

AIRCRAFT RESCUE AND FIRE FIGHTING (ARFF) MOBILE SIMULATOR



MT. VERNON OUTLAND AIRPORT MT. VERNON, ILLINOIS

Documentation to adhere to the requirements of FAR Part 139 and the enhancement of aviation safety.



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AIRCRAFT RESCUE AND FIRE FIGHTING (ARFF) MOBILE ARFF SIMULATOR

An airport in the United States, that is certificated by the Federal Aviation Administration (FAA) must comply with the requirements of Federal Aviation Regulations (FAR) Part 139.

14 CFR Part 139 requires FAA to issue airport operating certificates to airports that---

- *Serve scheduled and unscheduled air carrier aircraft with more than 30 seats;*
- *Serve scheduled air carrier operations in aircraft with more than 9 seats but less than 31 seats; and*
- *The FAA Administrator requires to have a certificate.*

Airport Operating Certificates serve to ensure safety in air transportation. To obtain a certificate, an airport must agree to certain operational and safety standards and provide for such things as firefighting and rescue equipment. These requirements vary depending on the size of the airport and the type of flights available. The regulation, however, does allow FAA to issue certain exemptions to airports that serve few passengers yearly and for which some requirements might create a financial hardship.¹

The primary document of record that must be prepared and approved by the Airport Sponsor and reviewed and approved by the FAA is the Airport Certification Manual (ACM). Within the ACM is a chapter that addresses the requirements of FAR Part 14 Part 139.319, Aircraft Rescue and Firefighting: Operational requirements. Specifically with FAR Part 14 Part 139.319 is paragraph (i)(2)(vii) which addresses required training for emergency aircraft evacuation assistance.

The Mt. Vernon Outland Airport (KMVN) is in Mt. Vernon, Jefferson County, Illinois, at the intersection of Interstates 57 and 64 and located in a portion of the State of the Illinois referred to as Little Egypt. KMVN is a FAR Part 139 Certificated Airport and subject to the requirements referenced previously. To comply with **14 Part 139.319 (i)(2)(vii) (Emergency Aircraft Evacuation Assistance)** training requirements, KMVN created a Mobile ARFF Simulator to assist first responders in complying with FAA requirements. This portable educational classroom gives first responders a hands-on experience in being able to extract passengers in the event of an incident. The Mobile ARFF Simulator can also be used for training of **14 Part 139.319 (i)(2)(ii) (Aircraft Familiarization)** and portions of other subjects. Advisory Circular AC 150/5210-17C "Programs for Training of ARFF Personnel", included in the Appendix, should be the foundation for any ARFF Training Curriculum. The Mobile ARFF Simulator aids in satisfying some of the Advisory Circular's training guidelines. Although the training specifications were created for 14 Part 139 airports, first responders serving airports of all sizes (non-FAR Part 139) could certainly benefit from understanding the twelve subject areas and tailoring a training curriculum to suit their department's needs. First responders should also be familiar with Advisory Circular AC 150/5200-12C "First Responders Responsibilities for Protecting Evidence at the Scene of an Aircraft Accident/Incident". This Advisory Circular appears in the Appendix.

The following describes the Mobile ARFF Simulator and training options.

THE AIRCRAFT

The Mobile ARFF Simulator started its life as a Piper PA-31T, PAY1 “Cheyenne I”. The PAY1 is a seven-seat cabin class twin engine turboprop. The aircraft was pressurized and routinely flew at altitudes of



18,000 – 30,000 feet. It cruised at approximately 365 knots. The maximum takeoff weight was 9,000 lbs. Turboprop aircraft such as the Piper Cheyenne PAY1-PAYIV Series and the more prevalent Beechcraft King Air BE90–BE-350 Series were the backbone of the entry level business transport market. Single engine turboprops can be seen on the ramps at nearly every airport. These aircraft burn Jet A (Turbine Engine) Fuel. They do not contain an Auxiliary Power Unit (APU) in their empennage (tail). The PA-31T carried 382 gallons.

The Mobile ARFF Simulator’s empennage has been removed so it can be trailered to off airport locations. First responders can get a “real feel” for emergency evacuation via an operable door, emergency exit, and all interior seats being intact. Thanks to foldable wing stubs, emergency evacuation using protective streams as well as landing gear/brake fires can be practiced. The simulator’s cockpit lacks most instrumentation but the control yokes, throttle quadrant levers, and upper switch panels remain so first responders can practice cockpit shutdown procedures. Small samples of aviation fuel are safely carried on-board. First responders leave training with knowledge of the dangers associated with 100LL and JetA Turbine Engine Fuels.



For first responders to see actual aircraft construction, elements of the aircraft’s interior have been removed on the right-side wall of the Mobile ARFF Simulator. Interior panels are still attached on the left side and the ceiling. Note the three Oxygen ports in the ceiling. The main Oxygen Lines feeding the ceiling ports are visible just behind the co-pilot’s seat. Alert your trainees to the coding tape on the actual lines and introduce them to the Attached Standardized Coding Chart.

TRANSPORT, SET-UP, AND RETURN

The Mobile ARFF Simulator contains a tail stand on the left rear. Please deploy the tail stand, adjust the height, and lock it into place prior to boarding the aircraft. Like all aircraft, please limit the access to one occupant on the door at one time. Prior to closing the door, make sure the door cables are tucked inside the door frame. Pay special attention to the door cable on the left side. It must be to the right of the hydraulic cylinder for the door to close properly.

The simulator's wing stubs will be locked and strapped during transport. Prior to training, remove the upper and lower ratchet straps holding the wing stubs. While bracing each wing in the vertical position, unlock the wing support mechanisms by removing the two clevis pins, fold the wing support mechanisms inward, and carefully lower each wing into place.

Feel free to pull the Emergency Exit Window. Since the aircraft is constructed for a pressurized cabin, it can only be opened from the interior. The door is a "plug type". Be sure to use this device in your training curriculum. To re-mount the window, place the bottom in first, then the top. Ensure the red handle's tabs are on the exterior of the support flange prior to moving the handle back into original position. It takes some practice and is sort of a tight fit. Use a flashlight and your eyes on the handle upper tabs/support lock while pressing it forward. Please do not lose any of the screws in the handle's mechanism. Ensure all screws are in place and finger tight before transport.

A 120V AC electrical connector is located on the lower side of the nose (look for the OEM 24V Ground Power Connector latch). Once plugged into a source (using an extension cord), cabin outlets on the firewall and service galley are energized.

The Mobile ARFF Simulator contains a 5000 BTU air conditioner mounted in the firewall area. To operate the air conditioning system, open the nose baggage compartment door (use the fence post supplied in the cabin to keep the baggage compartment door in the open position). The air conditioning unit is controlled by a small remote magnetized to a steel cover above the throttle quadrant just aft of the firewall in the cabin. Ensure the air conditioner is plugged into the dedicated outlet inside the nose baggage compartment. **Do not operate the air conditioner without the nose compartment baggage door in the open position. If it is necessary to use an extension cord with more than twenty feet of length, make sure the cord is constructed with wire gage of 12 or larger (14 gage wire will not support the load over lengths of 25 feet or more).**

At the completion of training. Unplug devices from all outlets. And make sure all doors, door latches, and the emergency exit window are in their proper positions. Verify the air conditioner remote is affixed to the throttle quadrant cover. Ensure the tail stand is stowed in the horizontal position and locked in place prior to transport.

Verify the wings are securely stored and locked in their upright position. Locking is accomplished by reversing the process listed above. Please make sure the clevis pins are re-inserted in the wing support mechanism bores. Re-attach the upper and lower ratchet straps as found upon receipt.

TRAINING RULES

Your department is encouraged to use the Mobile ARFF Simulator in as many ways as possible. This includes hands-on live training with extinguishing agents (exterior only), ingress/egress, landing gear/brake fires, theoretical extrication, locating and shutting down aircraft systems, and emergency evacuation.

However, to preserve the Mobile ARFF Simulator for future use, the following actions are not allowed:

ACTUAL FIRES "LIVE" INTERIOR FIRE ATTACK TRAINING CUTTING, SAWING, OR PUNCTURING OF THE AIRCRAFT

If AFFF and/or Dry Chemicals are utilized, please wash the Mobile ARFF Simulator upon completion of your training. The next department would appreciate receiving a clean aircraft.

TRAINING TIPS

It is recommended the following videos be viewed prior to using the Mobile ARFF Simulator:

- First Responder Safety at a Small Airplane or Helicopter Crash, Module #1, Systems and Materials (27 Min.) Hazards: https://www.faa.gov/aircraft/gen_av/first_responders/media/mod1/mod1.html
- First Responder Safety at a Small Airplane or Helicopter Crash, Module #2, Aircraft Type Familiarization and Mission Specific Hazards (7 Min.):
https://www.faa.gov/aircraft/gen_av/first_responders/media/mod2/mod2.html

It is recommended the following videos be viewed prior to using the Mobile ARFF Simulator (cont.):

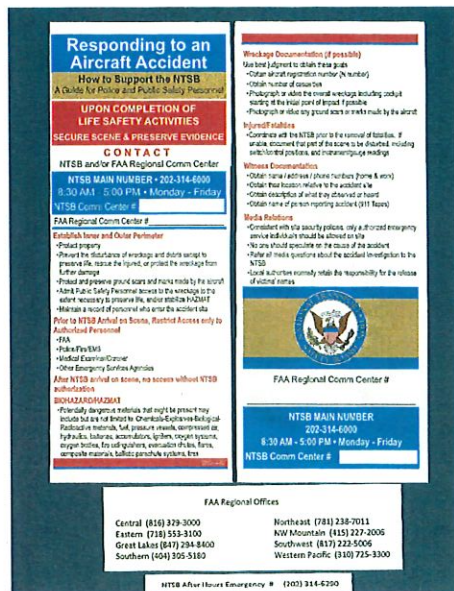
- ARFF Aircraft Familiarization Video (20 Min): <https://www.youtube.com/watch?v=AHq3GTcfjdY>
- ARFF Aircraft Forcible Entry (26 Min): <https://www.youtube.com/watch?v=W-Xp5GIKz18>
- Emergency A/C Evacuation Assistance Video (10 Min):
<https://www.youtube.com/watch?v=G6J8NiG4P9c>

The Mobile ARFF Simulator includes a flash drive containing an ARFF “Crash Chart” Database. If your department does not have a “Crash Chart” Database, please install the database on your devices and ensure your first responders have access to it. The “Crash Chart” Database should be utilized in your Aircraft Familiarization and Emergency Aircraft Evacuation Assistance Training.



It is recommended the following video be viewed by all Command Personnel & Training Officers:

- First Responder Safety at a small Airplane or Helicopter Crash, Module #3, Command & Recovery:
https://www.faa.gov/aircraft/gen_av/first_responders/media/mod3/mod3.html



The video details the notification and interaction with the FAA and NTSB after an accident. Included in the Appendix is the NTSB Pamphlet “Responding to an Aircraft Accident”. Command Personnel and Training Officers should become familiar with the pamphlet’s bullet points and use them in all training classes.

