoline (AVGAS)
    - i. Weight
    - ii. Specific gravity
    - iii. Vapor density
  - b. Jet-A (grade of kerosene)
    - i. Weight
    - ii. Specific gravity
    - iii. Vapor density
  - c. Other fuels
    - i. Blends
    - ii. Military grade
- 3) Characteristics of aircraft fuels
  - a. Flashpoint
  - b. Auto ignition temperature
  - c. Explosive limits
    - i. Upper
    - ii. Lower
  - d. Flame spread
  - e. Vapor pressure
- 4) Agent application rates and densities
  - a. Agent application rate - minimum 95 gpm @ at nozzle pressure specified by manufacturer

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- b. Agent application density - 0.13 gpm/minimum/ft<sup>2</sup> of AFFF extinguishing agent for fire size in square feet

Requisite Skills: Operate fire streams and apply agent.

**200-5.3.3** Extinguish an aircraft fuel spill fire, given an assignment, PPE, an ARFF vehicle turret flowing a minimum of 946 L/min (250 gpm), a fire sized to the flow rate used [AFFF flow rate divided by 4.92 L/min/m<sup>2</sup> for fire size in square meters (0.13 gpm/min/ft<sup>2</sup> for fire size in square feet)], and the procedures for agent application, so that the agent is applied according to procedures and the fire is extinguished in a time proportionate to, but no longer than, 90 seconds for 192 m<sup>2</sup> (1923 ft<sup>2</sup>) fire with a flow rate at 946 L/min (250 gpm).

**Requisite Knowledge:** Operation of ARFF vehicle agent delivery systems, the fire behavior of aircraft fuels in pools, physical properties and characteristics of aircraft fuel, the procedures for agent application, and agent application rates and densities.

- 1) Operation of ARFF vehicle agent delivery systems
  - a. As per manufacturer operating procedures
  - b. Per AHJ
- 2) Fire behavior of aircraft fuels in pools
  - a. Flame Spread
  - b. Flashback (re-ignition)
  - c. Vapors
  - d. Flammability
- 3) Physical properties of aircraft fuels
  - a. Aviation gasoline (AVGAS)
    - i. Weight
    - ii. Specific gravity
    - iii. Vapor density
  - b. Jet-A (grade of kerosene)
    - i. Weight
    - ii. Specific gravity
    - iii. Vapor density
  - c. Other fuels
    - i. Blends
    - ii. Military grade
- 4) Characteristics of aircraft fuels
  - a. Flashpoint

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- b. Auto ignition temperature
  - c. Explosive limits
    - i. Upper
    - ii. Lower
  - d. Flame spread
  - e. Vapor pressure
- 5) Agent application rates and densities
- a. Agent application rate - minimum 250 gpm @ at nozzle pressure specified by manufacturer
  - b. Agent application density - 0.13 gpm/minimum/ft<sup>2</sup> of AFFF for fire size in square feet

Requisite Skills: Apply fire-fighting agents and streams using ARFF vehicle turrets.

- 200-5.3.4** Extinguish a three-dimensional aircraft fuel fire as a member of a team, given a team, PPE, an assignment, ARFF vehicle hand line(s) using primary and secondary agents, and agent application procedures, so that a dual-agent attack is used, the agent is applied according to procedures, the fire is extinguished, and the fuel source is secured.

**Requisite Knowledge:** The fire behavior of aircraft fuels in three-dimensional and atomized states, physical properties and characteristics of aircraft fuel, agent application rates and densities, agent application procedures, and methods of controlling fuel sources.

- 1) Fire behavior of aircraft fuels in three-dimensional state
  - a. Running, flowing fuel fire from elevated source
  - b. Pressurized fuel source
- 2) Fire behavior of aircraft fuels in atomized state
  - a. Explosive atmosphere
  - b. Higher proliferation of vapors
- 3) Physical properties of aircraft fuels
  - a. Aviation gasoline (AVGAS)
    - i. Weight
    - ii. Specific gravity
    - iii. Vapor density
  - b. Jet-A (grade of kerosene)
    - i. Weight
    - ii. Specific gravity
    - iii. Vapor density
  - c. Other fuels

