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Accident Investigation Guide

2005 Edition

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Chuck Whitlock
Principal Investigator

Jerry Taylor Wolf
Project Leader

USDA Forest Service
Technology & Development Program
Missoula, MT

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Chapter 1

Accident Investigation

Chapter 1—Accident Investigation

1.1 Introduction

A Forest Service serious accident is one that involves:
- A death
- Three or more persons hospitalized after treatment for reasons other than observation
- Wildland fire shelter deployments or entrapments
- Property damage, other than to aircraft, that exceeds $250,000
- Damage to aircraft that exceeds $1,000,000 or results in total destruction of the aircraft

A. Supervisors and managers at all organizational levels are responsible for identifying and abating hazards, incorporating safe operating procedures into each of our daily tasks, and refusing to accept unnecessary risk. The causes of most accidents or incidents are a result of failures to observe established policies, procedures, and controls. All too often, accident investigations reveal existing hazards that were not adequately addressed.

B. The accident investigation gathers and interprets information to help managers understand how and why an accident or incident occurred. Recommendations can then be developed for corrective actions that will mitigate hazards and prevent future injuries and property damage.

C. An investigation must be done promptly to assure that important information is not lost, misplaced, or contaminated. The agency's first priority is to aid the injured and to ensure prompt emergency medical attention. As soon as the emergency situation is over, the accident investigation begins.

D. An accident is an unplanned event involving Forest Service employees, volunteers, cooperators, contractors, emergency firefighters, special program enrollees, property, or the environment that results in an injury, illness, or material loss (chapter 6732.1 of FSM 6700).

E. An aviation accident is an occurrence associated with the operation of an aircraft that takes place between the time any person boards an aircraft with the intention of flight until all such persons have disembarked or before equipment has been unloaded.

1.2 Authority

The authority for the investigation of accidents is established in:
- Public Law 107–203
- Title 5, USC 7902
- 29 CFR 1904.2
- 41 CFR 101-37
- 49 CFR 830 NTSB
- Executive Order 12196
- FSM 5700, Aviation Management, Chapter 5720
- FSM 6700, Safety and Health Program, Chapter 6732.1

1.3 Purpose

The purpose of accident investigations is to provide management with information for accident prevention. The *Accident Investigation Guide* details information on the investigative process and associated tasks, such as gathering and maintaining custody of physical and photographic evidence, documenting witness statements, interviewing witnesses, managing records, preparing the investigation report (factual and management evaluation sections), and conducting accident review boards. The guide also includes the investigation protocol for wildland fire shelter entrapments, deployments, and fatalities, and aviation accidents and incidents with potential. Because the guide is revised as needed, it is important to use the most current version.

A compact disk (CD) also is included with the guide. All exhibits that may be necessary for accident investigation teams and accident review boards are provided as Microsoft Word documents.

1.4 Scope

A. The Accident Investigation Guide is designed for Washington Office Forest Service Chief's investigation teams, but region and station investigations should also follow the guide for consistency. A Chief's investigation team may also be mobilized anytime the Designated Agency Safety and Health Official (DASHO) believes an investigation is warranted, for example, an "incident with potential."

The DASHO may also delegate responsibility to conduct the investigation to the regional forester or station director in the region where the accident occurred. In these cases, the DASHO will provide a letter of delegation of authority assigning the responsibility. In these situations, the DASHO may appoint at least one member to the investigation team. The procedures outlined in this guide will be used to conduct delegated investigations.

The process in the guide should also be used—entirely or in part—for all accident and incident investigations conducted at any unit level by individuals working under the direction and authority of the Forest Service. For example, while specific required procedures for motor vehicle accident investigations are outlined in the Manual on Uniform Traffic Control Devices, applicable information on conducting witness interviews and collecting evidence is available in this guide.

B. Multi-agency/Interagency Investigations. With the advent of All-Hazards Incident Management, Forest Service employees, equipment, and contract resources are now working in unfamiliar environments, such as hurricanes, floods, and biological hazard areas, in addition to wildland firefighting. National emergencies may be longlasting events that may require rotation of personnel and other resources. Many of these incidents also involve other Federal, State, county and municipal agencies. When accidents occur during these activities, it will be necessary to conduct multi-agency investigations where cooperation between agencies is paramount.

The team leader should establish cooperative relationships with the other agencies involved in the investigation to ensure that the Forest Service meets its responsibilities while recognizing each agency's need to fulfill theirs. This may involve negotiations, cooperative agreements, and coordination with the agency official who signed the delegation of authority, for example, a *Memorandum of Understanding* between the U.S. Department of the Interior (USDI) and the U.S. Department of Agriculture (USDA), to establish the basis for interagency investigations of serious fire-related accidents (exhibit 8–3).

During these types of investigations, a broader range of technical specialists than is typically used in Forest Service activities may be needed to assess risks to involved personnel or to provide the skill level needed to conduct the investigations.

C. A Forest Service firefighter fatality as a result of a burnover or entrapment requires the USDA Office of Inspector General to conduct an independent investigation. That investigation shall be independent of the Forest Service investigation (Public Law 107–203).

D. Aviation accidents and incidents with potential (mishaps) are investigated in accordance with chapter 9 and FSM 5700, chapter 5720. Smokejumping and helicopter rappelling are considered Forest Service aviation accidents if they occur before the employee has safely disembarked from the aircraft or before equipment has been unloaded.

E. The National Transportation Safety Board (NTSB) has the responsibility to investigate all Forest Service aviation accidents and certain incidents with potential (mishaps). This results in special interagency working relationships, policies, and procedures when conducting aviation accident investigations.

The NTSB will appoint an investigator in charge (IIC) to perform the NTSB factual investigation. The investigation process and direction is under the authority of the IIC. The IIC will conduct the NTSB investigation in one of the following ways:

- The IIC conducts the onsite investigation. When the IIC conducts the onsite investigation, the Qualified Technical Investigator (QTI) assists the IIC as requested in the collection of data to support the NTSB factual investigation.
- The IIC delegates the onsite investigation to the Federal Aviation Administration (FAA). When the FAA conducts the onsite investigation, they do so with the full authority of the NTSB. The QTI will be the liaison with the FAA onsite investigator and the Forest Service.
- The IIC delegates the onsite investigation to the Forest Service. When neither the NTSB nor the FAA conduct the onsite investigation, the QTI will conduct the onsite investigation and provide all data collected to the IIC.

In addition, the Forest Service investigation team will conduct their investigation of Forest Service management and policy issues following this investigation guide concurrent with the NTSB investigation.

F. Collateral Investigations. Collateral investigations are conducted independently of the accident or incident investigation and record the facts for litigation, claims, and other administrative or disciplinary actions.

1.5 Investigation Team Selection

1.4
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1.6

For Washington Office-level accident investigations, the deputy chief for business operations, who serves as the DASHO, shall notify the appropriate regional forester or station director that a Chief's level investigation has been authorized and whether it will be conducted by a national level team or delegated to the region, station, or area.

1.6 Composition of the Investigation Team

The investigation team normally includes: a team leader, chief investigator, safety manager, technical specialist(s), a documentation specialist, a union representative, and a law enforcement representative. For aviation investigations, a qualified technical investigator (QTI) has the same duties as a chief investigator. Other team members may be added as needed (exhibit 1–1). The team leader, chief investigator or QTI, and all team members should be recruited from outside of the unit experiencing the accident. For fire-related investigations, investigators and technical specialists may need certification that addresses red-card requirements for unescorted investigation site visits. A delegation of authority memorandum documents the official appointment of the team leader (exhibit 1–2).

Duties and responsibilities of team members:

A. Team Leader. The team leader is normally a line officer or higher-level agency official and is selected based on the severity of the accident and the level of management representation

needed. The team leader must be knowledgeable of Forest Service policy and should be appointed from outside of the region, forest, or unit that incurred the accident.

1. Qualifications. Senior management official (senior executive service level) for Washington Office investigations; Regional Office director or forest supervisor for regional office investigations.

