NFPA 422
Guide for Aircraft Accident Response

1999 Edition

National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101
An International Codes and Standards Organization

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Guide for

Aircraft Accident Response

1999 Edition

This edition of NFPA 422, *Guide for Aircraft Accident Response*, was prepared by the Technical Committee on Aircraft Rescue and Fire Fighting and acted on by the National Fire Protection Association, Inc., at its May Meeting held May 17–20, 1999, in Baltimore, MD. It was issued by the Standards Council on July 22, 1999, with an effective date of August 13, 1999, and supersedes all previous editions.

This edition of NFPA 422 was approved as an American National Standard on August 13, 1999.

Origin and Development of NFPA 422

Originally a manual, NFPA 422 was initially begun in 1963 and was submitted to the Association for adoption at the 1972 Annual Meeting. The document was revised in 1979 and 1984 and the 1989 edition was a reconfirmation of the 1984 edition.

The title for the 1994 edition was changed from *Manual for Aircraft Fire and Explosion Investigators* to the current title. The document was completely revised to provide a framework for the accumulation of data relative to the effectiveness of aircraft accident emergency response services in the application of principles found in the standards and guides developed by the Technical Committee on Aircraft Rescue and Fire Fighting.

This document is intended to assist the committee in collecting significant data that may be utilized to facilitate revisions to the NFPA aircraft rescue and fire-fighting documents.

The 1999 edition is a reconfirmation of the 1994 edition. Editorial changes were made to make the forms easier to use.

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NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on aircraft rescue and fire-fighting services and equipment, for procedures for handling aircraft fire emergencies, and for specialized vehicles used to perform these functions at airports, with particular emphasis on saving lives and reducing injuries coincident with aircraft fires following impact or aircraft ground fires. This Committee also shall have responsibility for documents on aircraft hand fire extinguishers and accident prevention and the saving of lives in future aircraft accidents involving fire.

Contents

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Appendix A.

Information on referenced publications can be found in Chapter 5 and Appendix C.

Chapter 1 Introduction

1-1 Scope. This guide provides a framework for the collection of data that provides information on the effectiveness of aircraft accident emergency response services. This guide applies the principles of those standards and guides developed by the Technical Committee on Aircraft Rescue and Fire Fighting.

1-2* Purpose.

1-2.1 The purpose of this document is to outline a format for a comprehensive emergency response analysis and the collection of significant data that can be utilized to facilitate revisions to applicable NFPA documents.

1-2.2 Chapter 4 of this guide also can be effectively used to record and critique airport emergency disaster exercises.

The purpose of Chapter 4 is to provide the information associated with an accident that can be used to update and refine disaster plans for other airports and communities involved in aviation operations. It also is used to provide data for the revision of NFPA 424, *Guide for Airport/Community Emergency Planning*. Both the positive and negative consequences of the operation should be emphasized with the objective of improving life safety in future accidents.

1-3 Arrangement. This guide contains two separate reports that are intended to provide a comprehensive emergency response analysis when completed. These report forms can be photocopied from this guide if they are not available elsewhere.

1-3.1 The forms should be completed by persons with knowledge of the pertinent subject matter.

1-3.2 No obtained information should be released to the news media or to any person unless permission has been obtained first from the chief of the official investigating team. The successful collection of information is related directly to its judicious treatment.

1-3.3 These forms can be used by any person or organization for their internal use. However, when released, copies should be sent to the Technical Committee on Aircraft Rescue and Fire Fighting for entry into the NFPA database.

1-4 Units. This guide uses metric units of measurement in accordance with the modernized metric system known as the International System of Units (SI). The liter unit, which falls outside of but is recognized by SI, is used commonly in international fire protection.

1-4.1 If a measurement value provided in this guide is followed by an equivalent value in other units, the first stated value should be regarded as the recommendation. The equivalent value might be approximate.

1-4.2 SI units have been converted from U.S. values by multiplying the U.S. value by the conversion factor and rounding the result to the appropriate number of significant digits.

Chapter 2 Aircraft Accident/Emergency Response Data

2-1 Fire Data. Reports on incidents and accidents that involve fires should include information on the origin of the fire, the method by which it was spread and fed, the type and effectiveness of extinguishing agents used, and whether any equipment malfunctioned. Methods for fighting fires that follow crashes and for forced entry into burning aircraft have been the subject of much research. All available facts should be reported to improve safety to life.

2-2 Emergency Exit Data. It should be noted whether escape from the burning plane was successful and whether emergency exits were able to be used or were blocked due to the fire's intensity and location. Information and data should be solicited from flight crew, passengers, and witnesses.

2-3 Weather Data. It is important to verify the weather conditions that existed at the time of the fire, particularly the wind direction and velocity. This information, combined with information on the location and use of emergency exits, can provide data on fire spread in the cabin interior.

2-4 Fire-Fighting Data. Reports should indicate the type of ground fire-fighting equipment available and used, including the response time and effectiveness of each responding vehicle, and the quantity and type of extinguishing agents used and left unused. The level of experience and degree of training of fire-fighting and rescue personnel also should be reported. The type of clothing worn by personnel involved and the degree of protection provided by this clothing is especially important. Reports should indicate any problems with communications, command and control on the scene, and problems with any emergency plans employed.

2-5 Medical Data. A complete report should be made on the medical findings that result from analysis of the accident. This report should differentiate between injuries and deaths due to fire and those due to impact. Pathological examinations should include toxicological analyses in order to identify all toxic products of combustion. The report also should describe the fire-extinguishing and victim-care procedures that were used. These reports can be completed by different persons.

2-6 Flight Crew. Complete information on in-flight fires is essential in order to improve and develop adequate fire-warning and fire-extinguishing systems. The source of the flight crew's discovery of fire in progress and the effectiveness of extinguishment efforts should be determined. A complete, step-by-step description of the procedure used by the crew for extinguishing the fire should be recorded and compared with the approved method listed in the applicable technical manual, flight manual, and flight attendant manual. The voice recorder and the aircraft flight recorder can be most helpful to the investigator in gathering this important information.

2-7 Data Collector's Responsibilities. Before completing the aircraft fire and emergency response reports, the following tasks should be completed.

(a) The data collector should become familiar with the overall accident site.

(b) The data collector should determine the location of the responding emergency response services at the time of response and the response routes accessed.

(c) The data collector should first walk through the wreckage area to size up the layout and distribution. This familiarity provides a mental picture of the main line of distribution and is helpful for plotting and interpreting witness statements, breakup patterns, and so forth.

(d) Upon arrival, the data collector should immediately contact the accident investigator in charge. For on-airport accidents, the airport authority or the Federal Aviation Administration (FAA) can provide the location of the investigator in charge. For off-airport accidents, the local enforcement authority should be contacted.

Chapter 3 NFPA Aircraft Fire Investigation Report Form

3-1 Using the Report. The following instructions provide detailed information on how to complete the NFPA Aircraft Fire Investigation Report Form *(see Figure 3-1)*, which is reproduced in this guide. The numbering of Chapter 3 corresponds directly to the numbered questions on the report. Each question can be identified either by bold or italic type and is followed by instructions on answering the question.

3-1.1 General.

3-1.1.1 Aircraft Data. See Figure 3-1.1.1 for an example of this section of the form.

3-1.1.2 Location of Emergency. The following provides information regarding the accident scene and the surrounding area.

(a) **Provide name of specific airport, if applicable, or city, nearest city, or nearest airport, stating distance factors and, where applicable, compass directions.* Example: 1 mile northwest of Burbank Airport, Burbank, California.

(b) *Prepare grid map, including terrain features.* This map greatly assists in showing the exact location and helps to determine whether the terrain was a factor in the accident as shown in Figure 3-1.1.2. Use the grid map in the fire investigation report *(see Figure 3-1)*. Please note that details of the fire scene are not included in this map but are to be entered later in the report on a separate grid map. In this sketch, show means of access to the accident site, including any perimeter roads around the airport, location of gates, and so forth. Indicate whether the rescue and fire-fighting (RFF) equipment had to travel long distances on public roads, and, if so, sketch the routing.