Below are some tips to help your department utilize the Mobile ARFF Simulator:

AIRCRAFT FAMILIARIZATION

Aircraft Familiarization – This would be a good time to compare and contrast twin engine piston and twin-engine turboprop aircraft. Piston powered aircraft burn 100LL aviation gasoline and turbine powered aircraft burn Jet A fuel. First responders should be visually able to tell the difference in engines. Piston engine nacelles and propeller blades are smaller. Another way to discern a turboprop engine is by its overall length. The propeller, engine and nacelle combination are very long. Turboprops also have very large exposed exhausts.

Some facts about fuels – ensure your trainees know the differences between 100LL Aviation Gasoline and Jet A (Turbine Engine) Fuels. 100LL Aviation Gasoline is blue in color, evaporates quickly, and for the most part is clean. Its ignition temperature, flash point (-49 degrees F), flammable limits and flame spread (800 feet per minute) are similar to automotive gasoline. Jet A is straw clear (like Coors Beer), evaporates very slowly, and is oily/greasy. Its 100-degree F flash point is much higher than 100LL Aviation Gasoline and its flame spread is lower at 100 feet per minute. Use caution with spills of both fuels over ten feet in any direction or covering an area over 50 square feet. Trainees need to be mindful of ambient temperatures on hot summer days. Concrete and asphalt aprons could be 25 to 50 degrees F hotter making spill or incidents more dangerous for first responders.

If fuel is detected at the scene either by sight or smell, do not enter without a charged handline or cover by a turret operator.

Piston types may or may not be pressurized. All turboprops are pressurized due to the maximum performance characteristics of flying at higher altitudes.

Locate the PA-31T information on the ARFF Crash Chart Database. Ensure your first responders know where they are located and are familiar with the following on the aircraft:

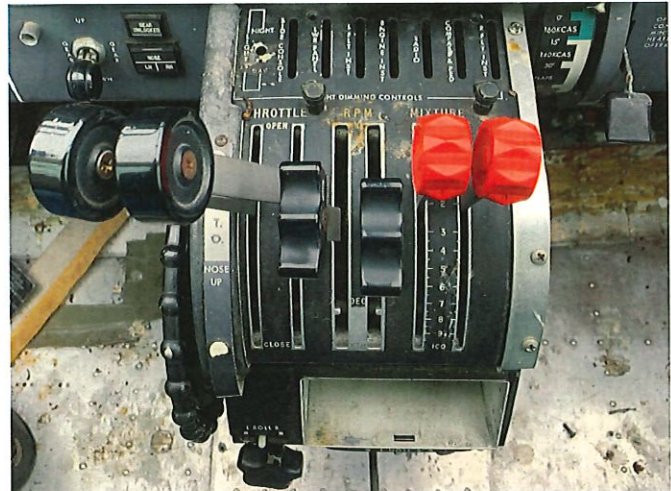
- **Throttles, Propeller, & Fuel/Mixture Controls**
- **Emergency Master Switches**
- **Fuel Shut-Off Switches**
- **Battery Quick Disconnect**
- **Oxygen System**
- **Hydraulic System**
- **Engine Fire Protection**
- **Anti-Icing**

Note: Reinforce that in an actual accident, photograph/record everything – especially instruments and fuel shut-off switch locations. Or, use the “Buddy System” so that more than one first responder can relay information to investigative authorities.

“THROTTLES, BOTTLES, & BATTERIES”

In cabin class and large aircraft, it is important to shutdown fuel flow to the engines and the electrical power. Internal turbine blades will continue to rotate if not shutdown (even if propeller blades are stationary in the ground). The aircraft could move, first responders could be sucked into the inlet(s), and flames could be spread by exhaust gases.

THROTTLES: On the center throttle quadrant, move the throttle(s) (pilot side/black color) and mixtures/fuel controllers (co-pilot side/red color) toward the rear or downward.



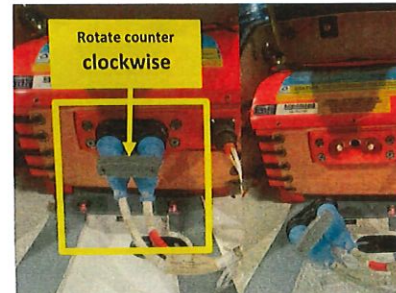
BOTTLES (Engine Fire Suppression): *If an engine is on fire, depress the engine fire suppression button for that engine. These buttons should be clearly labeled (ENGINE FIRE or FIRE) and located either near the top of the dash pad (separated by pilot/co-pilot seat) or high above on the center panel (close together).*

Note: The onboard fire suppression system is electrically activated so it must be depressed before turning off the electrical power.

BATTERIES: Turn off the electrical power at the Master Switch(es). The Master Switch(es) are normally located on the pilot's side lower left panel. The Master Switch(es) should be clearly labeled BATTERY MASTER, ELECTRICAL POWER, or BATTERY POWER). Master Switch(es) could also be located on the center throttle quadrant or high above on the center panel. There may be one, two, or multiple Master Switch(es). If multiple, they will be together and may have a metal panel or bar above them so that they can be turned on and off together.



Note: The electrical system can also be disabled by locating the battery box (either near the nose or tail) and turning the large "Quick Disconnect" knob counterclockwise at the actual battery.



Turboprops such as the PA-31T will have an Oxygen System fed by a green colored pressurized cylinder. Even if the bottle is located and first responders close the valve, responders should assume the lines are still pressurized.

Exercise extreme caution around hydraulic lines. Hydraulic lines are pressurized and some fluids can be extremely flammable. Hydraulic fluids can cause irritation to the skin and eyes.

The following topics in FAA Advisory Circular 150/5210-17C (1.3.2) "Aircraft Familiarization" (all points listed) can be covered and/or discussed using the Mobile ARFF Simulator and its corresponding "Crash Charts":

1. Identify all types of passenger and cargo aircraft operating at the airport.
2. Identify the different types of propulsion systems.
3. Locate normal entry doors, emergency exit openings, and ~~evacuation slides~~ for a given aircraft.
4. Demonstrate the opening of all doors and compartments for a given passenger or cargo aircraft.
5. Identify approximate aircrew and passenger capacities for a given aircraft.
6. Identify the type of fuel used, location of the tanks, and capacity of fuel tanks for a given aircraft.
See the supplemental information titled 100 LL Fuel & Jet A Fuel.
7. Identify and locate components of the fuel, oxygen, hydraulic, electrical, fire protection, anti-icing, auxiliary power (APU), brake, wheel, and egress systems for a given aircraft.
8. ~~Identify and locate the flight data recorder and cockpit voice recorder in the event of an aircraft mishap.~~
9. ~~Identify and locate the opening and operation of doors, compartments, and hatches for a given cargo aircraft.~~
10. ~~Identify normal and emergency shutdown procedures for aircraft engines and auxiliary power units.~~
11. Identify the general hazards associated with military aircraft, such as ejection seats, armament, and specialized fuels. *See the supplemental information titled U.S. Military.*

EMERGENCY AIRCRAFT EVACUATION ASSISTANCE TRAINING

Before any extrication discussion develops, stress the following phrase: **Try before you pry!** Make sure your first responders attempt to open all available doors and emergency exit windows BEFORE cutting any aircraft surface. Some twin-engine piston aircraft like the Cessna 402 and Piper PA31 "Navajo" have a third access window above the pilot seat. This window has exterior latches for easy access to the cockpit and cabin. Although pressurized aircraft have emergency access windows with exterior latches, some older models only open from the inside. In this case, the window has to be treated as any other window

Emergency Aircraft Evacuation Assistance – Think of the Mobile ARFF Simulator as a small-scale example of the aircraft shown on the ARFF Aircraft Forcible Entry and Emergency Aircraft Evacuation Assistance Videos. The Mobile ARFF Simulator has pressurized windows, window bays, and is made of the same materials as larger transport aircraft.

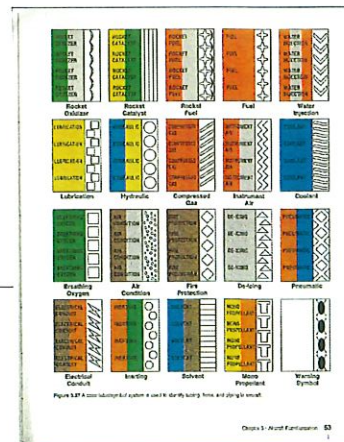
AGAIN, NO SAWING, CUTTING, AX HAMMERING, PUNCTURING, OR ANYTHING THAT COULD DAMAGE THE MOBILE ARFF SIMULATOR IS ALLOWED!

A very good way to achieve some real-world scenario training using the Mobile ARFF Simulator is to close the door and inform your trainees that the aircraft has crashed, and that the door is damaged beyond use. There are five occupants on board and all are unconscious. Ask your first responders "how do we get to them?" Remember the following:

1. Locate the Emergency Exit (at least one will be present on the opposite side of the main door). The Emergency Exit on the ARFF Mobile Trainer is a plug type. It can't be opened from the outside of the aircraft. Although nearly all newer aircraft contain Emergency Exit windows that are openable from the exterior, this situation could happen in the real world.
2. The aircraft has thick windows (pressurized construction). Puncturing windows is either difficult or not possible. Never try to penetrate the cockpit windows – especially the windscreen (front).
3. Cutting near the door is not a good idea – the door area is the most structurally enhanced area on an aircraft.
4. Most twin engine aircraft have a service galley and/or lavatory in the aft section of the aircraft. Cutting in the service galley and/or lavatory area adds a significant amount of workload due to more structure and should be avoided.

If time is available (such as a developing a pre-emergency plan), trainees should identify the type of aircraft from the ARFF Crash Chart and develop an understanding where and where not to cut. The Crash Chart will include an area identified "Cut in Rescue", "Emergency Rescue", or "Chop Out Area".

If no time is available, use this memory aid "**Within 3 it should be free**". Choose a window above where the wing meets the fuselage on either side and cut no more than 3" around its perimeter. Research shows that forward to mid-cabin windows are the preferred cut in rescue areas depicted on most ARFF Crash Charts. These areas should be free of process piping due to engines located in the tail or in/under the wings.



If process piping is exposed or discovered during rescue, its contents can be determined via the Standardized Coding Chart. The chart uses color, symbols, and labels to simplify identification of the systems.

The Oxygen System piping is visible in the Mobile ARFF Simulator in several locations. Examples of other piping systems are on display externally as well.

Once a cut area is identified, the first responder can locate the area, or “Bay”, select a tool, and **imagine** cutting that “Bay”.

For most small to mid-size jet and turboprop aircraft, a 14-inch diameter rotary saw is the tool of choice for extrication. Its blade diameter is sufficient to cut through outer layer skin, support structure, HVAC ducts, and interior panels (as visible on the right side of the ARFF Mobile Simulator). Category CIII and larger Aircraft (lengths of 100’ feet or more) will require a 16-inch diameter rotary saw to penetrate all structural elements.