2. Duties and Responsibilities.

   a. Organizes, conducts, and controls the Forest Service investigation effort and provides support to team activities with the assistance of the chief investigator or QTI.

   b. Establishes cooperative working relationships with other Federal, State, county, and municipal agencies involved in the investigation.

   c. Contacts the unit that had the accident to determine the status of the local investigation in progress and to obtain other pertinent information.

   d. Coordinates Critical Incident Stress Management/Critical Incident Stress Debriefing (CISM/CISD) activities planned by the unit to ensure investigation integrity is maintained while meeting the needs of affected individuals.

   e. Provides briefings for affected personnel, agency officials, and the public.

   f. Conducts investigation team meetings and coordinates information exchange between team members.

   g. Maintains liaison with regions, stations, areas, labs, forests, units, and the Washington Office.

   h. Approves requests for resources from the chief investigator and approves team members for the investigation or for release from the investigation. A team leader investigation checklist (exhibit 1–3) is provided at the end of chapter 1. It is designed to help the team leader identify other individuals who are key to the investigation.

   i. Forwards the expanded briefing to the safety manager at the organizational level that authorized the investigation. This briefing is prepared by the investigation team within 72 hours of the team's arrival (exhibit 1–5). The preliminary briefing is prepared by the home unit (unit where the accident occurs) within 24 hours after the accident has occurred (exhibit 1–4). The unit is responsible for forwarding it to the safety manager at the organizational level that authorized the investigation.

   j. Arranges local transportation, obtains a suitable local workplace, provides for the safety of the team, and ensures the security of the meeting place and the information gathered during the investigation.

   k. Arranges critical incident stress debriefing for investigation team members as needed.

   l. Coordinates with the unit information officer for all media releases. For aviation, the team leader coordinates with the NTSB before the release of information to the public.

   m. Forwards the draft factual and management evaluation sections of the investigation report to the safety manager at the organizational level that authorized the investigation.

   n. With the assistance of the chief investigator or QTI, conducts the closeout meeting for the agency administrator (the authorized official on the unit where the accident occurred) to provide information on the status of the investigation (exhibit 1–6).

   o. Helps prepare and presents the draft factual and management evaluation sections of the investigation report to the authority authorizing the investigation and to the Accident Review Board.

   p. Coordinates with the appropriate Forest Service human resources office to address death benefits, occupational workers' compensation program issues, and requirements of the public safety officers' benefit program for survivors of firefighters or law enforcement officers killed in the line of duty. Firefighter and law enforcement beneficiaries will receive a death benefit only if an autopsy is completed. The team leader should ensure that the medical examiner has a copy of FA-156 Firefighter Autopsy Protocol.

   q. The team leader should always attempt to have autopsies conducted. If an autopsy is not planned, determine whether the family would agree to one if the information gained would benefit the investigation.

   r. If information is discovered that suggests an administrative or criminal review is needed, the team leader will advise the DASHO, who will determine what further actions are required.

B. Chief Investigator. The chief investigator is responsible for the direct management of the technical investigation activities other than those associated with aviation accidents.

1. Qualifications. Satisfactorily completed a serious accident investigation course and served as a team member on an accident investigation team. For Washington Office ground investigations, the chief investigator shall be selected and assigned to the investigation by the DASHO.

2. Duties and Responsibilities

a. Directs investigations by providing information and guidance to the team leader.

b. Requests, manages, and supervises the technical specialists and documentation specialist based on the technical complexity of the investigation.

c. Ensures that the investigation addresses pertinent safety issues and concerns.

d. Ensures security and control of the accident site.

e. Recommends that the team leader release technical specialists assigned to the investigation when their services are no longer required.

f. Drafts the expanded briefing, and factual and management evaluation sections of the investigation report.

g. Completes the Human Factors Accident and Incident Analysis (exhibit 2–2).

h. Ensures coordination with local law enforcement, the coroner's office, CISD/CISM team leader, and others, as required.

i. Requests that drug testing, autopsies, medical reports, and other appropriate tests are conducted when required.

j. Assists the team leader in presenting the factual section of the investigation report to the authority authorizing the investigation.

k. Takes possession of and maintains all relevant Forest Service and contractor records for the case file.

l. Serves as spokesperson in conjunction with the team leader and unit information officer for all media releases.

C. Qualified Technical Investigator (QTI). The qualified technical investigator is responsible for the direct management of the technical investigation activities for aviation accidents.

1. Qualifications.

a. Must meet the requirements in 41 CFR 101–37.

b. Completion of a Washington Office-approved aviation accident investigation related course within the previous 5 years.

c. Participation in an investigation of an aviation accident or incident with potential within the previous 5 years.

d. Attendance at a Washington Office-sponsored accident investigation workshop within the previous 2 years.

e. Proven ability to communicate effectively and work in a team environment.

f. Must have experience in at least one of the following areas:
- Aviation program management
- Aviation safety management
- Aviation operations, fixed-wing or rotor-craft
- Aircraft maintenance

2. Duties and Responsibilities.

a. By formal designation from the NTSB, serves as the Forest Service representative as a member in the factual investigation conducted by the NTSB. Ensures that a NTSB transmittal letter is completed (exhibit 9–1).

b. Serves as the liaison between the NTSB investigator in charge and Forest Service team leader.

c. Provides technical expertise, knowledge of procedures, operating practices, qualifications, and policies of aviation management.

d. Ensures that a SAFECOM (safety communiqué) is prepared and forwarded through established channels.

e. Coordinates issuing safety alerts through the national aviation safety and training manager.

f. Completes the NTSB form 6120.1/2, Pilot/Operator Aircraft Accident Report within 10 days, or within 7 days after an aircraft is overdue and still missing.

g. Obtains the pilot's agency issued qualification card and submits it to the Regional Aviation Officer, as appropriate.

h. Completes the Aviation Human Factors Analysis (exhibit 9–2).

i. Assigns tasks, organizes, and directs technical team members.

j. Coordinates release of wreckage with the NTSB through the appropriate contract officer.

D. Safety Manager. The safety manager is a safety and occupational health professional responsible for advising the team on safety issues pertinent to the investigation in accordance with the U.S. Department of Labor Occupational Safety and Health Administration (OSHA) and Forest Service policies.

1. Qualifications. Safety and occupational health professional skilled in accident investigation. Has satisfactorily completed an accident investigation course.

2. Duties and Responsibilities.

   a. Advises the team on the conduct of the investigation to ensure compliance with OSHA and Forest Service requirements.

   b. Ensures a job hazard analysis (JHA) is completed for the investigation team's operations and activities (exhibit 1–7).

   c. Ensures team members have the necessary training (such as L-180, Human Factors) for any activity they will be performing.

   d. Ensures team members use the required personal protective clothing (PPE) and equipment as prescribed by the JHA.

E. Technical Specialists (as needed). Technical specialists, such as fire equipment specialists, contracting officers, and human factors specialists, have skills needed to support the accident investigation.

1. Qualifications. Possess technical skills in the specialty required to support the investigation effort.

2. Duties and Responsibilities. Works directly for the chief investigator or QTI providing technical support for the investigation until released by the team leader.

F. Documentation Specialist. The documentation specialist provides document management support.

1. Qualifications. Skilled in word processing and records management.

2. Duties and Responsibilities.

   a. Works directly for the chief investigator or QTI to provide document management support to the investigation until released by the team leader.

   b. Maintains the original case file.

   c. Prepares the draft/final factual section and the draft management evaluation section.

G. National Federation of Federal Employees (NFFE) representative. A Forest Service employee who has been designated by the appropriate NFFE official as the union representative to serve as an investigation team member, in compliance with article 27 of the master agreement between the Forest Service and NFFE.

1. Qualifications. Serves as NFFE representative as defined in the master agreement between the Forest Service and NFFE.

2. Duties and Responsibilities. Works for the chief investigator or QTI and provides technical support until released by the team leader.

H. Law enforcement and investigation representative (LEI). A Forest Service law enforcement official who is selected by the Washington Office Director of Law Enforcement.

1. Qualifications. A Forest Service employee who has the specialized technical investigative expertise and skills to perform investigations.

2. Duties and Responsibilities.

   a. Works with the team leader to provide law enforcement assistance and support as appropriate.

   b. Provides appropriate local law enforcement notifications; secures sites, physical evidence, and property; establishes the evidence log and chain-of-custody log; secures the likely point of origin in fire fatality investigation; and requests toxicology reports and autopsies, requested by the chief investigator or QTI.

   c. Ensures all evidence collected by the investigation team is safeguarded and the chain-of-custody is maintained.

I. Writer/editor. During more complex investigations it may be necessary to have a writer/editor to assist in the drafting and completion of the factual and management evaluation sections of the investigation report. The team leader can request this assistance from the authorizing official.

1.7 Investigation Sequence

A. Before team arrival. Many activities should occur at the unit experiencing the accident while the team is traveling. The team leader should ensure, with the unit line officer, that the following actions are underway while the team is being formed and traveling to the site.

- Initiating rescue and medical assistance.
- Securing the site.
- Requesting an autopsy.
- Identifying witnesses.
- Setting up administrative support for the team.
- Collecting and preserving evidence.

Exhibit 1–8 provides more detail on these actions and should be faxed or e-mailed to the unit as soon as possible.

B. Initial briefing with the agency administrator. Soon after the team arrives at the accident location, the group should hold a formal inbriefing with the agency administrator to get an overview of the activities that have occurred before their arrival, such as CISD/CISM activities. All records and information that have been gathered should be transferred to the team at this time. Compile a list of all personnel involved and their telephone numbers. Establish a team workplace, assign a forest/station liaison, obtain clerical support, determine transportation needs, and whether a public information officer is available. NOTE: Ensure that the agency administrator understands the role of the investigation team and the need to maintain the confidentiality of the team's actions and findings.

C. Initial team meeting. The team leader and chief investigator (or QTI) need to meet with the team soon after arrival to establish the structure of the team:

- Who are designated members, and who are designated support personnel?
- What skills and expertise does each member possess?
- Is additional technical or administrative assistance needed?

The chief investigator will explain investigation procedures, and make team assignments based on information needed and the expertise of the team members.

D. Accident site visit. Once the team reaches the accident location, going to the accident site is recommended, but not a priority if the accident site has been secured and protected by law enforcement. The chief investigator or QTI should coordinate all accident site visits with any other agencies assigned to investigate the accident and those who have jurisdictional responsibilities for the accident site.