3-1.1.3 Time Factors. The information needed on time is as follows.

(1) *Date of accident.* The day/month/year format should be used.

(2) *Local time and Greenwich mean time (GMT).* Both the hour: minutes (local) and hour: minutes (GMT) should be given.

3-1.1.4 Type of Aircraft Accident. The following are eight basic types of accidents that involve the responsibilities of the aircraft fire investigator.

(a) *Crash, no fire.* It is important for the investigator to determine why no fire occurred. What set of circumstances caused this crash without also causing a fire? A study of procedures that were used can be of benefit in future crashes.

(b) *Crash, immediately followed by fire.* This type of accident is the opposite of 3-1.1.4(a), but the object of the investigation is the same. What procedures were used?

(c) *Crash, followed by fire but with delay in ignition (time interval).* What caused the delay in the ignition, and what procedures could have further delayed or prevented the ignition?

(d) *Fire in air, fire extinguished in flight.* The cause of the fire should be determined, and the procedures used to extinguish the fire should be identified. How can these procedures be improved? Did the crew act rapidly enough?

(e) *Fire in air, followed by crash and fire.* Crew members seldom survive this type of accident and careful examination of the wreckage is necessary to determine the cause and location of a fire in the air. Examination of various components of the aircraft fire-extinguishing system indicates the extent to which the extinguishing system was used and the procedures were completed. Remember to check the positions of components of other systems on the fire-extinguishing checklist. It is possible that the procedure for manipulation of the fire-extinguishing controls was positioned low on the checklist so that the crew did not have time to perform this function. Can the procedure be shortened? Why was the procedure unsuccessful in extinguishing the fire?

(f) *Fire on the ground, no crash.* The cause of the fire should be determined to help prevent future fires of this type. The fire sequence should be examined carefully to determine whether it is possible to reduce the time needed to extinguish a fire, the time needed to detect a fire, and the time needed to isolate a fire.

(g) *Fire inside hangar, no crash.* The cause should be determined to aid in developing prevention techniques. Once the causal factor has been established, efforts to prevent this type of fire can be successful. However, since the cause of this type of fire usually is traced to human behavior, the procedures used and their effectiveness should be noted carefully. Can the procedures be made more effective?

(h) *Fire — other (specify).* This section addresses any other type of aircraft accident. The causal factor should be determined, and the extinguishing procedures used and the extent to which they were successful should be identified. Can they be improved?

(i) *In-water accident.* The cause of the accident should be determined. It is important to describe the tactics, strategy, and equipment utilized to suppress fire and accomplish rescue in these circumstances. Much can be learned from this information.

(j) *Other aircraft ground incidents.* It is important to describe other emergencies that necessitate an Aircraft Rescue and Fire-Fighting (ARFF) response. Many times the prompt response of the ARFF prevents major aircraft damage and loss of life, and significant new response techniques are developed as a result.

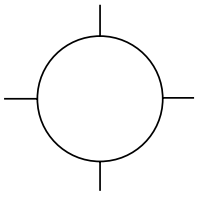
Figure 3-1 NFPA Aircraft Fire Investigation Report Form *(continues)*.

NFPA AIRCRAFT FIRE INVESTIGATION REPORT FORM

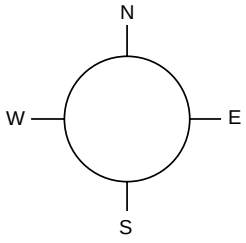
Report no. _____ Date of report _____

GENERAL

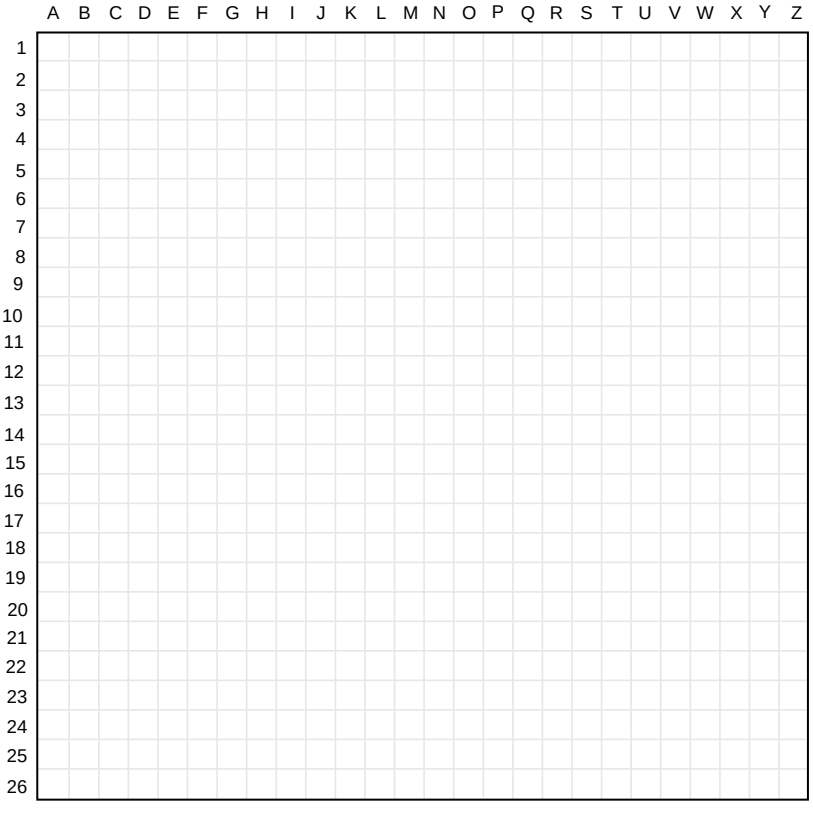
1. Aircraft Data
   (a) Type of aircraft _____ (b) Model no. _____
   (c) Manufacturer of aircraft _____
   (d) Type and number of engines _____ (e) Registration no. _____
   (f) Name of operator _____
   (g) Purpose of aircraft use _____
   (h) Flight route _____
   (i) Other information _____
2. Location of Emergency
   (a) Provide name of specific airport, if applicable, or city, nearest city, or nearest airport, stating distance factors and, where applicable, compass directions _____
   (b) Prepare grid map showing location of the accident site in relation to the fire station, the access route taken, and any significant features, such as runways, taxiways, aprons, roads, and water area. Include relationship of crash site to city or airport.



Indicate grid compass direction



Indicate wind direction with arrow and state wind velocity



3. Time Factors
   (a) Date of accident _____ (b) Local time _____ Greenwich mean time _____

(Fire Investigation 1 of 9)

Figure 3-1 *Continued.*

4. Type of Aircraft Accident (Check the appropriate items and elaborate on situation.)

(a) Crash, no fire ❑ Yes ❑ No Comments: _____

(b) Crash, immediately followed by fire ❑ Yes ❑ No Comments: _____

(c) Crash, followed by fire but with delay in ignition ❑ Yes ❑ No Comments (include time interval): _____

(d) Fire in air, fire extinguished in flight ❑ Yes ❑ No Comments: _____

(e) Fire in air, followed by crash and fire ❑ Yes ❑ No Comments: _____

(f) Fire on the ground, no crash ❑ Yes ❑ No Comments: _____

(g) Fire inside hangar, no crash ❑ Yes ❑ No Comments: _____

(h) Fire — other (specify): _____

(i) In-water accident ❑ Yes ❑ No Comments: _____

(j) Other aircraft ground incidents _____

5. Flight Factors (Check the appropriate items and elaborate on situation.) ❑ On airport ❑ Off airport

(a) Crash at takeoff ❑ Yes ❑ No Comments: _____

(b) Crash immediately after takeoff ❑ Yes ❑ No Comments (include altitude obtained): _____