What if the aircraft’s wings are broken off and the fuselage is laying on its side or upside down? Cutting the bottom side of the fuselage is not a good idea due to large support structures and process piping. In the case of the Piper PA-31T, oxygen lines are plumbed through the top of the fuselage. **Cutting the top of the cabin is not recommended!** However, cutting is permissible on Cessna and Gulfstream Jets (see the Crash Chart Database for specific models and chop out areas).

First responders also need to ensure the aircraft is stable prior to making entry. Struts, cribbing, airbags, rope/strap ties-offs should be used to ensure first response safety.

The following topics of Advisory Circular 150/5210-17C (1.3.7) “Emergency Aircraft Evacuation Assistance” (all points listed) can be discussed using the Mobile ARFF Simulator and its corresponding “Crash Charts”:

1. Identify procedures followed during an emergency situation by crews of air carriers, cargo aircraft, and general aviation aircraft operating at the airport.
2. Identify the procedures to use to protect evacuation points.
3. Identify which opening should be used to gain entry for a given aircraft and considerations that may affect the situation.
4. Select the necessary forcible entry tool(s) and/or equipment to gain entry to a given aircraft and situation.
5. While wearing full protective clothing, demonstrate, from inside and outside the aircraft, opening normal entry doors and emergency exit points for a given aircraft.
6. Identify potential locations for cut-in entry, using reference manuals, aircraft markings, or general guidelines for a given aircraft.
7. Identify the hazards with cut-in entry.
8. Demonstrate the procedures used to assist passengers during emergency evacuation.

Note: ARFF personnel should not impede the exit of occupants and crew when trying to enter the fuselage for rescue and/or firefighting, ARFF personnel must locate and open any other available exits. Additionally, many occupants may not be able to extricate themselves, so ARFF personnel should be prepared to assist after all those who are able to exit have evacuated.

ADDITIONAL TRAINING

The following segments of Advisory Circular 150/5210-17C can be incorporated into your training with a little imagination:

1.3.1 – Airport Familiarization:

These 12 points must be covered by the Airport Manager, Operations Manager, and/or FBO Manager at the specific airport.

1.3.3 - Rescue and Firefighting Personnel Safety:

- A. Identify the hazards associated with aircraft rescue and firefighting.
- B. Identify the hazards to personnel associated with aircraft and aircraft systems. *See the supplemental information titled Aircraft Systems. Pay close attention to BRS and Airbags – especially the Cirrus SR-22 Aircraft.*

Note: There are several remaining sub-points in this section related to SCBA and Infectious Diseases/Bloodborne Pathogens that are taught inside the fire department.

1.3.4 - Emergency Communications Systems on the Airport Including Fire Alarms:

These eight points are mostly covered by the Airport Manager, Operations Manager, and/or FBO Manager at the specific airport. However, some could be table topped nearly anywhere.

- A. Demonstrate the use of communication equipment used.
- B. Demonstrate the use of standard hand signals used to communicate with aircrew personnel (*recommend discussing local communication with your significant airport tenants and FBO Line Staff*).
- C. Demonstrate knowledge of the phonetic alphabet.
- D. Identify radio frequencies and channels used by the organization and mutual aiders.
- E. Identify the procedures for receiving alarm(s) and notifying mutual aiders.
- F. Identify procedures for obtaining clearances or authority to operate on the airfield and movement areas.
- G. Give an initial status report for a simulated aircraft accident.
- H. Identify the local methods used to communicate with aircraft personnel.

1.3.5 – Use of Fire Hoses, Nozzles, Turrets, and Other Appliances:

Due to the primary focus being on truck carried equipment, these 13 points are covered by the specific fire department.

1.3.6 - Applications of Extinguishing Agents:

- A. Identify the preferred agent(s) to use in suppression and extinguishment for various fire scenarios (*discuss what agent to use on fuel, engine, airframe, and landing gear fire scenarios. Have first responders provide their agent preferences and why they chose a particular agent*).
- B. Demonstrate agent application techniques utilizing turrets, high reach extendable turrets (if available), and hose lines in both exterior and interior fire attack scenarios. Again, no live interior firefighting!

This would be a good time to discuss landing gear/brake fires. Stress that any landing gear/brake fire should always be attacked from the front or the rear (45 degree angles) due the potential of an exploding wheel sending shrapnel outward and perpendicular to the fuselage. If the situation is on the side with the loading/unloading door (Rescue Side), attack near the door with the goal of protecting the occupants existing the aircraft. See the Appendix Landing Gear/Brake Fires for more information.

1.3.8 - Firefighting Operations:

- A. Identify the proper procedure to use when protecting an aircraft fuselage from fire exposure.
- B. Identify the procedures to use to stabilize aircraft wreckage.
- C. Identify interior aircraft attack procedures.
- D. Demonstrate how to deploy applicable ladders to access aircraft.

The stability of the aircraft is one of the first considerations before entering a crashed aircraft. If not stable, use whatever means necessary to make the wreckage stable before entering (struts, cribbing, ropes/straps, airbags, etc).

1.3.9 - *Adapting and Using Structural Rescue and Firefighting Equipment for Aircraft Rescue and Firefighting:*

- A. Use of hydraulic extrication equipment on an aircraft and how it differs from that used on motor vehicles (*aluminum and aluminum alloys cut easier than steel and do not spark like steel when cut*).
- B. Use of power circular saws, reciprocating saws, and various other power tools designed for structural firefighting and the challenges their use on aircraft present (again, the most effective aircraft extrication tool is the 14" – 16" diameter rotary saw. AMKUS/Hurst Hydraulic Cutters/Spreaders work very well after puncture holes are made).
- C. Use of fire axes, Halligan tool, pike poles and other hand tools designed for structural firefighting and what each would be used for.

1.3.10 & 11 – *HAZMAT and Dangerous Goods.*

It is important to realize that aircraft can and do carry HAZMAT. Placards are not affixed to cargo aircraft as they are on road vehicles. Always assume an aircraft is carrying HAZMAT. Use all PPE, including SCBA when approaching an accident scene. If a large cargo carrier is involved, do not render assistance until absolutely certain what is on board. Contact the carrier's dispatch and/or HAZMAT department. If the Captain is able, he will bring the NOTOC (Notice to Captain) form (manifest) to first responders.

1.3.12 - Familiarization with Firefighters' Duties under the Airport Emergency Plan:

These points are mostly covered by the Airport Manager, Operations Manager, and/or FBO Manager at the specific airport. However, some could be table topped nearly anywhere.

- A. Identify various types of aircraft related emergencies.
- B. Identify the procedures to use to size-up a given aircraft accident/incident.

OTHER HANDS-ON OPPORTUNITIES

Mt. Vernon Outland Airport owns other aircraft that are utilized for ARFF hands on training. A Cessna 402B is used for scenario based ARFF practice (engine, landing gear, wing, cabin fires, etc). For actual extrication practice, a Cessna Citation 550 Fuselage is mounted on a specially designed frame. The aircraft structure has been modified for re-use after each training exercise. If travel time is no factor, members of your department are invited to Mt. Vernon Outland Airport to use these additional tools. You will have to supply your vehicle(s) and equipment.



CONCLUSION

Enjoy your time with the Mobile ARFF Simulator. I hope it helps your department develop procedures and methods to make aviation safer at your airport and community.

If your department discovers new ways to teach with the Mobile ARFF Simulator, please pass your methods, tips, additions, deletions along so that others can benefit. Send your comments to:

Chris Collins
Airport Director
Mt. Vernon Outland Airport
100 Aviation Drive
director@mtvernonairport.com
(618) 315-5462 (cell)

APPENDIX

Advisory Circular AC 150/5210-17C "Programs for Training of ARFF Personnel"

Advisory Circular AC 150/5200-12C "First Responders Responsibilities for Protecting Evidence at the Scene of an Aircraft Accident/Incident"

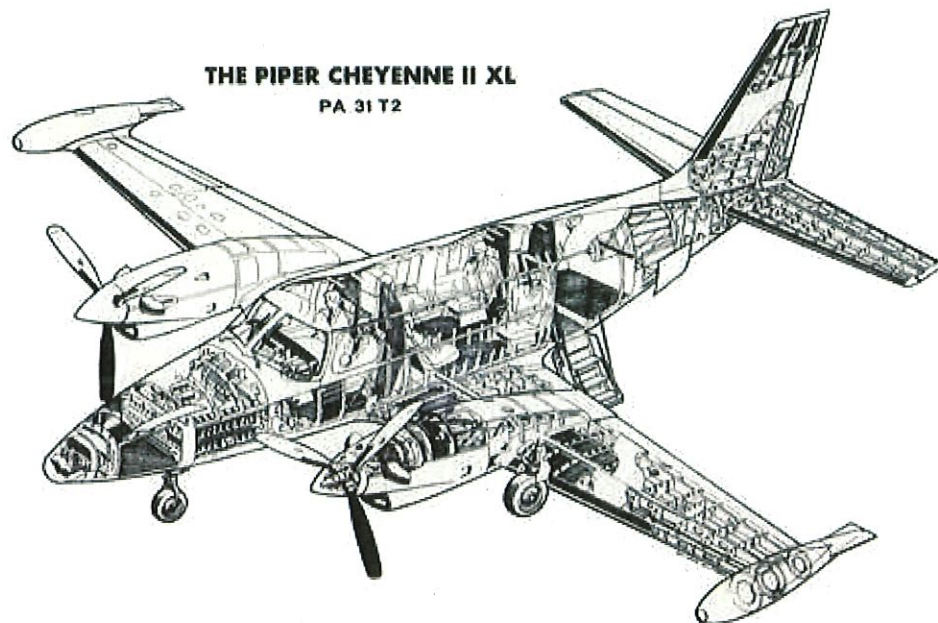
Standardized Aircraft Coding Chart

NTSB Pamphlet "Responding to an Aircraft Accident"