At the site, the chief investigator or QTI will establish:
- What main tasks need to be completed.
- Order in which tasks should be done.
- Who will do the tasks?
- Whether the team has the right PPE.
- The extent of the site.
- Whether the site is secure.
- Initial description and mapping of the site.
- Photographs of everything before it is touched.
- Collection of evidence.
- Logging of evidence and photographs.

E. Interviews and evidence collection. After the onsite visit, the chief investigator will determine which individuals need to be interviewed and what human, material, and environmental evidence needs to be collected. Chapter 3 and 4 discuss these tasks in more detail.

F. Daily team meetings. The team leader and the chief investigator (or QTI) will schedule daily team meetings, usually one in the morning and one in the evening. Items to cover include:

1. Priorities
2. Specific team assignments
3. Review of daily findings:
   —Compare notes, establish facts, and the chronology of events as evidence is gathered. Discuss preliminary findings (list) and highlight areas of concern.
   —Identify and document additional items needed and prioritize assignments.

G. Develop findings and recommendations.

- Develop a findings list based on the chronology of events and factual data gathered during the investigation. Findings are based on facts or conditions that are material to the accident.
- Determine which findings support causal factors and which findings support contributing factors to the accident.
- Develop preliminary recommendations. Team participation in this process is important. Each item should be discussed thoroughly.

1.8 Investigation Briefings and Report

A. Preliminary (24-Hour) Briefing. This document, prepared by the unit where the accident occurs, contains the first details of the accident. Within 24 hours of the accident, the briefing is transmitted by the unit to the safety manager, at the organizational level that authorized the investigation and to the Washington Office, Office of Safety and Occupational Health (exhibit 1–4). It has preliminary factual information about the accident and may contain preventive measures or recommendations of an emergency nature. This information does not necessarily become part of the factual section, but is retained as part of the case file.

B. Expanded (72-Hour) Briefing. This document contains a brief narrative of the accident based on factual information gathered at the accident site. The chief investigator or QTI drafts it within 72 hours after the team arrives at the site and the document is released under the signature of the team leader (exhibit 1–5). The team leader sends the expanded briefing to the safety manager at the organizational level that authorized the investigation and to the Washington Office, Office of Safety and Occupational Health. This information does not necessarily become part of the factual section, but is retained as part of the case file.

C. Safety Alert. A safety alert is needed when the investigation has identified a failure in a piece of equipment or a faulty policy or procedure that could lead to an accident before the investigation report is complete (exhibit 1–9). Proposed safety alerts will be submitted to the Washington Office, Office of Safety and Occupational Health for distribution. For aviation accidents, an aviation safety alert (exhibit 1–10) will be issued through the national aviation safety and training manager. For fire operations accidents, a National Wildfire Coordinating Group (NWCG) safety warning will be issued through the Forest Service National Fire Operations safety officer.

D. Accident Investigation Report

1. Factual Section. This section of the investigation report contains the facts involving the accident. The team leader will forward the draft factual section under signature of the chairperson by a letter of transmittal (exhibit 6–1) within 45 calendar days of the accident to the safety manager at the organizational level authorizing the investigation (the approving official). Extensions beyond this deadline need to be requested by the team leader and approved by the official authorizing the investigation. The section cover will be labeled DRAFT—FOR OFFICIAL USE ONLY, and will remain a draft until accepted by the organizational level authorizing the investigation (the approving official) as outlined in chapters 7 and 9. For additional information on the factual and the management evaluation sections, refer to chapter 6. The accident investigation report format is in chapter 6.1 General, C., Formatting Guidelines. For aviation, also refer to the accident investigation template (exhibit 9–3).

2. Management Evaluation Section. This section of the investigation report contains an executive summary and recommendations to prevent similar accidents. The team leader will forward the draft management evaluation section under signature of the chairperson by a letter of transmittal (exhibit 6–1) within 45 days of the accident to the safety manager at the organizational level authorizing the investigation (the approving official). Extensions beyond this deadline need to be requested by the team leader and approved by the official authorizing the investigation. The section will be labeled DRAFT—FOR OFFICIAL USE ONLY, and will remain a draft until it is approved by the organizational level authorizing the investigation (the approving official) as outlined in chapter 7.

E. Closeout briefing with Agency Administrator. This briefing, conducted by the team leader with the assistance of the chief investigator or QTI, provides information on the status of the investigation (including the timelines) to the agency administrator (exhibit 1–6).

1.9 Report Use

Information collected and developed during the course of an accident investigation is for accident prevention purposes.

Except for factual data, this information is not intended to be used for purposes such as:

- Evidence (or to obtain evidence) to determine civil/criminal misconduct of agency personnel
- Evidence to determine the disciplinary responsibility of agency personnel
- Evidence to assert affirmative claims on behalf of the Government
- Evidence to determine the liability of the Government
- Evidence before administrative bodies
- Punitive or administrative action taken by agencies of the United States

EXHIBIT 1–1

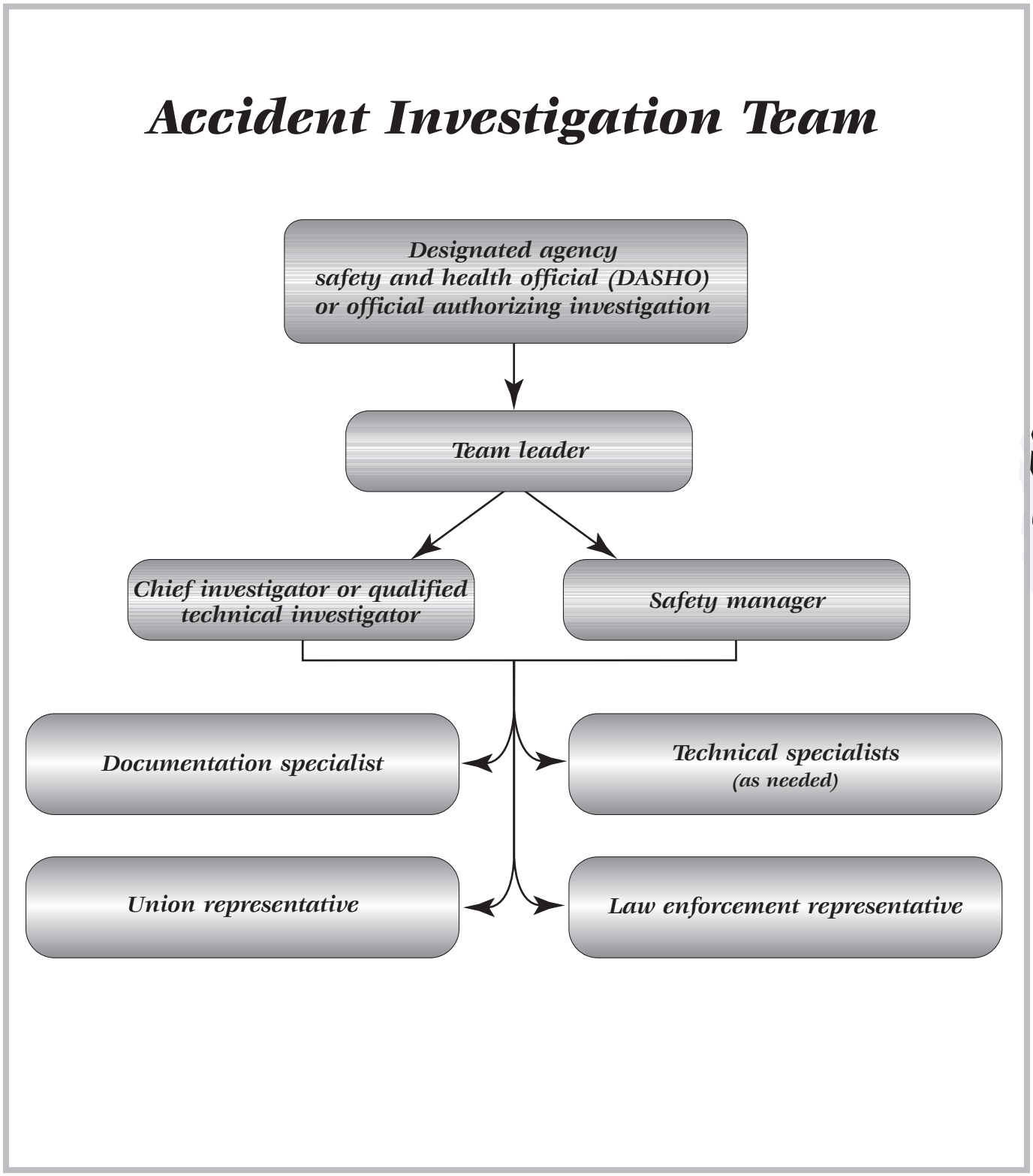

Exhibit 1–1—The ground and aviation accident investigation team's organizational chart.

EXHIBIT 1–2

United States Department of Agriculture | Forest Service | Washington Office | 1400 Independence Ave. SW. P.O. Box 96090 Washington, DC 20250

File code: 6730 Date:
Route to:

Subject: Delegation of Authority

To: (Investigation team leader)

This memorandum formalizes your appointment as team leader of the Chief's office accident investigation team formed to investigate the ___fatality that occurred near___, on___. As team leader, you have full authority of the Chief to execute and complete a thorough accident investigation. Your authority includes, but is not limited to:

- Controlling, organizing, managing, and directing the investigation.
- Authorizing and requesting additional personnel, including technical specialists, to support the investigation team, and releasing them upon completion of assigned duties.
- Authorizing and coordinating the expenditure of appropriated funds.
- Coordinating all media releases about the investigation.