(c) Aircraft in flight, power stall ❑ Yes ❑ No Comments: _____

(d) Aircraft in flight, explosion in air ❑ Yes ❑ No Comments: _____

(e) Aircraft in flight, fire in air ❑ Yes ❑ No Comments (include origin): _____

(f) Aircraft in flight, structural failure ❑ Yes ❑ No Comments (include structure): _____

(g) Collision with other aircraft while airborne ❑ Yes ❑ No Comments: _____

(h) Power on, collision with structure ❑ Yes ❑ No Comments (include type of structure): _____

(Fire Investigation 2 of 9)

Figure 3-1 ***Continued.***

(i) Power on, collision with ground ❑ Yes ❑ No Comments (include type of terrain): _____

(j) Crash while landing (runway) ❑ Yes ❑ No Comments: _____

(k) Crash while making emergency landing (off runway) ❑ Yes ❑ No Comments (include type of terrain): _____

(l) Other (specify) _____

6. Weather Factors

(a) General weather conditions _____ (b) Surface visibility _____ miles/feet

(c) Wind direction _____ Wind velocity/knots _____

(d) Ambient temperature _____ °F _____ °C Dew point _____ °F _____ °C

(e) Ice _____ Snow _____ Fog _____ Dry _____ Wet _____ (f) Visibility distance _____

FIRE FACTORS

1. Aircraft Fuel (Class B Fire)

(a) Quantity of fuel on board at time of accident _____ Type of fuel _____

(b) Describe type of fuel spill _____

(1) Dimensions _____ (2) Rate of fuel leakage _____

(3) Type of terrain _____ (4) Soil conditions _____

2. Other Flammable Liquids (Class B Fire) ❑ Yes ❑ No Comments: _____

3. Combustible Metals (Class D Fire) ❑ Yes ❑ No Comments: _____

4. Ordinary Solid Combustibles (Class A Fire) ❑ Yes ❑ No Comments: _____

5. Other Combustibles Not Part of Aircraft ❑ Yes ❑ No Comments: _____

6. Oxygen Involvement ❑ Yes ❑ No Liquid _____ Gaseous _____ Solid (Generator) _____

7. Hazardous Materials/Dangerous Goods ❑ Yes ❑ No

Type and location _____

Comments: _____

(Fire Investigation 3 of 9)

Figure 3-1 *Continued.*

IGNITION SOURCE

1. General Location of Probable Original Ignition Source (Describe evidence of ignition source.)
   (a) Impact ❑ Yes ❑ No Comments: _____
   _____
   (b) Power plants ❑ Yes ❑ No Comments: _____
   _____
   (c) Aircraft electrical circuits ❑ Yes ❑ No Comments: _____
   _____
   (d) Electrostatic sparks ❑ Yes ❑ No Comments: _____
   _____
   (e) Other sources ❑ Yes ❑ No Comments: _____
   _____
2. Progress of the Fire
   (a) Describe the progress of the fire from ignition to extinguishment _____
   _____
   _____
   (b) Describe the path and speed of flame spread, the effect of structural breakup on flame spread, and the effect of open exits on flame spread. Identify who opened exits and when they were opened _____
   _____
   _____
   (c) Describe the extent and length of time of fuselage survivability after the impact
   (1) Inspection of metal parts _____
   (2) Fuel odors _____
   (3) Pressurized containers _____
   (4) Oxygen systems _____
   (5) Smoke deposits _____

AIRCRAFT SAFETY SYSTEMS

1. Did the aircraft have any fixed fire-extinguishing systems? ❑ Yes ❑ No
2. What type of system? _____
3. Specify extinguishing agent employed: _____
4. Was it used? ❑ Yes ❑ No What effect did it have on the fire? _____
   _____
5. Were aircraft hand-operable fire extinguishers available? ❑ Yes ❑ No Were they used? ❑ Yes ❑ No
6. State effectiveness _____
7. Did the aircraft have fire alarm and detection equipment installed? ❑ Yes ❑ No
8. Which type? _____
   Did they operate? ❑ Yes ❑ No
9. Other information: _____
   _____

(Fire Investigation 4 of 9)

Figure 3-1 ***Continued.***

EMERGENCY NOTIFICATION

1. How long after the accident occurred was it discovered? _____
2. Who discovered it? _____
3. Who dispatched the fire alarm? _____
4. How was the fire alarm transmitted? Box _____ Telephone _____ Radio _____ Observed _____
   Other _____
5. Was the location of the accident accurately described? ❑ Yes ❑ No
6. If not, indicate the reason and describe the effect on any related delay in the response of the ARFF _____
   _____
7. What were the fire and evacuation conditions at the time of arrival of the ARFF? _____
   _____
8. Time Factors
   (a) If emergency preannounced, from announcement to touchdown (impact): _____ minutes
   (b) If emergency not preannounced, from accident/incident to alert of the ARFF services: _____ minutes
   (c) From alert to the arrival of the major vehicles: _____ minutes
   (d) From arrival of the ARFF to fire under control: _____ minutes
   (e) From arrival of the ARFF to rescue operations commencing: _____ minutes
   (f) From arrival of the ARFF to rescue operations terminated: _____ minutes
   (g) From arrival of the ARFF to extinguishment of the fire: _____ minutes
   (h) From extinguishment of fire to return to service: _____ minutes
   (i) List any factors that affected the response time of the ARFF _____
   _____
9. Remarks _____
   _____
   _____
   _____

AIRCRAFT AND FIRE-FIGHTING SERVICES

1. Vehicles and Staffing

	Vehicle 1	Vehicle 2	Vehicle 3	Vehicle 4	Vehicle 5
Brand name and manufacturer					
Date of procurement					
Model/year of manufacture					
Agent capacity: ❑ gal ❑ L					
Foam					
Water					
Dry chemical					
Halon					
Other _____					

(Fire Investigation 5 of 9)

Figure 3-1 *Continued.*

	Vehicle 1	Vehicle 2	Vehicle 3	Vehicle 4	Vehicle 5
Agent discharged: ❑ gal ❑ L					
Foam					
Water					
Dry chemical					
Halon					
Other _____					
Manpower assigned					
Number of turrets					
Turret flow rate(s) and pattern					
1					
2					
Time vehicle dispatched					
Response time to scene					
Distance traveled					
Time returned to service					
Terrain conditions					
Ice					
Mud					
Snow					
Steep slopes					
Sand					
Other _____					
Communication equipment					
Radio					
Cellular phone					
Fax					
Aircraft headphones					
Bullhorn					

Remarks _____

(a) Were any vehicles out of service at the time of the accident? _____

(b) List type and reason for lack of availability

(1) _____

(2) _____

(3) _____

(Fire Investigation 6 of 9)

Figure 3-1 ***Continued.***

2. Fire-Extinguishing Agents Used

(a) Total Agents and Quantities Applied: ❑ gal ❑ L

Type	Control (Q_1)	Extinguish (Q_2)	Handlines Overhaul (Q_3)
Dry chemical			
Halon			
Foam			
Other _____			

(b) Handline Utilization

	Number of Lines	Size of Lines	Flow Rate Hoseline(s): ❑ gpm ❑ L/min			Handline Size Hoseline(s)			Nozzle-Type Hoseline(s)			Manpower Hoseline(s)		
			#1	#2	#3	#1	#2	#3	#1	#2	#3	#1	#2	#3
External use														
Interior use														

3. Fire-Fighting Operations

(a) Were vehicles replenished with water? ❑ Yes ❑ No

(b) Source: Tankers _____ Hydrants _____ Drafting _____ Relay pumping _____

(c) Describe details of resupply operation _____

_____

(d) Were vehicles replenished with foam? ❑ Yes ❑ No

(e) Source: 5-gallon cans _____ Barrels _____ Tanker on-site _____ Tanker at firehouse _____