ARFF Extinguishing Agents

Landing Gear/Brake Fires

HAZMAT Large Carrier Contacts



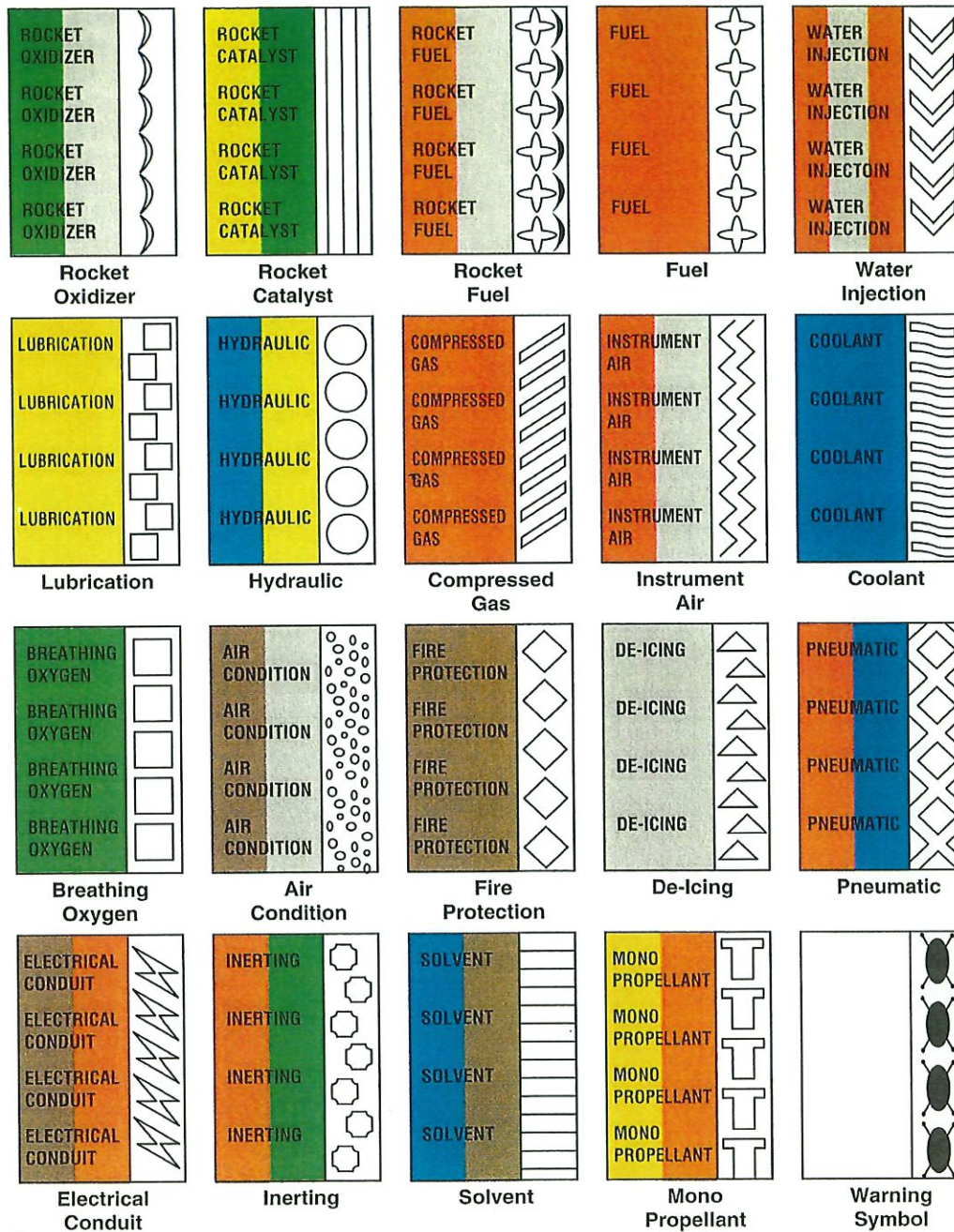


Figure 3.37 A color/label/symbol system is used to identify tubing, hose, and piping in aircraft.

Responding to an Aircraft Accident

How to Support the NTSB

A Guide for Police and Public Safety Personnel

UPON COMPLETION OF LIFE SAFETY ACTIVITIES

SECURE SCENE & PRESERVE EVIDENCE

CONTACT

NTSB and/or FAA Regional Comm Center

NTSB MAIN NUMBER • 202-314-6000

8:30 AM - 5:00 PM • Monday - Friday

NTSB Comm Center #

FAA Regional Comm Center #

Establish Inner and Outer Perimeter

- Protect property
- Prevent the disturbance of wreckage and debris except to preserve life, rescue the injured, or protect the wreckage from further damage
- Protect and preserve ground scars and marks made by the aircraft
- Admit Public Safety Personnel access to the wreckage to the extent necessary to preserve life, and/or stabilize HAZMAT
- Maintain a record of personnel who enter the accident site

Prior to NTSB Arrival on Scene, Restrict Access only to Authorized Personnel

- FAA
- Police/Fire/EMS
- Medical Examiner/Coroner
- Other Emergency Services Agencies

After NTSB arrival on scene, no access without NTSB authorization

BIOHAZARD/HAZMAT

- Potentially dangerous materials that might be present may include but are not limited to: Chemicals-Explosives-Biological-Radioactive materials, fuel, pressure vessels, compressed air, hydraulics, batteries, accumulators, igniters, oxygen systems, oxygen bottles, fire extinguishers, evacuation chutes, flares, composite materials, ballistic parachute systems, tires

SPC-04-02

Wreckage Documentation (if possible)

Use best judgment to obtain these goals

- Obtain aircraft registration number (N number)
- Obtain number of casualties
- Photograph or video the overall wreckage including cockpit starting at the initial point of impact if possible
- Photograph or video any ground scars or marks made by the aircraft

Injured/Fatalities

- Coordinate with the NTSB prior to the removal of fatalities. If unable, document that part of the scene to be disturbed, including switch/control positions, and instrument/gauge readings

Witness Documentation

- Obtain name / address / phone numbers (home & work)
- Obtain their location relative to the accident site
- Obtain description of what they observed or heard
- Obtain name of person reporting accident (911 Tapes)

Media Relations

- Consistent with site security policies, only authorized emergency service individuals should be allowed on site
- No one should speculate on the cause of the accident
- Refer all media questions about the accident investigation to the NTSB
- Local authorities normally retain the responsibility for the release of victims' names



FAA Regional Comm Center #

NTSB MAIN NUMBER

202-314-6000

8:30 AM - 5:00 PM • Monday - Friday

NTSB Comm Center #

FAA Regional Offices

Central (816) 329-3000
Eastern (718) 553-3100
Great Lakes (847) 294-8400
Southern (404) 305-5180

Northeast (781) 238-7011
NW Mountain (415) 227-2006
Southwest (817) 222-5006
Western Pacific (310) 725-3300

NTSB After Hours Emergency # (202) 314-6290

BRAKES/LANDING GEAR FIRES

The heating of aircraft wheels and tires presents a potential explosion hazard, greatly increased when fire is present. In order not to endanger first responders needlessly, it is important to distinguish between hot brakes and brake fires.

Hot brakes will normally cool by themselves without the use of an extinguishing agent. Most aircraft operating manuals for propeller driven aircraft recommend that the flight crew keep the propeller turning fast enough to provide cooling Airflow. Most wheels of jet aircraft have fusible plugs which will melt at about 177 degrees C and deflate the tire before Dangerous pressures are reached. When responding to a wheel fire, first responders should approach the wheels with Extreme caution in a fore or aft direction, never from the side in line with the axle. Since heat is transferred from the Wheel to the brake it is essential that the extinguishing agent be applied to this area. If further cooling is desired after Extinguishment of the fire, the agent should be directed at the brake area only.

Too rapid cooling of the hot wheel, especially if localized, may cause explosive failure of the wheel. Solid streams of Water should not be used except as a last resort. Water fog can be used but intermittent application of short bursts of 5 to 10 seconds every 30 seconds is recommended. Dry chemical is an effective extinguishing agent but has limited cooling capacity. Once the tires are deflated, any extinguishing agent may be safely used as there is no further explosive danger.

HOT BRAKES

- Normal Cooling – move aircraft to a safe location and allow for ambient cooling
- Water Mist – apply from hand line or turret
- Fans – Use caution during placement

WHEEL FIRES

- Grease/Oil Fire –Use AFFF/Water
- Actual Wheel on Fire – Use MET-L-X, Dry Chemical, AFFF/Water, then large amounts of water. Follow up with Water mist to maintain cooling effect
- Fusible plug should melt and deflate the tire when temperature is excessive



Appears in your supplemental binder

HAZMAT

(Large Carrier Dispatch/Emergency Contacts)



- FedEx Global Operations Control Center: (901) 397-8040



- UPS HAZMAT Support Center: (800) 554-9964
- UPS Contingency: (502) 359-5350
- UPS Flight Control: (502) 359-5100



- Atlas/Polar (GCC): (914-701-8050)



- ABX (Flight Control): (937) 366-2450



- Kalitta Air: (734) 484-2708



- There are many smaller operators using smaller aircraft that normally do not but might carry HAZMAT: USA Jet, Ameristar, Ameriflight, Berry, Royal Air Freight, Freight Runners Express, McNeely, Aeronaves, and others.

ARFF EXTINGUISHING AGENTS 1.3.6

AFFF (Water/Foam): Provides a vapor covering “blanket”. Excellent for **FUEL FIRES & FUEL SPILLS**. Be careful to not aim direct as you will wash away any foam blanket with pressure. Use deflection/bank down, roll on, or base sweep technique. Apply from upwind and uphill if possible



Dry Chemical (Sodium or Potassium based): Great at eliminating oxygen but does not provide much cooling. Abrasive, corrosive, and leaves residues. **First choice for pressure fed fuel fires and vertical fires.** Aim at base of fire and sweep past the extents then drift a cloud above the entire area.

Met-L-X: Exclusive for Class “D” metal and **LANDING GEAR fires**. Non-toxic and non-abrasive. Withdraws oxygen and lowers the temperature of the burning metal below its ignition temperature.



ARFF EXTINGUISHING - CLEAN AGENTS

Halon 1211/Halotron 1: Colorless, odorless, non-conductive, evaporates quickly, and leaves no residue. Great for engine and avionics (electrical) fires. Use PPE due to acidic gases given off from fire. Ceased being manufactured in the late 1990's but still available due to recycling.



Carbon Dioxide CO2: Designed for Class B liquid fires but is safe to use on Class C electrical fires. Not effective on Class K (cooking oils & greases). Dry ice cloud reduces the oxygen component of the fire triangle and cools the equipment. Does not work well outdoors due to wind. Leaves no residue. Avoid contact – frostbite!



FE-36: Ideal replacement for Halon 1211. Non corrosive, non-conductive, low toxicity, and low residue. Agent of choice for high value equipment that would otherwise be destroyed by water, foam, carbon dioxide (shock cooling), and dry chemical (communication facilities, computer rooms, data/document storage, electronic manufacturing, and aircraft). **Suppresses Class B fires in engine compartments**, petro-chemical facilities, paint lockers, and other hydrocarbon based materials are stored and/or handled.





U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject: Programs for Training of Aircraft
Rescue and Firefighting Personnel

Date: 6/12/2015

AC No: 150/5210-17C

Initiated By: AAS-300

Change:

1 **Purpose.**

This Advisory Circular (AC) provides information on courses and reference materials for training of Aircraft Rescue and Firefighting (ARFF) personnel.

2 **Application.**

The Federal Aviation Administration (FAA) recommends the guidelines and standards in this AC for aircraft rescue and firefighting training programs. In general, use of this AC is not mandatory. However, for airports certificated under Title 14 Code of Federal Regulations, Part 139 (14 CFR part 139), this AC is required. It provides acceptable guidance in meeting the requirements for aircraft rescue and firefighting training outlined in 14 CFR §139.319. The standards contained in this AC to help an airport's ARFF training program. An airport operator may elect to follow an alternative method, provided it is also approved by the FAA as an acceptable, alternate means of complying with the requirements of part 139. In the event of a conflict, the requirements under 14 CFR Part 139 take precedence over the guidelines set for in this AC

3 **Cancellation.**

This AC cancels AC 150/5210-17B, *Programs for Training of Aircraft Rescue and Firefighting Personnel*, dated September 23, 2009.