Using the Accident Investigation Guide: (most current edition), your investigation team will systematically investigate the circumstances related to the accident. Your team should produce the 72-hour briefing of the investigation status and the final report with factual and management evaluation sections within 45 calendar days from arrival at the accident scene. An extension may be granted based on valid justification.

The following individuals are assigned to your investigation team: (___names___)

All travel-associated costs related to this investigation should be charged to (___job code___) with an override code of (___).

For additional information, please contact Dick King, Office of Safety and Occupational Health, phone: 202–401–4470, or e-mail: *dickking@fs.fed.us*.

/s/ (Name)
(Name)
Designated Safety and Health Official

cc: (Name)

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Exhibit 1–2

Exhibit 1–2—The accident investigation team leader's delegation of authority.

EXHIBIT 1–3

TEAM LEADERS' INVESTIGATION CHECKLIST

❑ Accident or incident name:_____

❑ Location:_____

❑ Date of accident/incident:_____

❑ Brief description of accident/incident:_____

_____

_____

_____

_____

❑ Co-led or agency-led investigation—delegation of authority memo

Name:_____ Phone number:_____

❑ Agency administrator:_____

❑ Team leader:_____

❑ Chief investigator or qualified technical investigator:_____

❑ Safety manager/advisor:_____

❑ Technical specialists:_____

❑ Other investigation team member considerations—Office of Communications, finance, documentation, logistics, Office of the General Counsel, U.S. Department of Agriculture, cultural representative):

❑ Office of the Inspector General:_____

❑ OSHA representative:_____

Transportation

❑ Method: (aircraft/vehicle arrangements)

❑ Final destination/map:_____

❑ Team meeting location:_____

❑ Estimated time of arrival:_____

❑ Opening meeting date/time:_____

❑ Transportation needs at incident:_____

_____

Lodging

❑ Name:_____

❑ Location:_____

❑ Reservations:_____

Resource Needs

❑ Forest Service *Accident Investigation Guide* (most current edition)

❑ FS–6700–29 Report Guide

❑ Laptop computers with extra disks

❑ Cell phones and list of key phone numbers

❑ Programmable hand-held radios with batteries

❑ Camera (35-mm, with extra film, 400 ASA film/ batteries) and digital camera (3 to 4 megapixels)

❑ VHS video camera with blank tape

❑ Fire shirt and pants

❑ Laced boots, 8 inches high

❑ Hardhat

❑ Fire shelter

❑ Other needs:

Exhibit 1–3

Exhibit 1–3—Team leaders' investigation checklist.

EXHIBIT 1–4

United States Department of Agriculture | Forest Service | Washington Office | 1400 Independence Ave. SW. P.O. Box 96090 Washington, DC 20250

File code: 6730 Date:
Route to:

Subject: Preliminary (24-hour—after the accident) Briefing

To: (Official authorizing the investigation)

THE FOLLOWING INFORMATION IS PRELIMINARY AND SUBJECT TO CHANGE

Location:

Date of occurrence:

Time of occurrence:

Team leader:

Mission:

Activity:

Number injured:

Number of fatalities:

Property damage (such as to vessels, equipment, and structures):

Narrative:

cc:
Safety Manager (at the level authorizing the investigation)

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Exhibit 1–4

Exhibit 1–4—Preliminary (24-hour—after the accident) briefing.

EXHIBIT 1–5

United States Department of Agriculture | Forest Service | Washington Office | 1400 Independence Ave. SW. P.O. Box 96090 Washington, DC 20250

File code: 6730 Date:
Route to:

Subject: Expanded (72-hour—after the team arrives) Briefing
(Location of accident)
(Date of accident)

To: (Official authorizing the investigation)

THE FOLLOWING INFORMATION IS PRELIMINARY AND SUBJECT TO CHANGE

Name of injured or deceased (if the next of kin have been notified):

Preliminary factual findings:

Narrative:

/s/ Team leader

cc:
Safety Manager (at the level authorizing the investigation)

Caring for the Land and Serving People

Exhibit 1–5

Exhibit 1–5—Expanded (72-hour—after the team arrives) briefing.

EXHIBIT 1–6

Guidelines for the Closeout Meeting with the Agency Administrator

- Reemphasize that the purpose of the investigation, the accident investigation report, and the supporting materials are for accident prevention purposes.
- Review the accident's sequence of events and the team's determination of causal and contributing factors.
- Remind the agency administrator that this information is subject to review and approval by the Accident Review Board.
- Describe the process and the timeline for the remainder of the investigation process. Reports usually take the full 45 calendar days to complete before the accident review board process begins. In more complex investigations, more time may be needed for the investigation process. Extensions may be requested.
- Let the agency administrator know that they will be notified of any changes in the timeline.
- Do not discuss disciplinary actions. A separate investigation would have to be initiated to determine if any disciplinary actions are appropriate. Expressing your opinion in these matters should be handled very carefully.
- Recognize any outstanding support that you received from the unit or local agencies during the investigation.
- Let the agency administrator know that if they have any additional questions or need support, they can contact you for assistance.

Exhibit 1–6—Guidelines for the closeout meeting with the agency administrator.

EXHIBIT 1–7

U.S. Department of Agriculture Forest Service	1. Work Project/Activity Accident Investigation	2. Location	3. Unit NF/Station
Job Hazard Analysis (JHA) Reference-FSH 6709.11 and 12 (Instructions on Reverse)	**4. Name of Analyst**	**5. Job Title**	**6. Date**
7. Tasks / Procedures	8. Hazards	9. Abatement Actions	
Motorized Vehicle		**Qualifications**. All Forest Service employees who operate Government vehicles (or private vehicles used on official duty) shall hold a valid State driver's license with the proper endorsements for the size and class being driven and a Forest Service-issued identification card indicating the type of vehicle or equipment the operator is authorized and qualified to operate (FSM 7134.1). **Training**. Defensive driving training is required for all Forest Service employees who drive Government or private vehicles on official duty. Drivers must attend a Forest Service or National Safety Council or equivalent defensive driving course at least every 3 years.	
	Fatigue Particulates (dust) Weather Insects and animals Walking surfaces Smoky conditions	Employees shall not operate a motor vehicle while under the influence of alcohol and drugs nor while sick or suffering from excessive fatigue or emotional stress. **Drivers/Operators**. Drivers/operators have the responsibility to: Inform their supervisors of any physical, mental, or emotional condition that might impair their ability to safely drive a motorized vehicle or operate machinery. Know and observe all State and local traffic regulations.	

Exhibit 1–7—Job hazard analysis.

(Continued)

Exhibit 1–7

EXHIBIT 1–7 *(continued)*

U.S. Department of Agriculture Forest Service	1. Work Project/Activity Accident Investigation	2. Location	3. Unit NF/Station
		Observe the "Circle of Safety" rule. Walk around the vehicle. Check the windshield, wipers, and wiper fluid level. Adjust mirrors. Drive safely while operating the vehicle within its mechanical limits. Always wear your safety belt(s). The vehicle operator shall ensure passengers also wear safety belts. Monitor vehicle performance when driving. Inspect a vehicle after use. Correct or report problems before a vehicle is used again. Do not compromise your safety, the safety of your passengers, or public safety when driving. Pull off the road for a break or to change drivers if you experience any of these warning signs: Vehicle begins to feel too warm. Drowsiness, especially after meals. Eyestrain. Inattention, daydreaming.	

Exhibit 1–7—Job hazard analysis.

(Continued)

EXHIBIT 1–7 *(continued)*

U.S. Department of Agriculture Forest Service	1. Work Project/Activity Accident Investigation	2. Location	3. Unit NF/Station
		Work/rest guidelines. Vehicle operators must comply with these work/rest guidelines. Operate a vehicle: Only if you have had at least 8 consecutive hours off duty before beginning a shift. No more than 2 hours without a rest stop. **Equipment.** Ensure that Government vehicles are equipped with: Safety belts for all passengers. Refer to 49 CFR 392.9 for exception of bus passengers. Warning markers or reflectors and flashlight. First aid kit. The standard first aid kit in all Government vehicles must contain two packets of the standard protective equipment (rubber gloves, face masks, eye protection, and cardiopulmonary resuscitation (CPR) clear-mouth barrier). Fire extinguishers. **Defensive driving techniques.** Drive slowly and use transmission gearing, engine compression, and gravity to slow the vehicle as it travels uphill. Conversely, use engine compression and gearing on downhill grades. Do not use cell phones while driving. Have a passenger answer

Exhibit 1–7—Job hazard analysis.