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- i. Blends
  - ii. Military grade
- 4) Characteristics of aircraft fuels
  - a. Flashpoint
  - b. Auto ignition temperature
  - c. Explosive limits
    - i. Upper
    - ii. Lower
  - d. Flame spread
  - e. Vapor pressure
- 5) Agent application rates and densities
  - a. Agent application rate
    - i. Minimum 95 gpm @ at nozzle pressure specified by manufacturer
    - ii. Minimum 5 lbs/second dry chemical
  - b. Agent application densities
    - i. 0.13 gpm/minimum/ft<sup>2</sup> of AFFF for fire size in square feet
    - ii. Amount of dry chemical proportionate to hazard
- 6) Agent application procedures
  - a. Rapid knock down
  - b. Vapor suppression
- 7) Methods of controlling fuel sources
  - a. Shut off source
  - b. Control ignition source
  - c. Suppress vapors
  - d. Prevent run-off

Requisite Skills: Operate fire streams and apply agents; and secure fuel sources.

**200-5.3.5** Attack a fire on the interior of an aircraft while operating as a member of a team, given a team, PPE, an assignment, an ARFF vehicle hand line, an extinguishing agent, and a ladder or other means of accessing the aircraft, so that team integrity is maintained, the attack line is deployed for advancement, ladders or other means are used, access is gained into the fire area, effective agent application practices are used, the fire is approached, attack techniques facilitate suppression given the level of the fire, hidden fires are located and controlled, hazards are avoided or managed, and the fire is brought under control.

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**Requisite Knowledge:** Techniques for accessing the aircraft interior according to the aircraft type, methods for advancing hand lines from an ARFF vehicle, precautions to be followed when advancing hose lines to a fire, observable results that a fire stream has been applied, dangerous structural conditions created by fire, principles of exposure protection, potential long-term consequences of exposure to products of combustion, physical states of matter in which fuels are found, common types of accidents or injuries and their causes, the role of the backup team in fire attack situations, attack and control techniques, and techniques for exposing hidden fires.

- 1) Techniques for accessing the aircraft interior according to aircraft type
  - a. Assessing the exterior prior to entry
    - i. Blistering or peeling of paint
    - ii. Visible signs of heavy interior fire
    - iii. Engine fires
    - iv. Wheel assembly fires
    - v. HVAC system fires
    - vi. Exterior is very hot to the touch
  - b. Access points
    - i. Doors
      1. Cabin
      2. Cargo
    - ii. Emergency exits
    - iii. Rear stairs
    - iv. Hatches
    - v. Windows
    - vi. Fuselage breach
  - c. Access equipment
    - i. Ladders
      1. Ground ladders
      2. Specialty ladders
    - ii. Elevated platforms
    - iii. Mobile air stairs
    - iv. Forcible entry tools
- 2) Methods for advancing hand lines from the ARFF vehicle
  - a. Proper PPE and SCBA
  - b. Deployment of hand line(s)
  - c. Advancement of hand line(s)
  - d. Two person team
  - e. Two in/two out rule
  - f. Awareness of hazards
- 3) Precautions to be followed when advancing hose lines to a fire
  - a. Do not impede passenger evacuation

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- b. Deploy hand line(s) in a safe area
  - c. Watch for sharp objects
  - d. Avoid flammable liquids
  - e. Be aware of hazards present
  - f. Potential backdraft, flashover, rollover, and smoke explosion occurrences
- 4) Observable results that fire stream has been applied
- a. Steam from hose line application on a hot object (steam conversion)
  - b. Cooling
  - c. Fire knock down
  - d. Displacement of products of combustion
  - e. Smoke transformation
- 5) Dangerous structural conditions created by fire
- a. Missing structural components
  - b. Fire/flame spread to concealed areas
  - c. Instability
  - d. Molten metals
  - e. Collapses
  - f. Weakened structural components
- 6) Principles of exposure protection
- a. Hand line(s) should be in place to protect unburned portions
  - b. Protection of exposed or surrounding objects
  - c. Adequate water supply
  - d. Proper coverage to ensure cooling effect
  - e. Wind direction
- 7) Potential long-term consequences of exposure to products of combustion
- a. Carcinogenic effects
  - b. Respiratory damage
  - c. Dermatological
  - d. Product specific effects
    - i. Composites
    - ii. Fuels
    - iii. Aircraft fluids
- 8) Physical states of matter in which fuels are found
- a. Solid
  - b. Liquid
  - c. Vapor
- 9) Common types of accidents or injuries and their causes
- a. Types
    - i. Physical
    - ii. Psychological