(f) Was agent replenishment a factor that impaired the fire suppression operation? ❑ Yes ❑ No

If yes, explain _____

(g) Describe the fire-fighting strategy and tactics in detail _____

_____

(h) Describe problems encountered _____

_____

(i) Describe lessons learned and verified by experience _____

_____

(j) Training

(1) Training to NFPA 1001, *Standard for Fire Fighter Professional Qualifications,* and NFPA 1003, *Standard for Airport Fire Fighter Professional Qualifications* ❑ Yes ❑ No

(2) Date of last live fire _____ (3) Date of last cabin interior drill _____

(4) Date of last aircraft pre-planning exercise on affected aircraft _____

(k) Clothing

(1) Type of protective clothing used

(NFPA 1976, *Standard on Protective Clothing for Proximity Fire Fighting*) Proximity _____

(NFPA 1971, *Standard on Protective Ensemble for Structural Fire Fighting*) Structural _____

(l) Self-contained breathing apparatus (SCBA)

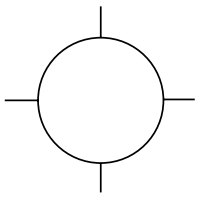
(1) Was it used? ❑ Yes ❑ No (2) Which type? _____

(Fire Investigation 7 of 9)

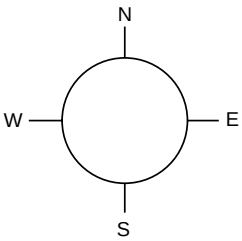
Figure 3-1 ***Continued.***

4. Grid Map of the Accident

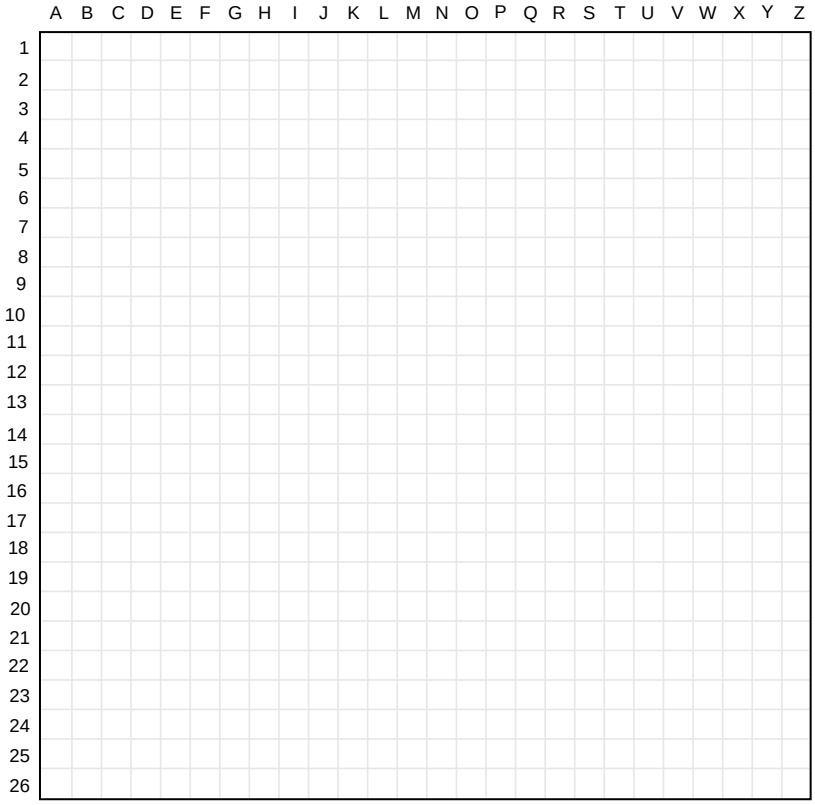
(a) Draw a diagram showing the positioning of the ARFF equipment in relation to the aircraft and including significant features such as fuel spills, escape routes, unusual terrain, water supplies, and buildings.



Indicate grid compass direction



Indicate wind direction with arrow and state wind velocity



Remarks _____

HUMAN FACTORS

1. Personnel Table

Occupants	Total on Board	Evacuated Unaided	Extricated	Medical Priority 1	Medical Priority 2	Medical Priority 3	Fatalities
Passengers							
Crew							
Other							

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Figure 3-1 ***Continued.***

2. Number of Casualties
   (a) Number who died as a result of this accident? _____
   (b) Number who died as a result of burns? _____
   (c) Number who died from suffocation? _____
   (d) What special factors are important regarding occupants (e.g., number thrown clear of the wreckage, rescue difficulties due to location of occupants, type of injuries, etc.)? _____
3. Describe Evacuation, Number of Rescue Personnel, Exits Used, Break-In Areas Used _____
4. Time Required to Accomplish Rescue and Removal of the Occupants _____
5. Time Required to Control the Fire: _____ minutes Time Required to Extinguish the Fire: _____ minutes

For questions regarding the form, call NFPA at (617) 984-7403.

Please send completed form to

NFPA Fire Investigations
National Fire Protection Association
1 Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101

fax: (617) 984-7110
e-mail: investigations@nfpa.org

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Figure 3-1.1.1 Example of the aircraft data section of the NFPA Aircraft Fire Investigation Report Form.

GENERAL

1. Aircraft Data

(a) Type of aircraft *Aircraft AAA* (b) Model no. *Series 000*

(c) Manufacturer of aircraft *Aircraft Company, Los Angeles, California*

(d) Type and number of engines *3* (e) Registration no. *N304*

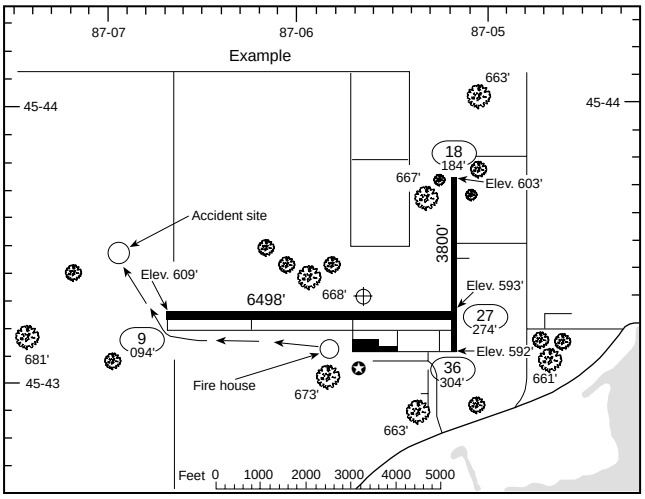
(f) Name of operator *OK Airlines*

(g) Purpose of aircraft use *The aircraft was on a charter flight for the World's Sport Society.*

(h) Flight route *Chicago to Los Angeles via airways*

(i) Other information *Provide any additional, appropriate information regarding this aircraft or flight not indicated previously.*

Figure 3-1.1.2 Example of a grid map detailing the terrain of the accident location.



3-1.1.5 Flight Factors. Observation of various flight factors prior to, during, and subsequent to initiation of an aircraft fire can supply information that leads to possible changes in procedures, structures, and so forth, that might prevent reoccurrence. Some pertinent flight factors include the following.

(a) *Crash at takeoff.* What was the point in the takeoff roll at which the crash occurred? Had power been reduced? What was the configuration of the flaps, gear, and so forth?

(b) *Crash immediately after takeoff.* What was the approximate maximum altitude reached? What was the configuration of the flaps, gear, and so forth? Had power been reduced? What were the changes in the heading (if any) of the aircraft? Was any smoke or flame emitting from the aircraft? If so, from where and at what point in time?

(c) *Aircraft in flight, power stall.* Was the aircraft involved in any abrupt pull-up? Was power still being applied?