(Continued)

EXHIBIT 1–7 (continued)

U.S. Department of Agriculture Forest Service	1. Work Project/Activity Accident Investigation	2. Location	3. Unit NF/Station
		the phone for you or pull off to side of the road. Keep right. Drive as far to the right as possible without driving on the shoulder. **Special hazards while driving on Forest Service roads.** Road width. Roads with narrow driving surfaces, roads classified as single-lane with turnouts, and roads with few places to park or turn around. Surface. A variety of road surfaces, including those that may be affected by weather. Sight distance. Sight distance that may be limited by adverse weather, blind curves, foliage, dust, smoke, and ambient light.	
Helicopter	Flying objects Particulates (dust) Noise	Get a safety briefing from Helitack managers prior to assignment.	
		Equipment. Flight suits or fire nomex shirts and pants, helmets or hardhats, leather or nomex flight gloves, and hearing protection.	
Walking and Hiking			
	Falling objects Walking surfaces Fatigue	**Safety practices**. Slips, trips, and falls are the leading causes of field and office accidents and injuries.	

Exhibit 1–7—Job hazard analysis.

(Continued)

EXHIBIT 1–7 (continued)

U.S. Department of Agriculture Forest Service	1. Work Project/Activity Accident Investigation	2. Location	3. Unit NF/Station
	Weather Insects and animals Poisonous plants	**General requirement**. Wear shoes with slip-resistant heels and soles with firm, flexible support. **Specific requirement**. For fire-related activities, wear all-leather, lace-up, 8-inch tall (minimum) boots. When hiking in the field, boots and a hardhat are required. Watch footing, look for tripping hazards, maintain balance. Be alert for snags and notify others of snag locations. Take breaks at regular intervals to prevent fatigue. Use sunscreen to protect against sunburn. Be alert for poisonous plants, such as poison oak or ivy. If exposed, wash affected areas and wash clothing. Be alert for poisonous insects and animals.	
Field Investigation Activities			
	Falling objects Walking surfaces Fatigue Particulates (dust) Weather Temperature Insects and animals Diseases Poisonous plants	Required PPE. Hardhat Leather work boots Leather gloves Nomex shirt and pants (for fire-related accidents) Fire shelter (for fire-related accidents) Eye protection/goggles	

Exhibit 1–7—Job hazard analysis.

(Continued)

Exhibit 1–7

EXHIBIT 1–7 *(continued)*

U.S. Department of Agriculture Forest Service	1. Work Project/Activity Accident Investigation	2. Location	3. Unit NF/Station
		Daily briefings by the team leader, chief investigator, and safety manager will outline tasks to be accomplished and the required safety procedures. Manage fatigue, take breaks as appropriate, allow for adequate rest. Eat well-balanced meals and drink plenty of fluids. Check clothing for ticks during and after each shift. Be alert for snakes.	
Security		**Security procedures.** Establish building evacuation procedures for work area being utilized, make sure all employees are aware of exits and safety meeting area. Inform team members of the process to report any accidents or injuries. Provide all team members with incident emergency phone numbers and the process to follow for rapid notification in the event of an emergency. Check-out/check-in systems (such as a sign out board) shall be located and utilized for team use. Advise the appropriate person(s) on the accident investigation team of travel plans with expected times of arrival and return when traveling to and from the investigation site or isolated locations. Ensure vehicles are operating properly and are	

Exhibit 1–7—Job hazard analysis.

(Continued)

EXHIBIT 1–7 *(continued)*

U.S. Department of Agriculture Forest Service	1. Work Project/Activity Accident Investigation	2. Location	3. Unit NF/Station
		equipped for the specific task. Travel in pairs where warranted. Ensure that communications equipment is operating properly and replacement batteries are available for hand-held radios.	
Bloodborne Pathogen Program		**Training**. All employees shall receive general HIV/AIDS education training. For employees whose jobs put them at risk for an occupational exposure, training shall cover the major elements of the OSHA bloodborne pathogens regulation.	
	Diseases	To further minimize employee risk, all employees, regardless of job classification or duties, shall observe universal precautions at all times. Observing universal precautions is an approach to infection control in which human blood and human body fluids are treated as if known to be infectious for HIV, HBV, or other bloodborne pathogens.	
Hot Conditions			
	Fatigue Weather	**Working in hot conditions**. Individual differences in heat tolerance are related to fitness, hydration, illness, drugs and medication, and fatigue. Heat stress occurs when the body's core temperature rises beyond safe limits. Evaporation of sweat is the body's main line of defense against heat. As sweat evaporates, it cools the body. When water lost by sweating is not replaced, the body's heat controls break down and body temperature climbs dangerously. Three factors that can contribute to heat stress are low or poor physical fitness, excess weight, and hypertension.	

Exhibit 1–7—Job hazard analysis.

(Continued)

Exhibit 1–7

EXHIBIT 1–7 *(continued)*

U.S. Department of Agriculture Forest Service	1. Work Project/Activity Accident Investigation	2. Location	3. Unit NF/Station
		Schedule the hardest work during the cooler hours of the day. Set a moderate work pace. As the temperature increases, stop for frequent rest periods of at least 15 minutes. Always have an adequate supply of water available and ensure that employees are getting needed liquids. Plan ahead for drinking water; don't allow water supplies to run out. To prevent dehydration: Drink 8 to 16 ounces of water before work. Take frequent drinks during each hour of work (1 quart or 1 liter per hour). Drink as much water as possible at lunch and the evening meal. Continue replacing fluids throughout the evening. Limit caffeine drinks, such as coffee or cola. Avoid alcoholic drinks. Provide well-planned meals and healthy snacks that are vital to maintain work capacity and to avoid heat disorders through adequate replacement of water, salt, and potassium. Carbohydrate/electrolyte beverages are recommended.	

Exhibit 1–7—Job hazard analysis.

(Continued)

EXHIBIT 1–7 *(continued)*

U.S. Department of Agriculture Forest Service	1. Work Project/Activity Accident Investigation	2. Location	3. Unit NF/Station
		Wear hardhats; they protect your head and keep you cooler. Prevent sunburn by wearing lightweight, light-colored, loose clothing, which allows air to circulate and sweat to evaporate, and offers protection from direct sun. Bare skin absorbs the sun's radiant heat and raises body temperature. During periods of continued extreme temperatures (90 °F or above), ensure that supervisors monitor employees and that employees watch each other for signs of heat-stress disorders, including heat cramps, heat exhaustion, and heatstroke. Heat cramps are identified by muscular pains and cramps, with leg and abdominal muscles usually affected first. Remedies include stretching and gently massaging cramped muscles and applying a heating pad or hot water bottle to help relieve muscle spasms. Heat exhaustion is characterized by fatigue, weakness, and collapse. The skin becomes pale, cool, and clammy. Individuals experience nausea, dizziness, a throbbing headache, breathing problems, and diarrhea. Recommended actions include moving to a cool, shady place, lying with the feet raised 8 to 12 inches above the head, loosening clothing, and applying cool compresses to the skin. If there is no improvement quickly, seek medical attention at once.	

Exhibit 1–7—Job hazard analysis.

(Continued)

EXHIBIT 1–7 (continued)

U.S. Department of Agriculture Forest Service	1. Work Project/Activity Accident Investigation	2. Location	3. Unit NF/Station
		Heatstroke is a medical emergency. Unaclimatized employees are especially prone to heatstroke. Symptoms are confusion, high body temperature, hot (often dry) skin, rapid pulse, convulsions, loss of consciousness, and coma. Lack of sweating is one sign of imminent heatstroke. Do not delay treatment. Cool the body down immediately. Administer fluids and transport the victim to a medical facility as quickly as possible.	
Lightning and Thunderstorms			
	Other physical hazard: Lightning striking employees	**Lightning and thunderstorms.** Heavy rain, hail, and lightning occur only in the mature stage of a thunderstorm. Keep informed; know what the storm is doing. When there is no shelter, avoid tall objects such as lone trees. If only isolated trees are nearby or if you are in open country, the best protection is to make yourself as small a target as possible. Drop to your knees, bend forward with your hands resting on your knees, and keep a distance of twice the height of the nearest tree between you and the tree. To minimize the flow of the current, keep your feet together. Keep away from wire fences, telephone lines, electrically conductive objects, and railroad tracks. Advise team members that if they feel an electrical charge, if their hair stands on end, or their skin tingles, a lightning strike may be imminent.	
Solar Radiation			

Exhibit 1–7—Job hazard analysis.

(Continued)

EXHIBIT 1–7 *(continued)*

U.S. Department of Agriculture Forest Service	1. Work Project/Activity Accident Investigation	2. Location	3. Unit NF/Station
	Burns	**To minimize UV exposure:** Keep exposed skin covered by wearing a hat, a bandanna, and a long-sleeved shirt (with sleeves rolled down and collar turned up). Wear sunglasses that filter out 100 percent of the UV rays. The use of non-UV protected sunglasses or photogrey glasses can increase the chance of UV damage to the retina and are not recommended. Provide and use protective sunscreen lotion, cream, oil, and lip balm as identified in the JHA. When possible, stay indoors during the peak exposure time in the summer or find worksites that are shady. Alter work schedules where appropriate to avoid peak summer exposure.	
Evacuation Plan (see attached Evacuation Plan)			
10. Line Officer Signature		**11. Title** Team Leader	**12. Date**

(Continued)

Exhibit 1–7—Job hazard analysis.

FIELD SITE
EMERGENCY EVACUATION PROCEDURES AND TRAVEL ROUTES

Project Name: Accident Investigation

Work Site Location: National Forest / Station
Include legal description:

<<<<<<<<<<<<<<o>>>>>>>>>>>>>>

To prepare for an emergency, which requires first aid, and/or immediate evacuation of personnel due to serious illness or injury, the following information should be predetermined, and available to all crewmembers:

DESIGNATED FIRST AID PROVIDER(S):
(At least one person on the investigation team field crew should be designated to provide first aid.