4 **Principal Changes.**

This revision is a substantial rewrite and includes the following major changes:

1. As described in a new Chapter 2, this AC replaces Appendix 1 with an Addendum of Aircraft Rescue and Firefighting (ARFF) Training Facilities, which the FAA will update on a quarterly basis.
2. It uses a new paragraph numbering system to make the text easier to follow and reference.

3. It removes the one minute time requirement for donning of Personal Protective Equipment and the Self-Contained Breathing Apparatus.

5 **Addendum of Aircraft Rescue and Firefighting (ARFF) Training Facilities.**

The FAA regards training that provides at a minimum the standards set forth in 14 Code of Federal Regulations (CFR) Part 139.319 (i)(1)-(4) as critical to safety on airports. To help ARFF personnel meet these minimum standards, the FAA publishes a list of ARFF training facilities and reference materials. Because changes to this list may occur more frequently than the schedule for updating the AC, the FAA will review it on a quarterly basis and post an updated list online as an Addendum to this AC. See Chapter 2 for more information.

6 **Copies of this AC.**

This AC and the current Addendum of training facilities is available online at http://www.faa.gov/airports/resources/advisory_circulars/.



Michael J. O'Donnell
Director, Office of Airport Safety and Standards

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CHAPTER 1. REQUIREMENTS FOR CERTIFICATED AIRPORTS

1.1 Introduction.

14 CFR Part 139.319 (i) requires that each holder of an airport operating certificate ensure that firefighting personnel are properly trained to perform their duties. This AC provides a method for meeting this provision, and lists the minimum requirements for training programs. Proficiency is the key to a successful ARFF training program, but this guidance is not intended to serve as a source of proficiency standards for airport firefighters. Instead, it is provided to assist the airport sponsor in establishing and ensuring an adequate training program. The number of hours of training required will vary from individual to individual. The FAA recommends a comprehensive, continuous, ongoing, and robust training program. It should encompass not only the subjects specified in 14 CFR Part 139.319 but also those additional areas of special interest defined in any local Standard Operating Procedure (SOP), Memorandum of Agreement (MOA), Memorandum of Understanding (MOU), and Standard Operating Guideline (SOG). At a minimum, annual recurrent training must occur for all ARFF personnel on a recurring basis at least **once every 12 consecutive calendar months (CCM)**. (See CertAlert 10-01 for an interpretation of the term “consecutive calendar months” as used in part 139, Certification of Airports, available at http://www.faa.gov/airports/airport_safety/aircraft_rescue_fire_fighting/.)

1.2 Training Schedule.

1.2.1 Initial Training.

Before firefighters assume any ARFF duties, they must complete their initial ARFF training. It is not acceptable to simply take structural firefighters and assign them to ARFF duties without the necessary additional training. The training curriculum must include current instruction in at least the areas listed in 0 through 1.3.13 below (also see Part 139.319).

1.2.1.1 Initial training is that training provided to enable personnel to identify and interpret advanced theories, facts, concepts, principles, requirements, procedures, equipment, and components of ARFF. Trainees must also be able to apply these principles to the aircraft serving the airport and demonstrate all required tasks safely and accurately and in accordance with established procedures. The goal is to provide sufficient training and instruction such that firefighters can function well as part of a team.

1.2.1.2 Initial training is not complete until individuals have finished all basic training (Part 139.319 (i)(2)(i)–(xi) and participated in at least one live-fire drill commensurate with the index of their airport .

1.2.2 Recurrent Training.

1.2.2.1 Once ARFF firefighters have completed initial training, they must receive recurrent instruction **every 12 consecutive calendar months (CCM)**. Recurrent training is defined as that training provided as often as necessary

but at least once every 12 CCM to enable ARFF firefighters to maintain a satisfactory level of proficiency. Appropriate frequencies for recurrent training will vary from airport to airport and from one firefighter to another. Training in several areas (such as aircraft familiarization and adapting structural equipment to ARFF) will require coordination with air carrier, other organizations on the local airport, and mutual aid agencies.

- 1.2.2.2 ARFF personnel must also participate in at least one live-fire drill every 12 CCM. See 1.4 below.

Note: The ARFF training curriculum should be approved by the ARFF Chief and available for inspection by the FAA airport certification safety inspector during an inspection.

1.2.3 Frequency of Training.

Recurrent and live-fire drill training must be completed each year within a 12 CCM period. If the training is not conducted during the 12 CCM period, the firefighter and the airport will be out of compliance with Part 139 **if the firefighter works any assigned ARFF shift**. To remain in compliance, airports with firefighters who miss training for any reason, such as injury, deployment, or other circumstances, must not be assigned ARFF response duties until their training is current.

- 1.2.3.1 In addition, the CCM period can differ for the recurrent training and the drill training. For example, firefighters who completed the last cycle of recurrent training on December 31, 2013, have until December 31, 2014, to complete the next round of recurrent training. However, if they last attended live-fire drill training on January 5, 2013, they have until January 31, 2014, to complete their next live-fire drill training. If the requirement is completed early, the next 12 CCM period starts with the month the firefighter actually participated in the training (see CertAlert10-01).

([http://www.faa.gov/airports/airport_safety/aircraft_rescue_fire_fighting/.](http://www.faa.gov/airports/airport_safety/aircraft_rescue_fire_fighting/))

1.3 **Training Curriculum.**

Part 139 sets forth *minimum* requirements for compliance. While Part 139.319 (i)(3) sets forth minimum requirements for ARFF, the FAA encourages training in multiple categories for ARFF personnel who serve in several positions.

1.3.1 Airport Familiarization.

The program should train ARFF personnel during both the hours of daylight and darkness and include airport-specific training so that ARFF personnel can do the following:

1. Describe the runway and taxiway identification system;
2. Describe the airfield lighting system (i.e. center line, edge and threshold lights, etc.);
3. Describe airfield pavement marking and signing systems, to include standard colors used in markings and signs (local training requirement);

4. Identify the limits of the runway safety areas on the airport to include Engineered Materials Arresting Systems (EMAS) (local training requirement);
5. Identify and locate the various aircraft navigation aids located on the airport and identify critical areas associated with navigation systems;
6. Cite airport rules and regulations on vehicle movement and access on the airport movement and non-movement areas and on communicating with the air traffic control tower (ATCT) for everything entering and exiting the movement area;
7. Cite procedures for communicating with the ATCT ; state the use of Common Traffic Advisory Frequency (CTAF);
8. Cite rules and regulations governing airport security;
9. Given a grid map or other standard map used at the airport, identify key terrain features, installations, and potential hazards in both movement and non-movement areas;
10. Identify the probable direction of travel of fuel in a simulated leak in the fuel distribution system;
11. Demonstrate the operation of the emergency fuel shutoff to the fuel system and pumps to stop the flow of fuel within the system; and
12. Identify hazardous materials (and their locations) that are frequently stored or used on the airport property.

1.3.2 Aircraft Familiarization.

The program should ARFF train personnel so they can do the following:

1. Identify all types of passenger and cargo aircraft operating at the airport,
 - a. **Recommendation:** Consider becoming familiar with general aviation and large business class aircraft too;
2. Identify the different types of aircraft propulsion systems;
3. Locate normal entry doors, emergency exit openings, and evacuation slides for a given aircraft;
4. Demonstrate the opening of all doors and compartments for a given passenger or cargo aircraft;
5. Identify approximate aircrew and passenger capacities for a given aircraft;
6. Indicate the type of fuel used, location of fuel tanks, and capacity of fuel tanks for a given aircraft;
7. Identify and locate components of the fuel, oxygen, hydraulic, electrical, fire protection, anti-icing, auxiliary power unit (APU), brake, wheel, and egress systems for a given aircraft;
8. Identify and locate the flight data recorder and cockpit voice recorder in the event of an aircraft mishap;

9. Identify and locate the opening and operation of doors, compartments, and hatches for a given cargo aircraft;
10. Identify normal and emergency shutdown procedures for aircraft engines and auxiliary power units; and
11. Identify the general hazards associated with military aircraft, such as ejection seats, armament, and specialized fuels.

Note: Appendix A also provides links to some aircraft informational charts.

1.3.3 Rescue and Firefighting Personnel Safety.

The program should train ARFF personnel so they can do the following to reduce the risks associated with their duties:

1. Identify the hazards associated with aircraft rescue and firefighting;
2. Identify the hazards to personnel associated with aircraft and aircraft systems;
3. Identify the potential stress effects on emergency services personnel involved in a mass casualty situation;
4. Identify the purpose and limitations of approved personal protective clothing used locally;
5. Demonstrate the inspection process for Protective Ensembles—proximity suits and/or structural firefighting turnout gear;
6. Demonstrate the ability to properly put on and take off personal protective ensembles;
7. Identify the purpose, components, operation, and limitations of self-contained breathing apparatus (SCBA);
8. Demonstrate the inspection process for the SCBA;
9. Demonstrate changing the air supply cylinder of a team member with an exhausted air supply cylinder;
10. Demonstrate proper putting on and taking off of the SCBA;
11. While wearing a SCBA, demonstrate the actions to take when the following emergency situations occur:
 - a. low air alarm activates,
 - b. air supply is exhausted,
 - c. regulator malfunctions,
 - d. face piece is damaged,
 - e. low pressure hose is damaged, or
 - f. high pressure hose is damaged;

12. While wearing a SCBA, demonstrate the actions to take to assist a team member experiencing the following emergency situations:
 - a. low air alarm activates,
 - b. air supply is exhausted,
 - c. regulator malfunctions,
 - d. face piece is damaged,
 - e. low pressure hose is damaged, or
 - f. high pressure hose is damaged;
13. Identify techniques for protection from communicable disease hazards; and
14. Demonstrate the proper safety precautions to take while wearing personal protective equipment (PPE) while operating power and hand-operated tools.

1.3.4 Emergency Communications Systems on the Airport, including Fire Alarms.

The program should train ARFF personnel so they can do the following:

1. Demonstrate the use of communication equipment used by their organization;
2. Demonstrate knowledge of the phonetic alphabet;
3. Identify radio frequencies and channels used by their organization and mutual aid organizations;
4. Identify the procedures for receiving an emergency alarm;
5. Identify procedures for multiple alarms and mutual aid;
6. Demonstrate the proper procedure for obtaining clearance from the ATCT or other responsible authority for apparatus movement;
7. Identify emergency light gun signals used by the ATCT;
8. Demonstrate the use of standard hand signals used to communicate with aircrew personnel;
9. Give an initial status report for a simulated aircraft accident; and
10. Identify the local method used to communicate with aircrew personnel.

1.3.5 Use of Fire Hoses, Nozzles, Turrets, and Other Appliances.

The program should train ARFF personnel so they can do the following:

1. Identify the purpose of each tool and item of equipment used locally;
2. Identify the location of each tool and item of equipment used locally;
3. Identify the hazards associated with each tool and item of equipment used locally;
4. Identify the proper procedures for use and maintenance of each tool and item of equipment used locally;
5. Identify the purpose of each hose, nozzle, and adapter used locally;

6. Identify the location of each hose, nozzle, and adapter used locally;
7. Identify the size and amount of each hose carried on each local vehicle;
8. Identify the proper procedures for use and maintenance of each hose, nozzle, and adapter used locally;
9. Identify the proper procedure to use when advancing hose for fire attack;
10. Identify the primary purpose, agent capacity, water capacity, type of agent carried, agent discharge rate/range, personnel requirements, and response limitations for each vehicle used locally;
11. Demonstrate the proper methods of operation for all handlines and vehicle-mounted discharge devices;
12. Identify driver maintenance procedures for each vehicle used locally; and
13. Identify the procedures for resupply, using available methods—hydrant, structural vehicles, tank trucks, or other vehicles and drafting from a static source—for each vehicle used locally.