(d) *Aircraft in flight, explosion in air.* Was there any explosion while in the air? If so, when? Take care to differentiate between explosions and other sounds. For example, a breaking spar can sound exactly like an explosion.

(e) *Aircraft in flight, fire in air.* If a fire during flight was suspected, what indications, such as smoke or flame, were present? From what portion of the aircraft? The location of the smoke emissions from an aircraft often can provide a valuable clue to that checklist procedure last performed by the crew before fire occurred. What color and how intense was the smoke? Describe the color of the smoke as it relates to everyday items (e.g., white as a bed sheet, gray as newsprint, etc.).

(f) *Aircraft in flight, structural failure.* In which phase of flight was the aircraft (e.g., takeoff, initial climb, cruise, etc.)? Which structure failed and when? In what manner? Was fire present? Did the fire occur before or after the structural failure?

(g) *Collision with other aircraft while airborne.* In this situation, the main focus of attention should be the relative angle between the two aircraft as they approached each other.

(h) *Power on, collision with structure.* At what phase of flight did the collision occur (e.g., takeoff, initial climb-out, landing, etc.)? At what altitude above the ground did the collision occur?

(i) *Power on, collision with ground.* In which phase of flight was the aircraft? What was the angle of impact? Describe the type of terrain and surface characteristics (e.g., ditches, embankments, etc.).

(j) *Crash while landing (runway).* Did the crew give any warning of any unusual condition? Was any unusual condition evident from the ground? At what phase of the landing did the collision occur (e.g., prior to touchdown, during rollout, during taxi, etc.)?

(k) *Crash while making emergency landing (off runway).* What were the indications regarding the type and nature of the emergency? In what type of terrain was the landing attempted? In what phase of the landing did the crash occur?

(l) *Other.* If none of the flight factors apply, describe the situation.

3-1.1.6 Weather Factors. The information needed regarding the weather is as follows.

(1) *General weather conditions.* What was the general weather condition (e.g., rain, fog, ice, snow, etc.)?
(2) *Surface visibility in miles.* What was the runway visibility (RVR)?
(3) *Wind direction and velocity in knots.*
(4) *Ambient temperature and dew point in °F or °C.* Specify measurement used.
(5) *Ice, snow, fog, dry, wet.*
(6) *Visibility distance.*

3-1.2 Fire Factors.

3-1.2.1 Aircraft Fuel (Class B Fire). The information regarding fuel is as follows.

(a) *Quantity of fuel on board at time of accident.* The quantity of fuel carried by the aircraft at the time of the incident/accident and an accounting of its status during and after the time of impact (if any) and fire (if any) are important in evaluating the effectiveness of the fuel tank construction and installation in minimizing fire hazard factors. Provide the quantities in gallons, pounds, kilos, or liters, specifying the unit used.

(b) **Describe type of fuel spill and effect of terrain and soil conditions on fuel spill.* The dimensions of the fuel spill area in square feet at time of ignition should be estimated, and the sequence of fire growth should be recorded from that time of ignition. This information should include the rate of fuel leakage from tanks or broken fuel lines and the rate of growth of fuel spill area. Did the scope of the terrain affect fuel runoff?

3-1.2.2 Other Flammable Liquids (Class B Fire). In the comments section, describe the part that engine oil, hydraulic fluid, alcohol, and so forth, played in the fire (pertinent only when original combustible or primary amount of fuel is involved). It is common knowledge that other special purpose liquids carried aboard aircraft are not only combustible but can be destructive to foams that are likely to be used to extinguish the main fuel fire. Although the quantities of these liquids are small in comparison with the quantity of fuel load, their presence should be treated as a clue to any effectiveness deficiency in the extinguishing agents used.

3-1.2.3 Combustible Metals (Class D Fire). In the comments section, describe the role of combustible metals as possible ignition source or continuing source of ignition (list types of metals involved). What was the effect on fire control? Magnesium and titanium are the only metals likely to be encountered as factors in an aircraft fire. Metals usually are not the cause of large fires. However, metals can create severe problems in a fire situation, since not only are they difficult to extinguish, but the usual agents, water and water-containing agents (e.g., foam), aggravate and often spread the burning metal. The metals themselves rarely self-ignite, but friction sparks resulting from their contact with the runway surface usually ignite fuel from any leaks in their vicinity. Metal fires usually are due to prolonged heating by the flames of liquid fuel fires or are the result of the friction of metals in contact with the runway. Titanium fires rarely occur.

3-1.2.4* Ordinary Solid Combustibles (Class A Fire). In the comments section, describe the role of solid combustibles (e.g., baggage, cargo, personal effects, cabin interior furnishings, etc.) as the original ignition source, the original combustible involved, or in terms of their effect on fire control. Fires burning in ordinary materials of construction, such as wood, cotton, rubber, synthetics, and so forth, are Class A fires. These fires normally are extinguished by water or foam and pose no special problem, except that they might be hidden and inaccessible to the fire fighter and, therefore, can constitute a constant reignition point for the flammable vapors.

3-1.2.5 Other Combustibles Not Part of Aircraft. In the comments section, describe the role of other combustibles (e.g., trees, grass, brush, vehicles, structures, etc.) as the original ignition source, the original combustible involved, or in terms of their effect on fire control.

3-1.2.6 Oxygen Involvement. In what state was the oxygen?

3-1.2.7 Hazardous Materials/Dangerous Goods. In the comments section, include any hazardous materials carried on the aircraft and their effect on the fire. Etiological factors are covered in Chapter 4.

3-1.3 Ignition Source.

3-1.3.1 General Location of Probable Original Ignition Source. Ignition factors can be divided into four basic groups, as follows.

(a) *Impact — frictional sparks, striking power lines, and so forth.* The source of original ignition quite frequently is other than the aircraft itself. Ignition can result from a friction spark that occurs on impact or possibly from power lines or the landing area lighting system. When conducting investigations, a serious effort should be made to determine the cause of ignition. Each aircraft accident exhibits evidence of several ignition sources and usually more than one fire factor. The sources and factors of greatest concern are those that cause sustained fire progression.

A close examination of the ground that runs from the aircraft back along the skid path, and even beyond the point of initial ground contact, is necessary to determine the point at which ignition occurred. This examination also helps determine whether fire was present prior to actual touchdown. Discoloration or charred material found in this area should be examined closely to attempt to determine the type of material burned and its possible location relative to the construction of the aircraft. Such material might consist of cabin furnishings, gear components, engine components, and so forth. Unlike structural buildings, where fire loads are somewhat static, the original ignition source in aircraft fires is not found necessarily in the areas where the most severe burning occurs. Information included in the report should describe the point of sustained ignition in relation to its position on or in the aircraft.

(b) *Power plants.* In aircraft accidents where impact forces are extremely excessive, the aircraft power plants generally provide the initial ignition of aircraft fuel loads. For this reason, every attempt should be made to determine the damage to, as well as any movement of, the engines during and after initial impact. Ignition generally takes place when engines become torn loose, severing fuel and electrical power lines. This potential for ignition from aircraft power plants is especially true of the turbine engine, as it remains extremely hot internally and continues to rotate for a period of time after impact.

(c) *Aircraft electrical circuits.* The next most common fire ignition results when electrical lines are severed in a fuel vapor atmosphere. Every effort should be made to examine broken wires and circuit breaker panels to discover possible causes of ignition, keeping in mind that there should be a source of flammable vapor or exposed combustibles in the area of the arcs, sparks, or heat if a fire was caused by such an ignition source. Examination of aircraft batteries also should be included in this investigation.

(d) *Electrostatic sparks.* These sparks often can be the cause of the original ignition source, since the aircraft itself, or portions of the aircraft that become separated during impact, builds up an electrostatic charge while moving through the air and might discharge this residual energy upon contact with the ground.

(e) *Other sources.* What other sources of ignition not covered previously caused the fire?