COMMUNICATION PROCEDURES TO FOLLOW IN THE EVENT OF AN EMERGENCY:

MEANS OF COMMUNICATION:
Duty Hours: Follow established forest/station procedures
Offduty Hours: Follow established forest/station procedures
(radio, cell phone, Emergency Position-Indicating Radiobeacon (EPIRB), etc.)

RADIO CHANNEL:
PHONE NUMBER:

HOME BASE:

HOME BASE EMERGENCY COORDINATOR:

EMERGENCY SERVICES:

AMBULANCE:
PHONE NUMBER:

(Continued)

EXHIBIT 1–7

HOSPITAL:
PHONE NUMBER:

(Air evacuation should be obtained through the supervisor's office (SO) dispatcher, if needed.)

EMERGENCY EVACUATION TRAVEL ROUTES: Attach map with roads for evacuation to main highway to above hospital (and helispots, if appropriate) highlighted.

In the event of an accident during a fire incident contact incident base during field site visits, follow incident emergency evacuation processes.

**********///**********

INVESTIGATION TEAM MEMBERS SHOULD PROVIDE THE FOLLOWING WHEN CALLING FOR ASSISTANCE:

- **nature of injury or accident (do not broadcast victim(s) name(s);**
- **type of assistance needed;**
- **number, and (for air transport) estimated weight, of persons to be transported;**
- **location of injured, using landmarks identifiable on ground and/or map;**
- **current information about weather and travel hazards/obstacles.**
- **(Crew should remain in contact with home unit until evacuation team arrives, if possible.)**

Copies of this plan should be provided to investigation team member(s) and home base coordinator(s), prior to beginning work.

Exhibit 1–7—Job hazard analysis.

EXHIBIT 1–8

Actions to be Taken by the Unit

Secure the Site

Upon completion of rescue and medical assistance, the scene must be secured by Forest Service law enforcement officers until released by the accident investigation team. Methods to secure the site:

- Ropes
- Barrier tape
- Cones
- Signs
- Flashing lights
- Posted guards

Do not move equipment, shelters, or any other items at the scene. Do not walk around the scene unless it's necessary for rescue or medical assistance. Nothing should be removed from the scene without permission from the accident investigation team leader or chief investigator/QTI. Evidence must be preserved at the scene. Photograph the scene (video or stills) if evidence could be lost before the accident investigation team arrives, such as by a rainstorm, washing away ruts or fluid spills.

Autopsies

Request an autopsy for all fatalities. Offer to pay for the autopsy if funding is an issue. Ask your local law enforcement officer (LEO) to provide a liaison to the county medical examiner or coroner. Access to emergency (911) logs and police reports may be needed.

In case of a fire-related fatality: immediately provide the county medical examiner or coroner with a copy of the FA-156 *Firefighter Autopsy Protocol*.

Employee Assistance Program

DO NOT provide critical incident stress counseling or debriefings to witnesses and coworkers before the arrival of the accident investigation team unless there is some critical need to do so. If that is the case, contact the team leader and explain the need for this action.

Witness Statements

Gather witnesses for accident investigation team interviews. If that is not possible and witnesses need to be released, have them write, date, and sign a statement before they leave. Use the following procedures.

Separate witnesses and have them write statements in their own words. Witness statements should be in the witness' own handwriting or typed by them on a computer. The witness statement should include:

- Name, work address, and phone number of the witness.
- What attracted the witness' attention to the accident.
- What actions the witness took at the accident site.
- Description of what happened.
- Time and location of the events.
- Environment (weather, lighting, temperature, noise, and so forth.
- Positions of people, equipment, and material, as well as the witness.
- What has been moved, repositioned, turned off or on, or taken from scene.
- Description of the sequence of events leading to accident.
- Other witnesses or involved people (include names if known).

Accident Investigation Team Administrative Support

The investigation team will need the following:

- Investigation team local unit liaison, including phone numbers and fax numbers.
- Lodging/meeting place for the investigation team (including private interview room). Coordinate with the team leader.
- Office supplies (including flip charts, markers).
- Documentation support (at the discretion of team leader)
  - —Shredder
  - —Fax
  - —Computers
  - —Printer
  - —Vehicles
  - —Speaker phones
  - —Copier

(Continued)

Exhibit 1–8

Exhibit 1–8—Actions to be taken by the unit.

EXHIBIT 1–8 *(continued)*

Actions to be Taken by the Unit *(continued)*

Evidence Collection

Collect all or as many of the following applicable items as possible:

- Radio logs (written and recorded)
- Dispatch logs
- Occupant emergency plans
- Maps
- Job hazard analyses
- Safety briefings
- Team briefings
- Employee training records
- Medical examination records
- Work capacity test results
- Qualifications/certifications (including red cards)
- Work/rest (timesheets) for at least two pay periods (current and before the accident)
- Recent fire assignments
- Equipment maintenance records
- Equipment performance tests
- Inspection documents
- Fire management plan
- RAWS (remote automated weather system information)
- Weather (forecast/conditions)
- Fire behavior
- Incident action plans/personnel lists
- Delegation of authority
- Memorandum of understanding (MOUs)/agreements
- Specifications/drawings
- Press releases
- Autopsy/toxicology report
- Death certificate
- 911 Log
- Witness statements
- Internal policies/guidelines
- Tailgate safety session documentation
- Unit's safety plan

Contacts

Designate someone to provide the following:

- Family liaison—The purpose of the family liaison is to maintain open lines of communication between the Forest Service and the family. The liaison will provide the family support, assistance, and information during the crisis situation.

- PAO—If there is significant media interest, contact the regional PAO for assistance.

Exhibit 1–8

Exhibit 1–8—Actions to be taken by the unit.

EXHIBIT 1–9

United States Department of Agriculture
Forest Service
Office of Safety and Occupational Health

Safety Alert

NO. 200x–xx **DATE:** **Page x of x**

SUBJECT:

AREA OF CONCERN:

DISTRIBUTION:

DISCUSSION:

POINT OF CONTACT:
(Name)
(National-level safety manager)

Exhibit 1–9

Exhibit 1–9—Safety alert.

EXHIBIT 1–10

United States Department of Agriculture
Forest Service

Aviation Safety Alert

NO. 200x–xx **DATE:** **Page x of x**

SUBJECT:

AREA OF CONCERN:

DISTRIBUTION:

DISCUSSION:

RECOMMENDATION:

/s/ (First and last name)
(National aviation safety and training manager)

/s/ (First and last name)
(National aviation operations officer)

Exhibit 1–10—Aviation safety alert.

Exhibit 1–10

Chapter 2

Investigation Overview

Chapter 2—Investigation Overview

2.1 Introduction

The four basic components of the accident investigation process are:
- The accident sequence.
- Human factors accident and incident analysis.
- Equipment factors analysis.
- Environmental factors analysis.

The nature and complexity of the accident determines the extent to which these components are evaluated. Exhibit 2–1 shows the accident investigation process.

2.2 Accident Sequence

The accident sequence consists of five components and is established based only on the facts determined during the investigation. The five components are:

- Events occurring before the accident. Establish the sequence of events leading to the accident to answer the questions: who, what, when, where, and how. Identify any contributing factors such as urgency, weather, equipment condition, or terrain. If a fire was involved, establish when, where, and how the fire was started. Determine flame propagation and whether attempts were made to extinguish the fire.

- The accident sequence. Start with the initiating event (examples are the truck tire blew out or the helicopter tail rotor struck a snag) and continue until the sequence reaches a logical endpoint.

- Events occurring after the accident. Identify the sequence of events that occurred after the accident (such as search and rescue or medical efforts), how the accident was first reported, and the locations of personnel and equipment after the accident. Note any disturbance to the accident site and security or preservation measures taken, as well as any injury and causal or contributing factors due to events that occurred after the accident, such as rescue and medical response.

- Injuries. Record all injuries. Identify all medical facilities that provided treatment, document the condition of the patients, and summarize autopsy reports, if applicable.

- Damage. Estimate the cost of the equipment or property damage and define the damage as minor, major, destroyed, or repairable.

2.3 Human Factors Accident and Incident Analysis

Human factors play a large role in most accidents. Investigators need to be able to identify the human factors that contribute to an accident. Thorough analysis can result in effective intervention and prevention strategies and recommendations. The Human Factors Accident and Incident Analysis checklist (exhibit 2–2) can be used to help the investigation team in identifying human factors associated with the accident. For aviation, use exhibit 9–2.

A. Qualifications and Training. Determine the qualifications and training of individuals directly involved in the accident (the vehicle operator, passengers, and supervisor). Identify any contributing factors such as the lack of operator certifications or insufficient training.

B. Duties. Identify the duties of individuals directly involved in the accident, such as primary and additional duties, and work and rest schedules. Note any contributing factors, such as employee fatigue. Conduct a work/rest analysis covering at least 72 hours before accident. Include an examination of time and attendance records as well as input from appropriate supervisors on tasks completed and actual time worked (may not necessarily match recorded time), offduty activities, and sleep duration cycles.