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- b. Causes
  - i. Inadequate training
  - ii. Lack of critical incident stress management
  - iii. Failure to comply with safety standards
  - iv. Dangerous conditions
- 10) The role of the backup team in fire attack situations
  - a. Two in/two out rule
    - i. Rescue of primary entry team
    - ii. Exterior support operations
  - b. Observing and communicating conditions
- 11) Attack and control techniques
  - a. Point of entry
  - b. Never impede egress of passengers
  - c. Observe hottest area of fire
  - d. Direct fire attack
  - e. Indirect fire attack
  - f. Cool exterior if entry is delayed
  - g. Piercing appliances
- 12) Techniques for exposing hidden fires
  - a. Ventilation
  - b. Overhaul
  - c. Thermal imagers
  - d. Interior inspection
    - i. Light ballasts
    - ii. Galley area
    - iii. Lavatories
    - iv. Flight deck area
    - v. Avionics
    - vi. Cargo compartments
    - vii. Electrical components

Requisite Skills: Deploy ARFF hand line on an interior aircraft fire; gain access to aircraft interior; open, close, and adjust nozzle flow and patterns; apply agent using direct, indirect and combination attacks; advance charged and uncharged hose lines up ladders and up and down interior and exterior stairways; and locate and suppress interior fires.

- 200-5.3.6** Attack an engine or auxiliary power unit/emergency power unit (APU/EPU) fire on an aircraft while operating as a member of a team, given PPE, an assignment, ARFF vehicle hand line or turret, a correct agent, and agent application procedures, so that agent application procedures are followed, the fire is extinguished, and the engine or APU/EPU is shut down.

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**Requisite Knowledge:** Techniques for accessing the aircraft engines and APU/EPUs, safety procedures, methods for advancing hand line from an ARFF vehicle, methods for operating turrets, and methods for shutting down engine and APU/EPU operation.

- 1) Techniques for accessing the aircraft engines and APU/EPUs
  - a. Assessing the exterior prior to entry
    - i. Blistering or peeling of paint
    - ii. Visible signs of compartment fire
    - iii. Engine fires
  - b. Gaining access
    - i. Hatches
    - ii. Cowlings
    - iii. Fire ports
  - c. Access equipment
    - i. Ladders
      1. Ground ladders
      2. Specialty ladders
    - ii. Elevated platforms
    - iii. Mobile air stairs
    - iv. Forcible entry tools
- 2) Safety procedures
  - a. Avoid intake
  - b. Avoid exhaust
  - c. Avoid propellers
  - d. Engine/APU shut down
- 3) Methods for advancing hand line from an ARFF vehicle
  - a. Proper PPE and SCBA
  - b. Deployment of hand line(s)
    - i. Reel lines
    - ii. Preconnected hose lines
  - c. Advancement of hand line(s)
  - d. Two person team
  - e. Two in/two out rule
  - f. Awareness of hazards
- 4) Methods for operating turrets
  - a. Per manufacturer specification
  - b. As per AHJ
- 5) Methods for shutting down engine and APU/EPU operation
  - a. Engine/APU shut down
    - i. Engine
      1. By flight crew

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- a. Fuel (throttles)
- b. On board extinguishing systems (bottles)
- c. Electrical (batteries)
2. By ARFF crew
  - a. Fuel (throttles)
  - b. On board extinguishing systems (bottles)
  - c. Electrical (batteries)
- ii. Auxiliary power unit (APU)
  1. By flight crew
    - a. Fuel (throttles)
    - b. On board extinguishing systems (bottles)
    - c. Electrical (batteries)
  2. By ARFF crew
    - a. Flight deck
      - i. Fuel (throttles)
      - ii. On board extinguishing systems (bottles)
      - iii. Electrical (batteries)
    - b. External controls
      - i. Engine shut down
      - ii. Extinguishing systems

Requisite Skills: Deploy and operate ARFF hand line, operate turrets, gain access to aircraft engine and APU/EPU, and shut down engine and APU.

- 200-5.3.7** Attack a wheel assembly fire, as a member of a team, given PPE, a team, an assignment, an ARFF vehicle hand line, and correct agent, so that the fire is extinguished.

**Requisite Knowledge:** Agent selection and application procedure, special safety considerations, and the characteristics of combustible metals.