3-1.3.2 Progress of the Fire. The information regarding the progress of the fire is as follows.

(a) *Describe the progress of the fire from ignition to extinguishment.* Once the point of sustained ignition is determined, a close examination of the burn pattern, together with a study of the aircraft construction, should provide a fairly clear picture of how the fire propagated prior to fire extinguishment action. In many cases, the fire-fighting efforts themselves cause fire extension in unusual patterns. These patterns generally can be distinguished from normal fire progression by the presence of extinguishing agent residue in the burn deposit. Note that normal fire behavior causes upward extension of the fire more rapidly than it causes lateral extension. Most materials, when burned or heated, become subject to air currents, and a close examination of the burn area provides an indication of fire travel by the manner in which the charred material is curved.

At this point in the investigation, it is especially helpful to have an understanding of the temperature at which different metals melt or support combustion. It also is important to understand that fire can progress by radiation, convection, and conduction. Due to the aircraft construction, fire progression usually occurs by all three of the preceding methods.

The most accurate account of fire progression usually can be obtained from eyewitnesses. However, during questioning, it is important to remember that each witness is likely to provide a different version of any given circumstance. No assumptions should be made until statements from several eyewitnesses have been received. Reported information then should be based on those facts most strongly supported by all of the accounts.

When filling out the report form, chart the fire progression as closely as possible from the time of initial touchdown or sustained ignition. The progression should be recorded in minutes and seconds. This recording provides a more complete accounting of the fire progression. Also, attempt to determine any unusual problems encountered during fire extinguishment operations.

(b) *Describe the path and speed of flame spread, the effect of structural breakup on flame spread, and the effect of open exits on flame spread. Identify who opened exits and when they were opened.* These items are somewhat self-explanatory, and the answers can be obtained during the normal course of the investigation. Interrogation of survivors and eyewitnesses is the most reliable source of this information, but care should be taken in evaluating this information from individuals who are closely involved. Where possible, the most satisfactory method of determining time factors for specific conditions is to have persons furnishing factual information recreate their actions, as most people lose the awareness of time during emergency situations. If possible, survivors should recreate their actions during the accident while inside an aircraft of identical type and configuration. In reporting on this phase of the investigation, it is best to furnish a sketch of the aircraft and identify exits and other points of reference by use of a numbering system or other suitable means.

(c) *Describe the extent and length of time of fuselage survivability after the impact.* This factor is subject to many variables, such as toxic gases, extent of carbon monoxide contamination, percentage of oxygen in the cabin, and temperature gradients. A complete laboratory analysis should be done on burn tests of the cabin interior materials to determine the toxicity of fumes. It is especially helpful to furnish a diagram of the cabin configuration showing those seats occupied at the time of impact. The diagram also should show the location of any fatalities and indicate those found in their original seat location. The survivors and flight attendants are the best source of this information, and an attempt should be made to determine how much time elapsed after impact before the last known survivor evacuated the aircraft. Investigation of fire origin and progression through the cabin also are very helpful in determining this time lapse. Examination of the items that follow will be beneficial in determining the preceding factors.

(1) *Inspection of metal parts.* A close investigation of metal parts involved in the fire area provides information on the severity and temperature of the fire. A basic knowledge of melting temperatures of various metals is necessary to establish temperatures. Since most aircraft metals are lightweight, they become subject to air currents when they are heated or reach the fluid state.

(2) *Fuel odors.* During the investigation, check all areas of the aircraft for residual fuel odors to determine the extent of fuel spread. This inspection is especially important in the baggage and cabin areas. Regardless of the extent of burnout, if fuel was present, the charred remains will have produced some trace of fuel odor.

(3) *Pressurized containers.* Many types of pressurized containers can be found in the personal effects aboard the aircraft as well as in the ordinary furnishings in the cabin area. Where pressure has been released during fire, unusual burn patterns can be detected. These burn patterns provide an indication of free-burn areas as well as excessive temperatures that can cause exterior venting.

(4) *Oxygen systems.* Both fixed systems and walk-around oxygen bottles contribute greatly to cabin burnout. These systems should be located and identified before a full appraisal of the fire behavior is reported.

(5) *Smoke deposits.* During the investigation, various types of smoke and ash deposits will be encountered. Any unusual deposits of these materials should be inspected carefully and analyzed to determine the type of material that caused the burn. Foreign material deposits in these areas also should be noted.

3-1.4 Aircraft Safety Systems.

3-1.4.1 Did Aircraft Have Any Fixed Fire-Extinguishing Systems? All transport category aircraft, as well as some light twin aircraft, have such systems. Most single-engine types do not.

3-1.4.2 What Type of System?

3-1.4.3 Specify Extinguishing Agent Employed. Most modern aircraft are equipped with bromotrifluoromethane (halon 1301) systems, which discharge by remote control from the cockpit into the fire zone of each engine by selection. Some aircraft also discharge agent into baggage bins, but most do not. Other agents that might be used are carbon dioxide (CO_2), chlorobromomethane (CB or CBM), or bromochlorodifluoromethane (halon 1211-BCF). The investigator should obtain all necessary details of the system installed from the fire-extinguishing equipment manufacturer.

3-1.4.4 Was It Used? What Effect Did It Have on the Fire? If possible, determine sequence of events and the answers to these questions from conversation with crew. Sequence should include the time from fire alarm or detection to discharge of agent and the effect of agent on fire. Was entire quantity of airborne agent used on fire? If fire continued, indi-

cate time from discharge to landing or impact. Describe airborne progression of fire. If crew is not available, determine from examination of aircraft or remains the position of the fire discharge controls, whether or not extinguishing agent cylinders are empty, and so forth.

3-1.4.5 Were Aircraft Hand-Operable Fire Extinguishers Available? Were They Used?

3-1.4.6 State Effectiveness. These questions apply only to fire originating in a cabin or in accessible baggage bins.

3-1.4.7 Did the Aircraft Have Fire Alarm and Detection Equipment Installed?

3-1.4.8 Which Type? Did They Operate?

3-1.4.9 Other Information. Is there any other information pertinent to the aircraft fire detection and extinguishing system?

3-1.5 Emergency Notification.

3-1.5.1 How Long After the Accident Occurred Was It Discovered? If there was uncontrolled ground fire, the investigator's job is made more difficult by destruction of possible evidence and the obscuration and masking of existing evidence. If exact time is not available, a close approximation later in the investigation helps significantly in determining burn times and effect on the evidence.

3-1.5.2 Who Discovered It? The time lapse between the occurrence of an accident and its discovery is a factor of some importance to the investigating team. Many aircraft accidents are discovered after it is too late. The reasons — weather conditions, aircraft out of fuel, isolated areas, and loss of communication with the aircraft — vary. The discovery of an accident by other aircraft notification or by survivors ultimately can be of great value to the investigator.

3-1.5.3 Who Dispatched the Fire Alarm? What was the agency that ordered ARFF equipment to respond?

3-1.5.4 How Was the Fire Alarm Transmitted? It is important for the investigator to find out from reliable sources who initiated the alarm and how [e.g., box, telephone, radio, observed, other (specify)] it was transmitted. Many airports have a mutual aid agreement with local fire authorities whereby alarms are transmitted by a "hot line" connected directly to the fire department alarm station for use in the event that outside help is needed by the airport crash and rescue crew.

3-1.5.5 Was Location of the Accident Accurately Described? If not, indicate the reason and describe the effect of any related delay in fire and rescue service. The investigator should be informed of the accuracy or inaccuracy of the original description of the accident location. In cases where an inaccurate location has been provided, valuable response time has been lost. It is then necessary to investigate the reason for the delay in the response.

3-1.5.6 If Not, Indicate the Reason and Describe the Effect of Any Related Delay in the Response of the ARFF. What were the consequences of erroneous response information?