1.3.6 Applications of Extinguishing Agents.

The program should train ARFF personnel so they can do the following:

1. Identify the quantity, type, and extinguishing properties of each agent carried on each vehicle used, including advantages and disadvantages for the airport;
2. Identify which agents used by the local organization are compatible and which are not;
3. Identify the locations and quantities of each agent that is kept in inventory for vehicle resupply;
4. Identify the preferred agent to use in suppression and extinguishment for various fire scenarios;
5. demonstrate agent application techniques utilizing turrets, High Reach Extendable Turrets (if available), and hose lines in both interior and exterior fire attack scenarios;
6. Identify the location of each portable fire extinguisher provided on local vehicles;
7. Identify each type of portable fire extinguisher by classification and rating; and
8. Identify the limitations and operating characteristics of each type of portable fire extinguisher.

1.3.7 Emergency Aircraft Evacuation Assistance.

The program should train ARFF personnel so they can do the following:

1. Identify procedures followed during an emergency situation by crews of air carriers, cargo aircraft, and general aviation aircraft operating at the local airport;
2. Identify the procedures to use to protect evacuation points;

3. Identify which opening should be used to gain entry for a given aircraft and considerations that may affect the situation;
4. Select the necessary forcible entry tool(s) and/or equipment to gain entry to a given aircraft and situation;
5. While wearing full protective clothing, demonstrate, from inside and outside the aircraft, opening normal entry doors and emergency exit points for a given aircraft;
6. Identify potential locations for cut-in entry, using reference materials, aircraft markings, or general guidelines for a given aircraft;
7. Identify the hazards associated with cut-in entry; and
8. Demonstrate procedures used to assist passengers during emergency evacuation.

Note: ARFF personnel should not impede the exit of occupants and crew when trying to enter the fuselage for rescue and/or firefighting. ARFF personnel must locate and open any other available exits. Additionally, many occupants may not be able to extricate themselves, so ARFF personnel should be prepared to assist after all those who are able to exit have evacuated.

1.3.8 Firefighting Operations.

The program should train ARFF personnel so they can do the following:

1. Describe Standard Operating Procedures (SOPs) for various emergency scenarios;
2. Select strategy and tactics for incident control and termination;
3. Identify the procedures for securing and maintaining a rescue path;
4. Identify the proper procedure to use when protecting an aircraft fuselage from fire exposure;
5. Identify the procedures to use when providing protective streams for personnel;
6. Identify procedures for controlling runoff from fire control operations and fuel spills; and
7. Identify the procedures to use to stabilize aircraft wreckage;
8. Identify interior aircraft ventilation procedures;
9. Identify interior aircraft attack procedures;
10. Demonstrate proper ground ladder inspection procedures; and
11. Demonstrate how to deploy applicable ladders to access aircraft.

1.3.9 Adapting and Using Structural Rescue and Firefighting Equipment for Aircraft Rescue and Firefighting.

For any structural rescue and firefighting equipment available and intended for use in aircraft firefighting, the program should train ARFF personnel so they can identify the procedures used to adapt the equipment for aircraft rescue and firefighting. Examples may include:

1. Use of hydraulic extrication equipment on an aircraft and how it differs from that use on motor vehicles.
2. Use of power circular saws, reciprocating saws, and various other power tools designed for structural firefighting and the challenges their use on aircraft present.
3. Use of fire axes, Halligan tool, pike poles and other hand tools designed for structural firefighting and what each would be used for.
4. Incorporating structural apparatus into an aircraft response.
5. Supplying water to an ARFF truck with structural apparatus or a potable drafting tank.

1.3.10 Aircraft Cargo Hazards.

The program should train ARFF personnel so they can do the following:

1. Identify the hazards indicated by each Department of Transportation (DOT) and International Civil Aviation Organization (ICAO) label;
2. Identify the limitation of the DOT and ICAO classifications and labeling system;
3. Identify local procedures in the event of a HAZMAT situation requiring a HAZMAT response;
4. Identify the procedures for contacting and using the Chemical Transportation Emergency Center (CHEMTREC) and other resources to obtain information about a hazardous material; and
5. Using information obtained from the DOT Emergency Response Guidebook (ERG) and CHEMTREC, identify the appropriate response, including risk assessment and rescue or evacuation requirements, for a given situation involving hazardous materials.

1.3.11 Dangerous Goods.

The program should train ARFF personnel so they can identify the Notification to Captain (NOTOC), Pilot Notification Form (PNF), or Applicable Cargo Waybill Listing Dangerous Goods Carried by the Aircraft.

1.3.12 Familiarization with Firefighters' Duties under the Airport Emergency Plan.

The program should train ARFF personnel so they can do the following:

1. Identify airport pre-fire and emergency plans;
2. Identify various types of aircraft-related emergencies;
3. Identify and understand the incident command system (ICS) to be utilized in an emergency, according to the National Incident Management System (NIMS) or the airport emergency plan (AEP);
4. Identify the procedures to use to size-up a given aircraft accident/incident;
5. Identify and understand individual duties as described in the AEP; and
6. Identify the other duties of his/her organization under the AEP.

1.3.13 Additional Training.

- 1.3.13.1 If the airport emergency plan calls for ARFF personnel to respond to special situations, such as water rescues or confined space rescue, provide training specific to such situations.
- 1.3.13.2 If a Surface Movement Guidance and Control System (SMGCS) plan is in place at the airport, firefighters must receive training specific to operations in low-visibility.
- 1.3.13.3 ARFF personnel must also receive training in recognizing aircraft with explosive devices (i.e. airbag systems, ballistic parachute systems, and ejection seats) during emergency operations. (See CertAlert 13-04, *Additional Precautions for Approaching Aircraft with Ballistic Parachutes, Ejection Seats, and Airbags*, at http://www.faa.gov/airports/airport_safety/ for the latest on explosive devices.)
- 1.3.13.4 ARFF personnel must receive training on ARFF Vehicle(s) and High Reach Extendable Turret (HRET) operations where applicable. (See AC 150/5210-23, *ARFF Vehicle and High Reach Extendable Turret (HRET) Operation, Training and Qualifications*, for additional guidance.)
- 1.3.13.5 If ARFF vehicles are equipped with specialized equipment [i.e. Forward Looking InfraRed (FLIR), Driver's Enhanced Vision System (DEVs)], firefighters must receive training on them.

1.4 **Live-Fire Drills.**

Each Part 139 certificate holder must ensure all ARFF personnel participate in at least one live-fire drill every 12 CCM. This drill must include at least a pit fire with an aircraft mock-up, using enough fuel to provide a fire that simulates realistic firefighting conditions. The conditions should simulate the type of fire that could be encountered on an air carrier aircraft at the airport. The drill should provide an opportunity for the firefighting team familiarized with the use of all fire extinguishing equipment, enhance their confidence and abilities with the equipment they will use in an actual accident/incident, and develop tactics, strategies, and procedures. If possible, a simulated rescue of aircraft occupants will help create a realistic simulation.

1.4.1 Live-Fire Drill Requirements.

- 1.4.1.1 ARFF personnel should demonstrate controlling and extinguishing a simulated aircraft fire using handlines and/or turrets, given an ARFF vehicle. The decision to train on handline or turret should be based on whether the trainee is assigned a handline or whether the trainee is a driver/operator who would normally operate the turrets. Many training programs may have all the participants working the handlines, and it would be acceptable for the driver/operator to meet the annual requirement in this

fashion. However, it would not be acceptable for a handline firefighter to use training on the turrets to meet the annual requirement.

- 1.4.1.2 ARFF personnel should demonstrate protecting firefighters and aircraft occupants using fire streams, given an ARFF vehicle.
- 1.4.1.3 The FAA will accept live-fire training using either flammable liquid hydrocarbon (FLH) or propane as a fuel source from either a fixed or mobile training facility. Requirements for these facilities are found in AC150/5220-17, *Aircraft Rescue and Fire Fighting (ARFF) Training Facilities*.
- 1.4.1.4 Alternatively, the FAA will accept training fires on U.S. Air Force (USAF) training facilities, specifically with the CFRTF-3 design, which includes an aircraft mockup in the center of a 100-foot-diameter burn area.
- 1.4.1.5 The FAA accepts mobile simulators for two years for Index C, D, and E airports holding a Class I airport operating certificate (AOC). Every third year, these airport fire departments must attend a large fixed facility to gain experience fighting a larger pit fire than the mobile simulators can duplicate. Class I airports that are Index A and B and Class II, III, and IV airports may use a mobile trainer every year to meet their 14 CFR Part 139.319 requirement.
- 1.4.1.6 The FAA allows using of a smaller pool fire when a fixed training facility that meets all other requirements of a mobile trainer. This, however, does not eliminate the requirement that every third year Index C, D, and E airports holding a Class I AOC must attend a large fixed facility to gain the necessary experience of fighting a larger pool.
- 1.4.1.7 **Personnel Who Do Not Normally Fight Fire.**

Personnel who are not expected to fight fire in the normal course of events would not be expected to complete the annual live-fire training. ARFF personnel who are not expected to fight fire are not considered “required” personnel, i.e., that group of ARFF personnel who are designated to meet the requirements of Section 139.319 (j)(5). Examples of personnel not required to complete the live-fire training might include the following:

 - 1. Firefighter dispatcher whose sole responsibilities involve communications;
 - 2. Fire Chief or Assistant Fire Chief; and
 - 3. A fire marshal or inspector.
 - 4. Mutual-aid personnel

1.5 **First Aid.**

At least one person trained and current in basic emergency medical care must be on duty during air carrier operations. In this context, “on duty” does not mean that the emergency medical person must be one of the regular ARFF personnel, but that there must be some assured means of having the individual available within a reasonable response time. This training must include 40 hours covering at least the following areas:

1. primary patient survey;
2. triage;
3. cardiopulmonary resuscitation (CPR);
4. bleeding;
5. shock;
6. injuries to the skull, spine, chest, and extremities;
7. internal injuries;
8. moving patients; and
9. burns.

Note: For any airport whose firefighters are required to maintain national certification, and state licensure for Emergency Medical Technician (EMT) or higher shows compliance for Part 139.319 (i)(4) emergency medical training.

1.6 **Hands-On Training (HOT).**

The FAA highly recommends that firefighters receive hands-on training on the aircraft that regularly serve their airport if possible. Such training is very difficult unless there are aircraft that remain overnight or there is an aircraft maintenance facility on the airport. Where such hands-on training is not feasible, the FAA recommends that ARFF crews have access to aircraft diagrams.