- 1) Agent selection and application procedure
  - a. Agent selection
    - i. Water
    - ii. Class D extinguishing agents
    - iii. Dry chemical
  - b. Application procedure
    - i. Mass application of water
    - ii. Adequate amount of class D agent for encapsulation
    - iii. Adequate amount of dry chemical for extinguishment
    - iv. Conservation of agent

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- 2) Special safety considerations
  - a. Fusible plugs
  - b. Proper approach
  - c. Tire disintegration
  - d. Wheel fragmentation
  - e. Aircraft collapse
  - f. Appropriate utilization of PPE with SCBA
  - g. Hazardous or flammable fluid release
  - h. Engine intake
  - i. Engine exhaust
- 3) The characteristics of combustible metals
  - a. High ignition point
  - b. Intense pyrolysis
  - c. Extreme heat
  - d. Reactivity

Requisite Skills: Approach the fire in accordance with safety procedures; and select and apply agent.

**200-5.3.8** Ventilate an aircraft through available doors and hatches while operating as a member of a team, given PPE, an assignment, tools, and mechanical ventilation devices, so that openings are created, all ventilation barriers are removed, and the heat and other products of combustion are released.

**Requisite Knowledge:** Aircraft access points; principles, advantages, limitations, and effects of mechanical ventilation; the methods of heat transfer; the principles of thermal layering within an aircraft on fire; and the techniques and safety precautions for venting aircraft.

- 1) Aircraft access points
  - a. Normal door operations
  - b. Over wing access
  - c. Cargo doors
  - d. Hatches
  - e. Breaks in structure of aircraft
- 2) Principles, advantages, limitations, and effects of mechanical ventilation
  - a. Negative pressure ventilation
    - i. Hydraulic
    - ii. Gas powered fans
    - iii. Electrical powered fans

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- b. Positive pressure ventilation
  - i. Gas powered fans
  - ii. Electrical powered fans
- 3) The methods of heat transfer
  - a. Conduction
  - b. Convection
  - c. Radiation
  - d. Direct flame impingement
- 4) The principles of thermal layering within an aircraft on fire
  - a. Smoke stratification
  - b. Heat travel
    - i. Vertical
    - ii. Horizontal
- 5) The techniques and safety precautions for venting aircraft
  - a. Techniques for venting aircraft
    - i. Mechanical
      - 1. Positive pressure
      - 2. Negative pressure
    - ii. Natural
      - 1. Horizontal
      - 2. Vertical
  - b. Safety considerations for venting aircraft
    - i. Flashover
    - ii. Rollover
    - iii. Backdraft
    - iv. Smoke explosion

Requisite Skills: Operate doors, hatches, and forcible entry tools, operate mechanical ventilation devices, and remove barriers.

- 200-5.3.9** Replenish extinguishing agents while operating as a member of a team, given an assignment, an ARFF vehicle, a fixed or mobile water source, a supply of agent, and supply lines and fittings, so that agents are available for application by the ARFF vehicle within the time established by the authority having jurisdiction (AHJ).

**Requisite Knowledge:** Re-supply procedures, operation procedures for ARFF vehicle replenishment, and pumps and transfer devices.

- 1) Re-supply procedures
  - a. Water sources

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- i. Airport water distribution system.
    - ii. Mobile water supply
    - iii. Additional water supplies
  - b. Water refill methods
    - i. Direct connection
    - ii. Overhead fill
  - c. Foam re-supply
    - i. Overhead gravity
    - ii. Mechanical or hand foam concentrate transfer pump
    - iii. 5 gallon container direct fill
  - d. Auxiliary agent refill
    - i. Knowledge of agent type
    - ii. Follow manufacturers procedures
    - iii. Service in well ventilated areas and utilize respiratory protection
- 2) Operation procedures for ARFF vehicle replenishment
  - a. Per ARFF vehicle manufacturer specifications
  - b. Procedures per AHJ
- 3) Operation procedures for pumps and transfer devices
  - a. Per manufacturer specifications
  - b. All agent systems should be thoroughly flushed after each use
  - c. Procedures per AHJ

Requisite Skills: Connect hose lines, operate valves, and operate pumps and transfer devices.

**200-5.3.10** Preserve the aircraft accident scene, given an assignment and procedures, so that evidence is identified, protected, and reported according to procedures.

**Requisite Knowledge:** Airport emergency plan requirements for preservation of the scene, evidence identification, evidence protection, and evidence reporting procedures.