3-1.5.7 What Were the Fire and Evacuation Conditions at the Time of Arrival of the ARFF? The fire and evacuation conditions at the time of the arrival of the rescue units are highly significant in the final analysis of the accident. These conditions can indicate the extent of fire, complete engulfment by fire, presence of interior or exterior fires, type of odors, smoke, and evacuation status of passengers. Were passengers evacuating, not evacuating, or was evacuation complete on arrival of rescue equipment?

3-1.5.8 Time Factors. Time factors should be determined as precisely as possible from the records, flight crew, fire department, air traffic control tower, and Air Traffic Control (ATC), and so forth. After analysis, the investigator should be able to determine the effectiveness of each phase of the operation. Include response time of ARFF vehicles from alarm to arrival at the scene and number of vehicles with very high frequency (VHF) communications. Also include response interference factors (e.g., weather, traffic, terrain) and those that affected the response time of the ARFF vehicles such as weather, distance from fire house, terrain, and access roads.

3-1.5.9 Remarks. Include all conclusions drawn by the data collector after analysis of the detection and alarm system used and the time factors involved. If any time factors seem implausible, the data collector should request a simulation or rerun.

3-1.6 Aircraft Rescue and Fire-Fighting Services.

3-1.6.1 Vehicles and Staffing. This table should be filled out carefully by the investigator working in coordination with the fire department. It provides information on the effectiveness of particular vehicles and the physical details of the operation and not only is useful in assessing effectiveness for the particular fire but serves as documented experience for study by all RFF services. Make certain to note condition of each vehicle in the remarks section. Note any injuries to RFF personnel during this operation as well as details of the use of any airport-based medical vehicles. The quantities provided in the table should be expressed in national units of measure of state involved.

3-1.6.2 Fire-Extinguishing Agents Used. This section should be filled out carefully by the investigator working in coordination with the fire department. This section is used to assess the overall effectiveness of the fire department by determining quantities of agents used, discharge rates and time, and order of agent use. In the remarks section, note any effect agents have had on one another. Note specifications and type of agents used and the quality of agent produced. Fire fighters on duty during the operation should be questioned regarding any deleterious effects on the foam blanket due to any other agents used. The quantities provided in this section should be expressed in national units of measure of state involved. In the past, agent quantities were determined from fire ground tests and previous experience, since detailed accident data was unavailable.

In order to justify the following agent quantity formula, it is essential that the following data be available:

$$Q = Q_1 + Q_2 + Q_3$$

where:

Q_1 = water quantity for control of the fire
Q_2 = water quantity used for extinguishment
Q_3 = water quantity used by handlines and for maintenance (overhaul) operations

3-1.6.3 Fire-Fighting Operations. Describe conduct of fire-fighting operations after arrival of equipment. After questioning the fire department, reconstruct the operational details in chronological order. Briefly describe the extent of the blaze, effect of the fire-fighting operation, start of evacuation, and completion of rescue and control of the fire situation. If the

fire attack was interrupted by a lack of replenishment water, note the reason for the delay. Include a description of problems encountered and lessons learned.

The following three sections include questions regarding the training and equipment of fire fighters.

(j) *Training.* It is important to ensure adequate and proper training by maintaining records on the type and frequency of training and the most recent training evolution employing hot drills, cabin interior drills, and aircraft pre-fire planning. Lack of sufficient training is a significant factor in the improper use of existing ARFF equipment.

(k) *Clothing.* The type of protective clothing utilized for fire suppression is significant, since NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, mandates a minimum level of personal protective equipment for ARFF.

(l) *Self-contained breathing apparatus (SCBA).* Recording the use of SCBA and the type utilized establishes statistics that define the levels of personal protective equipment used to suppress ARFF fires.

3-1.6.4 Grid Map of the Accident. Sketch the details suggested in the fire report on a separate sheet of paper. When satisfied that all details are included, transfer the sketch to the grid map. In the explanatory remarks, explain all details of the diagram that are necessary.

3-1.7 Human Factors. It is vitally important when analyzing an aircraft accident involving fire to obtain as much information as possible on the occupants of the aircraft. Improved aircraft structures and rescue techniques can result. Therefore, as many details as possible should be obtained by investigators. The coordinated effort of the entire investigation team should be used in this area.

3-1.7.1 Personnel Table. After consultation with those who participated in the rescue of personnel, the investigator should fill out this table carefully. If possible, a seating arrangement showing the location of passengers and crew prior to the accident, including gender and whether child or adult, should be obtained.

3-1.7.2 Number of Casualties. The investigator should create a seating arrangement chart indicating the status of passengers and crew during and after the accident (e.g., injury, burns, fatality, escaped unaided, rescued by fire and rescue personnel). Provide causes for all fatalities such as burns, asphyxiation, impact, and so forth.

3-1.7.3 Describe Evacuation, Number of Rescue Personnel, Exits Used, Break-In Areas Used. Extensive questioning of flight crew and passengers should help the investigator in this description. Include the extent of briefing and preplanning, if known.

In this section, also include information regarding the following questions.

(1) Had occupants begun evacuation or were they waiting to be rescued?
(2) Had flight crew been able to complete emergency shutdown drills?
(3) Were passengers or crew able to operate escape hatches satisfactorily?
(4) Was sufficient marking and lighting available to facilitate evacuation?
(5) Describe in detail any difficulties encountered in evacuation.

3-1.7.4 Time Required to Accomplish Rescue and Removal of the Occupants. In this section, include information regarding the following questions.

(1) Did occupants respond to orders from rescue crews?
(2) Which emergency exits were used during evacuation? Did they function properly, or were they damaged by impact or fire?
(3) Were aircraft crew able to assist in the rescue? If so, to what extent?
(4) How many persons used each means of egress?

3-1.7.5 Time Required to Control the Fire? Time Required to Extinguish the Fire? Describe in detail whether passenger and crew evacuation delayed extinguishing of fire. Smoldering and small spot fires not affecting rescue should not be included in this time factor.

3-2 Distributing the Report. Copies of each report should be sent to the appropriate government authorities involved in the investigation. When released by these authorities, reports should be sent to the following organizations:

International Civil Aviation Organization
1000 Sherbrooke Street, W
Montreal, Quebec, Canada H3A 2R2

Fire Analysis Department
National Fire Protection Association
1 Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101 U.S.A.

Other concerned qualified authorities are the U.S. Air Force, U.S. Navy, U.S. Flight Safety Foundation, and so forth.

Chapter 4 NFPA Disaster Response Report Form

4-1 Using the Report. The following instructions provide detailed information on how to complete the NFPA Disaster Response Report Form *(see Figure 4-1)*, which is reproduced in this guide. The numbering of Chapter 4 corresponds directly to the numbered questions on the report. Each question can be identified by bold type and is followed by instructions on answering the question.

4-1.1 Data Collection. The information needed to complete this report can be obtained from the FAA, airline or aircraft owner or their representatives, and representatives of the responding services.

4-1.2 Disaster Plan. A copy of the plan should be obtained. This provides the investigator with access to the telephone contacts necessary for obtaining details on the effectiveness of the response and a critique of the most recent exercise.

4-1.3 Alarm Notification. How was the alarm received?

4-1.4 Response Times. Response times have a direct bearing on the entire rescue operation. The times usually are reported to the chair of the National Transportation Safety Board (NTSB) Human Factors Group during interviews with the responding agencies. Response times often are recorded on tapes maintained by the airport tower, fire departments, and emergency services. Where recorded times are not available, more than one source should be used for verification.

Figure 4-1 NFPA Disaster Response Report Form *(continues)*.