C. Management. Determine the organization, supervision, and external control of individuals directly involved in the accident. Identify any contributing factors, such as a failure to emphasize safety by the supervisor or organization.

D. Compliance. Note deviations from policies, procedures, practices, and contract specifications. Review the JHA, safety equipment, and other items pertinent to the accident investigation.

E. Documents. Identify whether directives, operating guides, and contracts were current, readily available, and properly used by individuals associated with the accident. Review records specific to the accident, such as inspections, dispatch and equipment logs, time and attendance records, safety plans, and incident command system forms, if applicable.

F. Communications. Identify the type of communications used before, during, and after the accident. Identify any contributing factors related to communications, such as radio coverage or faulty equipment.

G. Services. Determine whether contractual services, such as road guards, traffic signs, or dispatch procedures contributed to the accident.

H. Risk Management. Determine whether a JHA or other workplace risk analysis was developed. Establish the role that the risk analysis played in the performance of the work project or activity. Determine whether a tailgate safety session was held and documented before work began.

2.4 Equipment Factors Analysis

A. Systems. Determine what equipment was involved in the accident and its suitability to perform the work project or activity. Include any pertinent operator manuals, maintenance records, inspections, and approvals of maintenance personnel.

B. Survivability. Evaluate the ability and suitability of the vehicle, system, or equipment to perform the work project or activity, and the structural integrity of the occupant compartment.

- Impact conditions and crash (dynamic) forces.
- Restraint and rollover protection systems. Were such systems installed? Were they used?
- Personal protective clothing and equipment, and safety equipment.
- Backup and emergency systems.
- Safety design.

C. Laboratory or Teardown Analysis. Review the results of any equipment component analyses. Special studies or tests should be conducted by another agency or private laboratory.

2.5 Environmental Factors Analysis

A. Weather. Verify the weather conditions before, during, and after the accident. Identify any contributing factors, such as precipitation, temperature, lighting, and visibility.

B. Physical Environment. Fully describe the accident scene. Determine whether the scene was preserved. Note the terrain at the accident site. Provide a general area map, a site-specific location map, profiles of terrain features, diagrams and sketches of the accident site, and diagrams of any other relevant objects. Take all measurements from a control point that has some permanency. Measurements can be made from the control point during return trips to the site. Identify any contributing factors, such as altitude, vegetation, slope, accessibility, dust, and smoke.

EXHIBIT 2–1

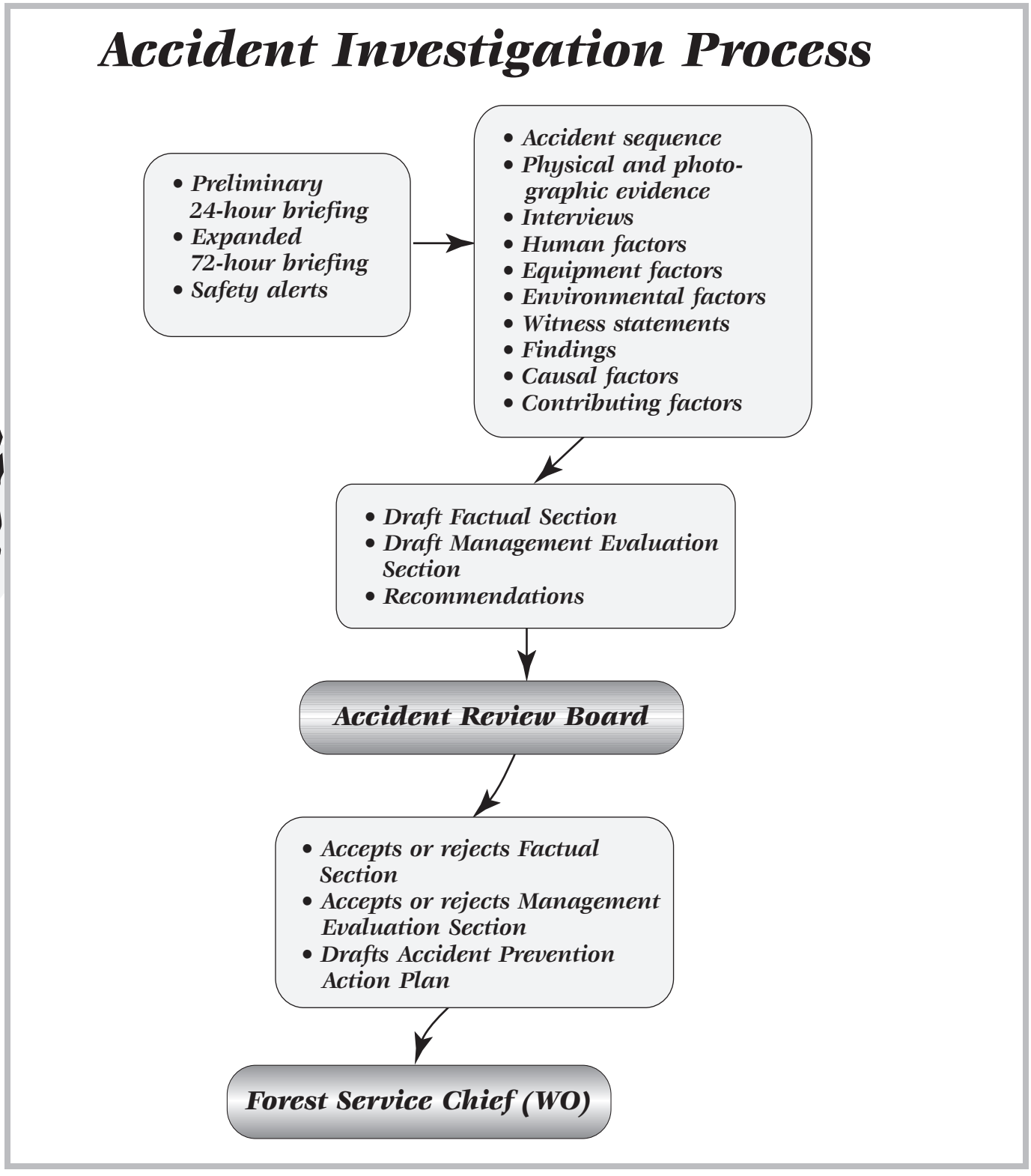

Exhibit 2–1

Exhibit 2–1—Accident investigation process.

EXHIBIT 2–2

Human Factors Accident and Incident Analysis

Sensory and Perceptual Factors

- Misjudgment of distance, clearance, speed, and so forth
- False perception caused by visual illusion. Conditions that impair visual performance:
  - —Featureless terrain (such as a desert, dry lake, water, snow).
  - —Darkness and poor visibility.
  - —Smoke and changing smoke patterns.
  - —Mountainous terrain or sloping runway.
  - —Anomalous light effects that cause flicker vertigo.
  - —Low contrast of objects to background or poor illumination.
  - —View into bright sunlight or moonlight.
  - —Shadows.
  - —Whiteout snow conditions.
- Spatial disorientation and vertigo. Conditions that affect sense of body position:
  - —Loss of visual cues.
  - —Adverse medical condition or physiological condition (alcohol and drug effects, hangover, dehydration, fatigue, and so forth).
  - —Moving head up and down, looking in and out to change radios, answering or using cell phones.
- Loss of situational awareness. Types:
  - —Geographic disorientation (such as deviation from route, loss of position awareness).
  - —General loss of situational awareness (such as failure to perceive hazardous condition).
  - —Erroneous situational assessment (misinterpretation of situation or condition).
  - —Failure to predict or anticipate changing conditions.
  - —False hypothesis confirmation bias (persistent false perception or misconception of situation).
- Attention failure (such as failure to monitor or respond when correct information is available). Types:
  - —Failure to visually scan outside the vehicle or equipment for hazards.
  - —Omission of checklist items.
  - —Failure to respond to communication or warning.
  - —Control-action error:
    - Failure to set, move, or reset control switch (lapse).
    - Unintentional activation of control switch (slip).
    - Control-substitution error (slip).
    - Control-reversal error (slip).
    - Control-adjustment or precision error (slip).
- Conditions that affect attention and situational awareness:
  - —Inattention (focus on information unrelated to tasks).
  - —Channelization, fixation (psychological narrowing of perception).
  - —Distraction (preoccupation with internal [mental] event or with external event).
  - —Task overload due to systems (such as communications).
  - —Task overload due to equipment systems assignment factors.
  - —Cognitive workload (problem-solving concentration or information overload).
  - —Habit influence or interference.
  - —Excessive crew stress or fatigue.
  - —Excessive workload or tasking.
  - —Inadequate briefing or preparation.
  - —Inadequate training or experience for assignment.
  - —Negative learning transfer (such as during transition to new assignment).
  - —Adverse meteorological conditions
  - —Tactical-situation overload or display-information overload.
  - —Inadequate crew motivation or inadequate vigilance.
  - —Inadequate equipment design.

Medical and Physiological Factors

- Carbon monoxide poisoning.
- Self-medication (without medical advice or against medical advice).
- Motion sickness.
- Incompatible physical capabilities.
- Overexertion while off duty.
- Influence of drugs or alcohol.
- Cold or flu (or other known illness).
- Excessive personal stress or fatigue.
- Inadequate nutrition (such as omitted meals).
- Hypoxia.
- Heat.
- Cold.
- Stress induced by heightened state of alertness.
- Affects of smoke.
- Dehydration.
- Other medical or physiological condition.