- 1) Airport emergency plan requirements for preservation of the scene
  - a. Scene security
  - b. Photographs
  - c. Sketches or drawings
  - d. Marking evidence locations
- 2) Evidence identification
  - a. During the primary search of an aircraft accident site

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- i. Life safety is the priority during this phase of the incident
    - ii. Evidence protection is secondary
  - b. During the secondary search of an aircraft accident site
    - i. Protection of evidence should have priority
    - ii. Since all the survivors should be rescued, slow down the search and protect evidence
- 3) Evidence protection
  - a. National Transportation Safety Board (NTSB) regulations
    - i. Removal of persons trapped or injured
    - ii. Protect the aircraft from further damage
    - iii. Protect the public from injury
  - b. Secure the scene
  - c. Document the moving of evidence
  - d. Secure and protect the flight data recorder (FDR) or cockpit voice recorder (CVR)
  - e. Special care should be taken in certain areas
    - i. In the cockpit or control areas
    - ii. Areas of primary structural failure or damage
- 4) Evidence reporting procedures
  - a. Documentation
    - i. Responder statements
    - ii. Witness statements
    - iii. Incident reporting
    - iv. Photographs
    - v. Maps
  - b. Discuss the relationships between various aircraft parts and occupants

Requisite Skills: Preserve the scene for investigators; and identify, protect, and report evidence.

**200-5.3.11** Overhaul the accident scene, given PPE, an assignment, hand lines, and property conservation equipment, so that all fires are located, exposed, and extinguished and all property is protected from further damage.

**Requisite Knowledge:** Methods of complete extinguishment and prevention of re-ignition, reasons for conservation, operating procedures for property conservation equipment, overhaul procedures, signs of a hidden fire, methods of detecting hidden fires, and tools and equipment used for overhaul.

- 1) Methods of complete extinguishment and prevention of re-ignition

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- a. Thermal imagers
- b. Overhaul
- c. Secure aircraft operating systems
- d. Vapor suppression
- 2) Reasons for conservation
  - a. Evidence protection
  - b. NTSB investigation
  - c. Scene stabilization
- 3) Operating procedures for property conservation equipment
  - a. Deployment of loss control systems
  - b. As per manufacturer's specifications
- 4) Overhaul procedures
  - a. Appropriate agency authorization
  - b. Use of PPE and SCBA
  - c. Aircraft stabilization
  - d. Air quality monitoring
  - e. Hazardous materials considerations
  - f. Hand line protection
  - g. Evidence protection
  - h. Hot spots located
  - i. Extinguishment and cooling
  - j. Pressurized systems identified
  - k. Void spaces opened or pierced
- 5) Signs of a hidden fire
  - a. Smoke
  - b. Steam
  - c. Thermal imager detection
- 6) Methods of detecting hidden fires
  - a. Smoke
  - b. Steam
  - c. Thermal imager detection
- 7) Tools and equipment used for overhaul
  - a. SCBA
  - b. Personal protective equipment
  - c. Hand line
  - d. Thermal imager
  - e. Forcible entry tools
  - f. Air monitors

**Requisite Skills:** Use property conservation equipment; detect hidden fires, and use tools and equipment to expose hidden fires.

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**200-5.4**      **Rescue**

This duty involves gaining access to an aircraft and assisting in the evacuation process, performing disentanglement, and initial triage.

**200-5.4.1**      Gain access into and out of an aircraft through normal entry points and emergency hatches, shut down and safety the aircraft, and assist in the evacuation process while operating as a member of a team, given PPE and an assignment, so that passenger evacuation and rescue can be accomplished.

**Requisite Knowledge:** Aircraft familiarization, including materials used in construction, aircraft terminology, automatic explosive devices, hazardous areas in and around aircraft, aircraft egress/ingress (hatches, doors, and evacuation chutes), military aircraft systems and associated hazards; capabilities and limitations of manual and power rescue tools and specialized high-reach devices, aircraft shutdown and safety procedures.