1.7 **Firefighter Certification.**

1.7.1 National Fire Protection Association (NFPA) Certification.

NFPA certification is not required by 14 CFR Part 139, but it would be a worthwhile goal of a training program to enable personnel to meet proficiency criteria as detailed in NFPA 1003, *Standard for Professional Qualifications for Airport Fire Fighters*. The NFPA Technical Committee on Fire Fighter Professional Qualifications developed the standard. It specifies the minimum requirements of professional competence required for service as an airport firefighter. It does not restrict any jurisdiction from exceeding the minimum requirements set forth in the standard. A training program that leads to the fulfillment of the professional qualifications for an airport firefighter identified in NFPA 1003, latest edition, is another means acceptable to the Administrator of providing firefighting and rescue personnel with the training considered necessary to perform their duties at airports. The fire fighter will still be required to receive airport

specific training prior to being assigned to an ARFF vehicle for duty. Copies of NFPA 1003, latest edition, may be ordered from NFPA at the address in the Appendix.

1.7.2 State-Level Airport Firefighter Certification.

A training program encompassing at least the requirements in Chapter 1 that leads to the fulfillment of the criteria for the applicable state-level airport firefighter certification is also an acceptable means of meeting the initial training requirement. The fire fighter will still be required to receive airport specific training prior to being assigned to an ARFF vehicle for duty.

1.7.3 Pro Board Certification.

The purpose of the Pro Board is to establish an internationally recognized means of acknowledging professional achievement in the fire service and related fields. The Pro Board serves to provide accreditation of organizations that certify uniform members of public fire departments, both career and volunteer. Accreditation is generally provided at the State level to the empowered certifying authority of that jurisdiction. Entities that achieve Pro Board accreditation are recognized as having met the rigors of review by an independent organization. This third party independent review is the best way to assure candidates and governance bodies that the entity's program meets the national standards. Pro Board certification meeting the NFPA 1003 standard is an acceptable means to the Administrator of providing firefighting and rescue personnel with the training considered necessary to perform their duties at airports. The fire fighter will still be required to receive airport specific training prior to being assigned to an ARFF vehicle for duty. See <http://www.theproboard.org/>.

1.7.4 IFSAC Certification.

The IFSAC Certificate Assembly provides accreditation to entities that certify the competency of and issue certificates to individuals who pass examinations based on the NFPA fire service professional qualifications and other standards approved by the Assembly. IFSAC certification meeting the NFPA 1003 standard is an acceptable means to the Administrator of providing firefighting and rescue personnel with the training considered necessary to perform their duties at airports. The fire fighter will still be required to receive airport specific training prior to being assigned to an ARFF vehicle for duty. See <http://www.ifsac.org/>.

1.8 **Mutual Aid Agreements.**

Where mutual aid agreements exist with U.S. Air Force personnel and/or municipal fire services surrounding the airport, all parties should receive familiarization training. In connection with such mutual aid agreements, the U.S. Air Force encourages and extends the use of Air Force base training facilities to surrounding municipal fire organizations, as explained in Air Force Regulation 32-2001, *Fire Protection and Prevention Program*.

1.9 **Noncertificated Airports.**

There are no regulatory requirements for ARFF services at non-certificated airports. However, the FAA recommends at those airports that have ARFF coverage, or for fire

departments that have airport responsibility, the use of AC. The FAA also provides valuable information on First Responder Safety at a Small Aircraft or Helicopter Accident and the Ballistic Parachute System Familiarization. See http://www.faa.gov/aircraft/gen_av/first_responders/.

1.10 FAA Programs Available.

1.10.1 FAA's Aircraft Rescue and Firefighting Training DVDs.

The FAA has produced two DVDs that provide a foundation upon which firefighters can build during the required annual recurrent training. The first DVD is appropriate for inclusion in initial training, i.e., contributing knowledge of basic aircraft rescue and firefighting principles. The second DVD provides more information on the use of the High Reach Extendable Turret (HRET), extrication techniques, and cargo aircraft. These DVDs are not meant to qualify viewers to become Certified ARFF Specialists. They are currently available from your regional Airport Certification Safety Inspector (ACSI) or by requesting them from the FAA ARFF Specialist via email (http://www.faa.gov/airports/airport_safety/aircraft_rescue_fire_fighting/.)

CHAPTER 2. ADDENDUM OF AIRCRAFT RESCUE AND FIREFIGHTING (ARFF) TRAINING FACILITIES

The FAA regards training that provides at a minimum the standards as set forth in 14 CFR Part 139. 319 (I)(1)-(4) as critical to safety on airports. To help ARFF personnel meet these minimum standards, the FAA publishes a list of ARFF programs and/or reference materials. Because changes may occur more frequently than the schedule for updating the AC, the FAA will post an updated version online as an Addendum to this AC.

2.1 Purpose of the Addendum.

The organizations listed in the Addendum also provide firefighter training programs and/or reference materials. The Addendum is not an all-inclusive list, nor does it indicate the only sources for such programs and/or reference materials available. The listing of an organization does not indicate an endorsement by the FAA. For programs that have a “HOT” fire drill facility, the appropriate Index level is included. None of the reference materials have been reviewed by the FAA for adequacy.

2.2 Copies of the Addendum.

The current Addendum is available online with this AC at:
http://www.faa.gov/airports/resources/advisory_circulars/.

2.3 Updating Training Facility Information.

Please send changes to this list to:

Airport Safety and Operations Division
Attn: ARFF Specialist
800 Independence Ave SW
AAS-300, Rm 618
Federal Aviation Administration
Washington DC 20591

2.3.1 Schedule for Updating Training Facility Information.

The FAA will update this addendum on a quarterly basis. To update your organization's information, submit any changes no later than September 25 for Quarter 1, December 25 for Quarter 2, March 25 for Quarter 3, and June 25 for Quarter 4.

APPENDIX A. RELATED READING MATERIAL**A.1 Regulations.**

1. 14 CFR Part 139 (Part 139), *Certification of Airports*.

A.2 Advisory Circulars.

The ACs listed below can be found at

http://www.faa.gov/airports/resources/advisory_circulars/. See current versions.

1. AC 150/5200-12, *First Responders' Responsibility for Protecting Evidence at the Scene of an Aircraft Accident/Incident*.
2. AC 150/5200-18, *Airport Safety Self-Inspection*. Contact FAA Regional Airports Office for associated DVD.
3. AC 150/5200-31, *Airport Emergency Plan*.
4. AC 150/5210-6, *Aircraft Fire and Rescue Facilities and Extinguishing Agents*.
5. AC 150/5210-7, *Aircraft Rescue and Firefighting Communications*.
6. AC 150/5210-13, *Airport Water Rescue Plans and Equipment*.
7. AC 150/5210-14, *Aircraft Rescue Fire Fighting Equipment, Tools and Clothing*.
8. AC 150/5210-19, *Driver's Enhanced Vision System (DEVS)*.
9. AC 150/5210-23, *ARFF Vehicle and High Reach Extendable Turret (HRET) Operation, Training and Qualifications*.
10. AC 150/5220-17, *Aircraft Rescue and Fire Fighting (ARFF) Training Facilities*.
11. 150/5220-22, *Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns*.
12. AC 150/5230-4, *Aircraft Fuel Storage, Handling, Training, and Dispensing on Airports*.
13. AC 150/5340-1, *Standards for Airport Markings*.
14. AC 150/5340-18, *Airport Signing and Graphics*.
15. AC 150/5340-30, *Design and Installation Details for Airport Visual Aids*.
16. AC 120-57, *Surface Movement Guidance and Control System*.

A.3 Part 139 CertAlerts.

The FAA has published a number of ARFF-related CertAlerts. A complete list as well as other ARFF resources are available at

http://www.faa.gov/airports/airport_safety/aircraft_rescue_fire_fighting/.

A.4 Other Resources.

- A.4.1 National Fire Protection Association (NFPA) 1003, Standard for Airport Fire Fighter Professional Qualifications, and NFPA 405, Standard for the Recurring Proficiency of Airport Fire Fighters, current edition.

NFPA
1 Batterymarch Park
Quincy, MA 02169
Phone: (617) 984-7537
Fax: (617) 984-7085
<http://www.nfpa.org>

- A.4.2 U.S. Air Force Technical Order (TO) 00-105E-9, Aircraft Rescue Information (Fire Protection).

The technical order describes procedures for fire service personnel responding to various types of emergencies involving military or civil aircraft. It also provides general information on aircraft rescue and firefighting as well as detailed information about military aircraft and civilian air carrier aircraft used by the military. Nonmilitary organizations having airport firefighting and rescue responsibilities at airports that serve military aircraft under routine and/or emergency conditions may obtain a copy of this technical order by sending a request to:

HQ AFCESA/CEXF
ATTN: Fire and Egress Service Manager
139 Barnes Drive Suite 1
Tyndall Air Force Base, FL 32403-5319
Phone: (850) 283-6150
<http://www.dodffcert.com/00-105E-9/index.cfm>

- A.4.3 International Fire Service Training Association's (IFSTA's) Aircraft Rescue and Fire Fighting, Fifth Edition.

The manual was developed to provide information for both airport and structural fire department officers to effectively accomplish the various tasks involved in aircraft firefighting and rescue. It is designed for all types of fire protection organizations and includes the use of both conventional and specialized aircraft firefighting apparatus. Copies may be purchased from IFSTA at the following address:

IFSTA Headquarters
Fire Protection Publications
Headquarters for the International Fire Service Training Association
930 N. Willis
Stillwater, OK 74078
Phone: (405) 744-5723
Fax: (405) 744-8204
<http://www.ifsta.org>

A.4.4 U.S. Navy Aircraft Firefighting and Rescue Manual, NAVAIR 00-80R-14, NATOPS.

This publication contains firefighting doctrine, procedures, references, and information for use by those persons involved in aircraft rescue, fire prevention, and firefighting response operations. It contains organizational, training, and readiness requirements for ships, air stations, and aviation facilities ashore. This manual prescribes minimum firefighting and rescue operating procedures applicable to all shipboard, expeditionary airfields, and shore-based activities involved in aircraft fire prevention, control, and suppression. The current versions of NATOPS publications are listed in the NATOPS Status Report, which is available from:

U.S. Navy Global Customer Support Team Lead

Phone: (301) 757-0187

Email: airworthiness@navy.mil

A.4.5 U.S. Navy Aircraft Emergency Rescue Information Manual, NAVAIR 00-80R-14-1.

This manual contains essential information and procedures for use by ARFF personnel when rescuing occupants from crashed or disabled naval aircraft. It has been organized for ready reference by rescue teams and is intended to serve both as an operational guide and a training manual for rescue personnel. This publication has been prepared for use by crash crew members and their supervisors engaged in aircraft rescue operations. It provides detailed information about aircraft hazards, danger areas, procedures for aircraft entry, engine shutdown, ejection seat safing, aircrew and passenger release and extraction, and other actions important to aircraft rescue and firefighting personnel. It is available from:

U.S. Navy Global Customer Support Team Lead

Phone: (301) 757-0187

Email: airworthiness@navy.mil

A.5 **Definitions and Acronyms.**

A.5.1 Definitions.