NFPA DISASTER RESPONSE REPORT FORM

Aircraft no. _____ Flight no. _____ Type of aircraft _____

Aircraft operator _____ Date of accident _____

DATA COLLECTION

1. Number of Occupants Cockpit crew _____ Cabin crew _____ Passengers _____
2. Other Persons Involved and Location _____

_____

_____

3. Number Occupants Escaped Unaided, Uninjured _____
4. Number Occupants Escaped Unaided, Ambulatory Injured _____
5. Number Rescued _____
6. Number of Trauma-Related Fatalities _____ Fire/Smoke-Related Fatalities _____
7. Other Fatalities _____ 8. Time Last Survivor Was Evacuated _____

DISASTER PLAN

1. Date of Last Revision _____ 2. Date of Last Inspection _____
3. Is Plan Current? ❑ Yes ❑ No If not, why? _____

_____

(a) Incorrect telephone numbers _____

(b) Incorrect radio frequencies _____

(c) Incorrect agencies, names, etc. _____

4. Date of Last Full-Scale Exercise _____
5. Date of Last Tabletop Exercise _____
6. Did All Responding Agencies Participate in the Exercises? ❑ Yes ❑ No If not, explain _____

_____

7. Dates of Any Mini Exercises in Last Two Years _____
8. Review of Mutual Aid Agreements _____

ALARM NOTIFICATION

1. How Was Alarm Received? _____

_____

_____

_____

RESPONSE TIMES

	Local Time		Local Time
1. Time of Accident	_____	4. Disaster Plan Activation	_____
2. Initial Notification of ARFF	_____	5. Triage Initiated	_____
3. Arrival of ARFF	_____	6. First Casualty Transported to Hospital	_____

(Disaster Response Report 1 of 6)

Figure 4-1 *Continued.*

	Local Time		Local Time
7. Arrival of Mobile Command Post	_____	12. Arrival of Mutual Aid Fire Service	_____
8. Arrival of First Medical Services	_____	13. First Casualty Transported to Hospital	_____
9. Arrival and Transportation for Uninjured	_____	14. First and Last Vehicle Arrived at Hospital	_____
10. Arrival of First Ambulances	_____	15. Last Casualty Transported to Hospital	_____
11. Arrival of Police/Security Services	_____	16. Response Terminated	_____

RESPONDING AGENCIES

1. Mutual Aid Fire Services (use extra sheet if number exceeds ten)

Agency	Vehicle Type	Time of Arrival	Amount of Agent Carried: ❑ gal ❑ L		
			Water	Foam	Other

(a) How were these vehicles utilized? _____

(b) Primary fire fighting _____ Tankers _____ Rescue _____

(c) Standby for continuing flight operations _____

(d) Other _____

2. Helicopters

(a) Were helicopters used during the emergency? ❑ Yes ❑ No

(b) To locate accident site? ❑ Yes ❑ No

(c) To control traffic? ❑ Yes ❑ No

(d) To transport casualties to hospital? ❑ Yes ❑ No

(e) Record the owner and/or operator of each helicopter and the arrival time

(1) Helicopter 1 _____

(2) Helicopter 2 _____

(3) Helicopter 3 _____

(Disaster Response Report 2 of 6)

Figure 4-1 ***Continued.***

(4) Helicopter 4 _____

_____

3. Civil Defense _____
4. Military _____
5. Police _____
6. Sheriff/State Patrol _____
7. Airline/Airport Personnel _____
8. Ambulance Services

Owner/Operator	Number Medical Personnel Provided	Patient Capacity	Arrival Time at Scene	Used/ Not Used

(a) Total medical personnel Doctors _____ Nurses _____ EMTs _____ ALS _____ BLS _____

9. Other Responders _____

RESCUE OPERATION

1. Mobile Command Post (MCP) _____

   How long after the accident was the MCP ready to assume control of the operation? _____

2. Who was the on-scene commander? _____

   (a) Was the incident command system (ICS) used? ❑ Yes ❑ No (b) If yes, were there problems? _____

   _____

3. Was the MCP power-driven or trailer? _____
4. Was the MCP easily recognizable? ❑ Yes ❑ No

   How? Lights _____ Balloons _____ Other _____

5. Was communication with responding agencies adequate? ❑ Yes ❑ No

   (a) How? Radio _____ Telephone _____ Wireless telephone _____ Fax _____ Other _____

   (b) Problems with communication? _____

   _____

6. Was an emergency operations center available? ❑ Yes ❑ No

(Disaster Response Report 3 of 6)

Figure 4-1 *Continued.*

TRIAGE

1. Who initiated the triage operation? _____
2. Who conducted the triage operation? _____
3. Where was the triage operation set up in relation to the accident? _____

   _____

   Describe location showing ambulance arrival and departure routes _____

   _____

   _____
4. Were emergency medical supplies available at the site? _____
5. Was terrain or weather a problem? ❑ Yes ❑ No If yes, describe _____

   _____
6. Were ambulance arrivals/departures controlled in an orderly manner? _____
7. Arrival time of first: Doctors _____ EMTs _____ Nurses _____
8. What were the weather conditions at the accident site? Temperature _____ Wind direction _____

   Wind velocity _____ Precipitation _____ Visibility _____
9. How were the victims tagged? _____

MEDICAL SERVICES

1. Hospital Distribution

Name of Hospital	Type	Distance from Incident	Arrival Time	Number of Casualties

2. How were the injured but ambulatory treated? First aid at site _____ Transported to hospital _____
3. What provisions were made for the uninjured/ambulatory?

   (a) Transported to the terminal by bus _____ Other _____

   (b) Provided with: Telephones _____ Food _____ Drink _____
4. What provisions were made for the fatalities? Body bags available _____ Temporary morgue _____

   Other _____
5. Were the services of the following available?

   Coroner _____ Clergy _____ Post office _____ Customs _____ Red Cross _____

(Disaster Response Report 4 of 6)

Figure 4-1 ***Continued.***

POLICE/SECURITY

1. Who provided the police services? Airport _____ County _____ State _____ City _____
2. Describe problems encountered regarding airfield/site access in detail _____
3. Was highway traffic control adequate for the responding agencies? ❑ Yes ❑ No
   Were there any street closure plans implemented? ❑ Yes ❑ No If yes, describe _____
4. Was the news media access coordinated? ❑ Yes ❑ No How? _____
5. Was crowd control maintained? ❑ Yes ❑ No How? _____
6. Who provided vehicle escort for accidents on the airport premises?
   Airport police _____ Airport authority _____ Other _____
7. How long after the accident was the crash site secured? _____ How? _____
8. Were off-airport emergency services informed of staging areas and rendezvous points? ❑ Yes ❑ No

GENERAL

1. Which types of heavy equipment and shoring materials were available for extrication purposes? _____
2. If a hazardous materials team was needed, describe problem involved _____
3. Were all responders easily identified? ❑ Yes ❑ No How? Vests ___ Hats ___ Armbands ___ Uniforms ___

WATER ACCIDENTS

1. Water Rescue Equipment

Agencies	Type	Size	Response Time	Passenger Capacity

(Disaster Response Report 5 of 6)

Figure 4-1 *Continued.*

(a) What was the method of response to the accident?

Boats _____ Amphibious vehicles _____ ARFF vehicles _____ Swamp buggies _____

(b) Time and distance to reach accident scene _____

_____

2. Were surviviors equipped with aircraft flotation equipment?

Life vests _____ Slides _____ Rafts _____ Seat cushions _____

3. What flotation equipment was transported to the scene? Rafts _____ Platforms _____ Life vests _____

4. Indicate weather and water conditions Water: Smooth _____ Choppy _____ Rough _____ Temperature _____

Air temperature: _____ °F _____ °C Other factors affecting rescue operations _____

_____

5. Describe any problems locating aircraft _____

_____

6. Underwater search and recovery _____

_____

7. Resuscitation of hypothermia victims due to near-drowning in cold water? ❑ Yes ❑ No

Remarks _____

_____

_____

_____

_____

_____

_____

_____

_____

Name _____

Representing _____

Telephone contact _____ Date _____

For questions regarding the form, call NFPA at (617) 984-7403.

Please send completed form to

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