- 1) Aircraft familiarization
  - a. General aviation
  - b. Commercial
  - c. Military
- 2) Materials used in construction
  - a. Aluminum/aluminum alloys
  - b. Steel
  - c. Magnesium/magnesium alloys
  - d. Titanium
  - e. Advanced aerospace (composite) materials
  - f. Wood
- 3) Aircraft terminology
  - a. Fixed wing
  - b. Rotary wing
- 4) Automatic explosive devices
  - a. Ejection seats
  - b. Canopy removers
  - c. Initiators
  - d. Rotary actuators
  - e. Thrusters
  - f. Explosive squibs
  - g. Seat catapults
  - h. Ballistic recovery system (BRS)
- 5) Hazardous areas in and around aircraft

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- a. Wings
    - i. Fuel leaks and spills
    - ii. Guns/missiles/rockets
    - iii. Pinching hazards
    - iv. No step areas
  - b. Engines
    - i. Fuel leaks and spills
    - ii. Propellers
    - iii. Jet engines
      - 1. intake
      - 2. exhaust
  - c. Fuselage
    - i. Radar systems
    - ii. Appendages
    - iii. Overheated wheel assemblies
    - iv. Tire/wheel failures
    - v. Evacuation slides
  - d. Tail
    - i. Engine or APU fires
    - ii. Tail cones
    - iii. Evacuation slides
  - e. General hazards
    - i. Electrocution hazards
    - ii. Composites
    - iii. Aircraft hazardous materials
    - iv. Aircraft cargo hazards
- 6) Aircraft egress/ingress (hatches, doors, and evacuation chutes)
- a. Aircraft doors
  - b. Aircraft hatches
  - c. Rear stairs
  - d. Tail-cone jettison
  - e. Escape slides
  - f. Emergency exits
  - g. Hatches
  - h. Windows
  - i. Fuselage breach
- 7) Military aircraft systems and associated hazards
- a. Fire protection/detection systems
  - b. Ejection systems
  - c. Weapon systems
  - d. Exotic fuels

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- 8) Capabilities and limitations of manual and power rescue tools and specialized high-reach devices
  - a. Flammable atmosphere
  - b. Stability of aircraft
  - c. Hands-on training
  - d. Safety standards apply
  - e. Hand tools
  - f. Power tools
    - i. Electric
    - ii. Hydraulic
    - iii. Pneumatic
  - g. Lifting and pulling tools
- 9) Aircraft shutdown and safetying procedures
  - a. Fuel cutoff/throttle
  - b. Fire shutoff "T" or "L" handles
  - c. Battery switch/disconnect

Requisite Skills: Operate power saws and cutting tools, hydraulic devices, pneumatic devices, and pulling devices; operate specialized ladders and high-reach devices; secure aircraft safety and shutdown.

**200-5.4.2** Locate and disentangle an entrapped victim from an aircraft as a member of a team, given PPE, a team and an assignment, and rescue tools, so that the victim is freed from entrapment without undue further injury and hazards are managed.

**Requisite Knowledge:** Capabilities and limitations of rescue tools, search procedures, hazard identification, and control methods.

- 1) Capabilities and limitations of rescue tools
  - a. Flammable atmosphere
  - b. Stability of aircraft
  - c. Hands-on training
  - d. Safety standards apply
  - e. Hand tools
  - f. Power tools
    - i. Electric
    - ii. Hydraulic
    - iii. Pneumatic
  - g. Lifting and pulling tools
- 2) Search procedures
  - a. Exterior search

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- b. Interior search
  - c. Two in/two out rule
  - d. Extrication of survivors
  - e. Primary search
  - f. Secondary search
  - g. Preservation of evidence
- 3) Hazard identification
- a. Aircraft hazardous/flammable materials
  - b. Aircraft dangerous goods
  - c. Post crash aircraft hazards
    - i. Fire
    - ii. Electrical
    - iii. Disrupted aircraft systems
    - iv. Etiological
    - v. Debris
- 4) Control methods
- a. Safety
  - b. Isolation
  - c. Insulation
  - d. Extinguishment

Requisite Skills: Perform search procedures, control hazards, remove victims, and operate rescue tool.

- 200-5.4.3** Implement initial triage of the victims of an aircraft accident, given PPE, an assignment, and the triage protocol of the AHJ, so that each victim is evaluated and correctly categorized according to protocol.

**Requisite Knowledge:** Categories of triage according to the triage protocol of the AHJ, and methods of assessment.

- 1) Categories of triage according to the triage protocol of the AHJ
- 2) Methods of assessment
  - a. START – simple triage and rapid treatment
  - b. As per AHJ

Requisite Skills: Triage patients per protocol.