1. **Notification to Captain (NOTOC)** documentation acts as a flight manifest. This document has also been called the Notice to Pilot in Command (NOPIC) or the Pilot Notification Form (PNF). Each NOTOC contains a standardized list of hazardous materials and dangerous goods (for both non-radioactive and radioactive materials) that are loaded onboard an aircraft. It also lists their location, quantity, and type of packaging as well as procedures to follow in the event of an emergency situation. Every air carrier has its own version of a written form to notify aircraft crew members about dangerous goods (HAZMAT) that is loaded onboard the aircraft.

A.5.2 Acronyms.

- | | |
|--------|------------------------------|
| 1. AAS | Airport Safety and Standards |
| 2. AC | Advisory Circular |
| 3. AEP | Airport Emergency Plan |

4. AOC	Airport Operating Certificate
5. ATCT	Air Traffic Control Tower
6. AIP	Airport Improvement Program
7. APU	Auxiliary Power Unit
8. ARFF	Aircraft Rescue and Firefighting
9. CCM	Consecutive Calendar Months
10. CertAlert	Certification Alert
11. CFR	Code of Federal Regulations
12. CFRTF	Crash Fire Rescue Training Facility
13. CHEMTREC	Chemical Transportation Emergency Center
14. CTAF	Common Traffic Advisory Frequency
15. CPR	Cardiopulmonary Resuscitation
16. DEVS	Driver's Enhanced Vision System
17. DOT	Department of Transportation
18. EMT	Emergency Medical Technician
19. ERG	DOT Emergency Response Guidebook
20. EMAS	Engineered Materials Arresting Systems
21. FAA	Federal Aviation Administration
22. FLIR	Forward Looking Infrared
23. HAZMAT	Hazardous Materials
24. HOT	Hands-on Training
25. HRET	High Reach Extendable Turret
26. IAP	Incident Action Plan
27. ICAO	International Civil Aviation Organization
28. ICS	Incident Command System
29. IFSTA	International Fire Service Training Association
30. MOA	Memorandum of Agreement
31. MOU	Memorandum of Understanding
32. NATOPS	Naval Aviation Training Operations Procedures and Standardization
33. NIMS	National Incident Management System
34. NFPA	National Fire Protection Association
35. NOPIC	Notice to Pilot in Command

36. NOTOC	Notification to Captain
37. PCA	Practical Critical Fire Area
38. PFC	Passenger Facility Charges
39. PPE	Personal Protective Equipment
40. PNF	Pilot Notification Form
41. SCBA	Self-Contained Breathing Apparatus
42. SMGCS	Surface Movement Guidance Control System
43. SOG	Standard Operating Guidelines
44. SOP	Standard Operating Procedures
45. TO	Technical Order

A.6 **Aircraft Manufacturer's Aircraft Rescue and Firefighting Charts.**

The links below will help ARFF personnel locate aircraft informational charts for the associated aircraft manufacturers.

1. Airbus - <http://www.airbus.com/support/maintenance-engineering/technical-data/aircraft-rescue-firefighting-charts/>
2. Antonov - <http://www.antonov.com/aircraft/passenger-aircraft/>
3. Boeing - http://www.boeing.com/boeing/commercial/airports/rescue_fire.page
4. Bombardier - https://customer.aero.bombardier.com/webd/BAG/CustSite/BRAD/RACSDocument.nsf/vwWebPage/QuickLinks_EmergencyDocs?OpenDocument
5. Embraer - <http://www.embraer.com/en-US/Pages/Home.aspx>
6. Ilyushin - <http://www.ilyushin.org/en/aircrafts/>



U.S. Department
of Transportation

Federal Aviation
Administration

Advisory Circular

Subject: FIRST RESPONDERS'
RESPONSIBILITY FOR PROTECTING
EVIDENCE AT THE SCENE OF AN
AIRCRAFT ACCIDENT/INCIDENT

Date: 9/28/2009
Initiated by: AAS-300

AC No.: 150/5200-12C
Change:

1. **PURPOSE.** This advisory circular (AC) furnishes general guidance for airport employees, airport management, and other personnel responsible for aircraft rescue and firefighting (ARFF) operations at the scene of an aircraft accident on the proper preservation of evidence. It explains the need for preservation of evidence and details operational actions which may be permitted if performed in the interest of preserving life.
2. **CANCELLATION.** AC 150/5200-12B, *Fire Department Responsibility in Protecting Evidence at the Scene of an Aircraft Accident*, dated September 3, 1999, is cancelled.
3. **APPLICATION.** The material contained in this AC is applicable for use on all civil airports. The Federal Aviation Administration (FAA) recommends the guidance and specifications in this Advisory Circular be used by First Responders responsible for protecting evidence at the scene of an aircraft accident/incident. In general, use of this AC is not mandatory. However, use of this AC is mandatory for all projects funded with federal grant monies through the Airport Improvement Program (AIP) and with revenue from the Passenger Facility Charges (PFC) Program. See Grant Assistance No. 34, *Policies, Standards, and Specifications*, and PFC Assurances No.9, *Standards and Specifications*.
4. **PRINCIPLE CHANGES.**
 - a. Title change: replaced *Fire Department* with *First Responders*.
 - b. Section 4: added new Related Reading Material.
 - c. Section 6: added figures showing representative Flight Data Recorders and Cockpit Voice Recorders.
5. **RELATED READING MATERIAL.**
 - a. **International Civil Aviation Organization (ICAO)**, Annex 13.
 - b. **International Fire Service Training Association (IFSTA)**, *Aircraft Rescue and Fire Fighting*, Fifth Edition CHAPTER 10.
 - c. **National Fire Equipment System (NFES) 2659**, *Interagency Aviation Mishap Response Guide and Checklist*.

- d. **International Fire Service Training Association** ARFF Fifth Edition, Chapter 4, Personnel Decontamination.
- e. **International Fire Service Training Association** ARFF Chapter 11, Str Tac Operations.
- f. **National Fire Protection Association (NFPA) 424**, *Guide for Airport/Community Emergency Planning*.
- g. **National Fire Protection Association 472**, *Standard for Competencies of Responders to Hazardous Material and WMD Incidents*.
- h. **National Fire Protection Association 473**, *Standards for Competencies for EMS Personnel Responding to Hazardous Materials Incidents and WMD Incidents*.
- i. **National Fire Protection Association 1003**, *Standard for Airport Firefighter Professional Qualifications 2005*, Chapter 6, *Airport Firefighter*.
- j. **National Transportation Safety Board Regulation**, Title 49 CFR, Part 830, Paragraph 830.10(b).
- k. **National Transportation Safety Board (NTSB)** brochure, *Responding to an Aircraft Accident, How to Support the NTSB, A Guide for Police and Public Safety Personnel*.
- l. **U.S. Air Force Fire Emergency Service Technical Order 00-105E-9**, *Aerospace Emergency Rescue and Mishap Response Information*.

6. GENERAL.

Today, investigators are increasingly suspicious of acts of sabotage, willful or egregious reckless conduct, intentional and specific acts of terrorism.

The cause of an aircraft accident has often been determined from a detailed analysis of the wreckage including the actual location of the wreckage and where the remains from the wreckage fell. Therefore, it is essential that wreckage be protected during rescue operations. This is not to imply that during fire fighter operations wreckage may not be disturbed; it should be kept to a minimum.

NTSB Regulation, Title 49 CFR, Part 830, §830.10(b) pertaining to the preservation of aircraft wreckage allows for the removal of aircraft components to the extent necessary to:

- Remove persons injured or trapped;
- Protect the aircraft from further damage; or
- Protect the public from injury.

It further states that, at §830.10(c):

“Where it is necessary to disturb or move aircraft wreckage, mail or cargo, sketches, descriptive notes, and photographs shall be made, if possible, of the original position and condition of the wreckage and any significant impact marks.”

Fire fighting operations should not be delayed in order to prepare such sketches or photographs. Firefighters or rescue personnel should attempt to remember the original location of anything that was moved during fire fighting and rescue operations.

As soon as practical, all personnel should document in writing all of their actions and activities during their involvement in the accident/incident. All documentation should be made available to appropriate investigative agencies.

Typical activities of first responders and authorities at an accident scene include the following:

- a. Setting up security to limit access to the wreckage area other than first responders and law enforcement authorities.
- b. After the fire(s) has been extinguished all personnel inside the secured area should be cautioned to keep their activities around the wreckage to a minimum to prevent unnecessary disturbance and eradication of valuable evidence, such as ground scars.
- c. During operations at an accident/incident potentially caused by an intentional act, limiting the activities will also reduce the risk of disturbing any unexploded or secondary devices.

7. OPERATIONS.

- a. Saving of aircraft occupants' lives is the primary objective. All other considerations, such as preservation of wreckage, must be secondary to rescue operations. Therefore, fire fighters in the performance of their primary mission of rescue through fire control or extinguishment should not be hampered or restrained by restrictions governing the preservation of evidence. However, during the final stages of salvage and overhaul, care should be taken to avoid unduly disturbing any evidence that may aid in determining the cause of the aircraft accident. Careful preservation of cockpit instruments, controls, areas of primary structural failure or damage, etc., in their original position is important. Any changes made in after-action documentation should be noted.
- b. To assure complete fire extinguishment and accountability of all persons, firefighters make a thorough examination of the aircraft cabin and storage compartments. During salvage and overhaul operations documentation of any items is essential for preservation of evidence for follow-on investigations.
- c. Airport fire and security departments should establish procedures whereby:
 - (1) Photographic coverage of the accident scene must be accomplished. This may require a camera be made available by the airport operator.
 - (2) Security of the accident scene is the responsibility of the airport operator until it is released to appropriate agency custody.
 - (3) When Cockpit Voice Recorders (CVRs) and Flight Data Recorders (FDRs) are located, they need to be protected. They are of vital importance to accident/incident investigations. If attached to the aircraft, their location should be carefully noted but not disturbed. If attached to the aircraft, they

should not be removed except to preserve them from any further damage. As a general rule, the voice and flight data recorders are located in the rear of the fuselage. Once located and secured, the recorders must not be tampered with or opened.

- (a) Firefighters should be trained in the identification of FDRs and CVRs. FDRs and CVRs need to be located and protected.
- (b) There are several types of FDRs. They are International Orange in color and measure approximately 5 x 8 x 21 inches. They have a “pinger” to facilitate under water location. See Figure 1.



Figure 1. Representative Flight Data Recorders

- (c) There are several types of CVRs. They are International Orange in color and measure approximately 5 x 8 x 13 inches. See Figure 2.



Figure 2. Representative Cockpit Voice Recorder

- d. Airport management should ensure that all first responders are thoroughly familiar with the relevant reference material, such as the Airport Certification manual and 14 CFR, Part 139. In addition, the principles in this AC should be reflected in departmental operating instructions and included in fire fighters personnel training programs, and the Emergency Plan elements of the Airport Certification Manual.

A handwritten signature in dark ink, appearing to read "Michael J. O'Donnell". The signature is stylized with a large, looping "M" and a long, sweeping "J" and "O".

Michael J. O'Donnell
Director of Airport Safety and Standards