(Continued)

Exhibit 2–2—Human factors accident and incident analysis.

EXHIBIT 2–2 (continued)

Human Factors Accident and Incident Analysis

—Assignment tasking or job fatigue (such as being on duty more than 14 hours, late-night or early-morning operations).
—Cumulative fatigue (such as excessive physical or mental workload, circadian disruption, or sleep loss).
—Cumulative effects of personal or occupational stress (beyond stress-coping limit).
—Emergency condition or workload transition (from normal operation to emergency operation).
—Medical or physiological preconditions (health and fitness, hangover, dehydration, and so forth).

Knowledge and Skill Factors

- Inadequate knowledge of systems, procedures, and so forth (knowledge-based errors). Types:
  —Knowledge-based.
  —Inadequate knowledge of systems, procedures.
  —Used improper procedure.
  —Ill-structured decisions.
  —Failure in problem solving.
- Inadequate equipment control, or inadequate accuracy and precision of equipment maneuvering (skill-based error). Types:
  —Breakdown in visual scan.
  —Failure to see and avoid.
  —Over or under reacting.
  —Over or under controlling.
  —Inadequate experience for complexity of assignment.
- Misuse of procedures or incorrect performance tasks (rule-based error), such as:
  —Failure to perform required procedure.
  —Use of wrong procedure or rule(s).
  —Failure to conduct step(s) in prescribed sequence.
- Conditions that lead to inadequate operational performance:
  —Lack or variation of standards.
  —Loss of situational awareness in varying environment.
  —Demonstration of performance below required proficiency standards or current standards.
  —Demonstration of inadequate performance or documented deficiencies.
  —Inadequate essential training for specific task(s).
  —Inadequate recent experience or inadequate experience.
  —Lack of sensory input.
  —Limited reaction time.

Assignment Factors

- Failure of dispatch to provide correct critical information (such as frequencies, location, other equipment, or resources).
- Poor communication with other assets (such as ground or aircraft).
- Inadequate or faulty supervision from ground or tactical aircraft.
- Lack or variation of standards.
- Nonparticipant or noncommunicative equipment or resources at the scene.
- Loss of situational awareness in varying environment.
- Changing plans or tactics (change of teams on incidents).
- Unanticipated change of radio frequencies.
- Intentional deviation from procedures.
- Unintentional deviation from procedures.
- Demonstration of performance below required proficiency standards or current standards.
- Demonstration of inadequate performance or documented deficiencies.
- Inadequate essential training for specific task(s).
- Inadequate recent experience or inadequate experience for assignment.
- Transition (learning new equipment or operational systems).
- Inadequate knowledge of tactical situation.
- Lack of sensory input.
- Limited reaction time.
- Conditions that lead to inadequate assignment performance.
  —Smoke.
  —Wind shifts.
  —Changes in fire behavior.
  —Low visibility.
  —Unexpected equipment, resources, or aircraft.
  —Assignment intensity.
  —Assignment creep.
  —Assignment urgency.
  —Failure to recognize deteriorating conditions.
  —Time compression.
  —Diverts to new incidents.
  —Excessive communication demands.
  —Past assignment success based on high-risk behavior.

(Continued)

Exhibit 2–2

Exhibit 2–2—Human factors accident and incident analysis.

EXHIBIT 2–2 (continued)

Human Factors Accident and Incident Analysis

Personality and Safety Attitude

- Overconfidence.
- Excessive motivation to achieve assignment.
- Reckless operation.
- Anger or frustration on the job.
- Stress-coping failure (such as anger).
- Overly assertive or nonassertive.
- Inadequate confidence to perform tasks or activities.
- Acquiescence to social pressure (from organization or peers) to operate in hazardous situation or condition.
- Failure to report or act upon incidents of misconduct.
- Toleration of unsafe acts and behaviors.
- Poor equipment or assignment preparation.

Judgment and Risk Decision

- Acceptance of a high-risk situation or assignment.
- Misjudgment of assignment risks (complacency).
- Failure to monitor assignment progress or conditions (complacency).
- Use of incorrect task priorities.
- Intentional deviation from safe procedure (imprudence).
- Intentional violation of standard operating procedure or regulation. Types:
  - —Violation of orders, regulations, standard operating procedures (SOP).
  - —Crew rest requirements.
  - —Inadequate training.
  - —Violated agency policy or contract.
  - —Failed to comply with agency manuals.
  - —Supervisor knowingly accepted unqualified crew.
  - —Failed to obtain valid weather brief.
  - —Accepted unnecessary hazard.
  - —Lacks adequate of up-to-date qualifications for assignment.
- Intentional disregard of warnings.
- Noncompliance with personal limits.
- Noncompliance with published equipment limits.
- Noncompliance with prescribed assignment parameters.
- Acquiescence to social pressure (from organization or peers).
- Conditions leading to poor safety attitude and risky judgment:
  - —History of taking high risks (personality-driven).
  - —Pattern of overconfidence.
  - —Personal denial of wrongdoing.
  - —Documented history of marginal performance or failure.
  - —Excessive motivation (did not know limits).
  - —Reputation as a reckless individual.
  - —Failure to cope with life stress (anger or frustration).
  - —Overly assertive or nonassertive (interpersonal style).
  - —Influenced by inadequate organizational climate or safety culture (such as lack of adequate supervision).

Communication and Crew Coordination

- Inadequate assignment plan or brief.
- Inadequate or wrong assignment information conveyed to crew (dispatch or supervisor errors).
- Failure to communicate plan or intentions.
- Failure to use standard or accepted terminology.
- Failure to work as a team.
- Inability or failure to contact and coordinate with ground or aviation personnel.
- Inadequate understanding of communication or failure to acknowledge communication.
- Interpersonal conflict or crew argument during assignment.
- Conditions leading to inadequate communication or coordination:
  - —Inadequate training in communication or crew coordination.
  - —Inadequate standard operating procedures for use of crew resources.
  - —Inadequate support from organization for crew-coordination doctrine.
  - —Failure of organizational safety culture to support crew resource management.

(Continued)

Exhibit 2–2—Human factors accident and incident analysis.

EXHIBIT 2–2 (continued)

Human Factors Accident and Incident Analysis

System Design and Operation Factors

- Use of wrong switch, lever, or control.
- Misinterpretation of instrument indication.
- Inability to reach or see control.
- Inability to see or interpret instrument or indicator.
- Failure to respond to warning.
- Selection or use of incorrect system-operating mode (mode confusion).
- Overreliance on automated system (automation complacency).
- Conditions that contribute to design-induced crew errors:
  - —Inadequate primary equipment control or display arrangement.
  - —Inadequate primary display data or data format.
  - —Inadequate hazard advisory or warning display.
  - —Inadequate system instructions or documentation.
  - —Inadequate system support or facilities.
  - —Inappropriate type or level of automation, or excessive mode complexity.

Supervisory and Organizational Factors

- Not adhering to rules and regulations.
- Inappropriate scheduling or crew assignment.
- Failure to monitor crew rest or duty requirements.
- Failure to establish adequate standards.
- Failure to provide adequate briefing for assignment.
- Failure to provide proper training.
- Lack of professional guidance.
- Undermining or failure to support crews.
- Failure to monitor compliance with standards.
- Failure to monitor crew training or qualifications.
- Failure to identify or remove a known high-risk employee.
- Failure to correct inappropriate behavior.
- Failure to correct a safety hazard.
- Failure to establish or monitor quality standards.
- Failure of standards, either poorly written, highly interpretable, or conflicting.
- Risk outweighs benefit.
- Poor crew pairing.
- Excessive assignment tasking or workload.
- Inadequate assignment briefing or supervision.
- Intentional violation of a standard or regulation.
- Failure to perceive or to assess (correctly) assignment risks, with respect to:
  - —Unseen or unrecognized hazards.
  - —Environmental hazards or operating conditions.
  - —Assignment tasking and crew skill level.
  - —Equipment limitations.
- Conditions leading to supervisory failures:
  - —Excessive operations or organizational workload (imposed by the organization or imposed by organizational chain).
  - —Inadequate organizational safety culture.
  - —Supervisor is over-tasked.
  - —Supervisor is untrained.
  - —Inattention to safety management (inadequate safety supervision).
  - —Inadequate work standards or low performance expectations.
  - —Inadequate or poor example set by supervisors.
  - —Inadequate safety commitment or emphasis by supervisors.
  - —Organization lacks an adequate system for monitoring and correcting hazardous conditions.
  - —Supervisors fail to promote and reward safe behavior or quickly correct unsafe behavior.
  - —Organization lacks adequate policies and procedures to ensure high quality work performance.

(Continued)

Exhibit 2–2

Exhibit 2–2—Human factors accident and incident analysis.

EXHIBIT 2–2 (continued)

Human Factors Accident and Incident Analysis

—Organization lacks adequate job-qualification standards or training program.
—Organization lacks adequate internal communication.
—Organization had no system or an inadequate system for management of high-risk employees.
—Organization lacks adequate process or procedures for operational risk management.
—Organization fails to provide adequate human factors training.
—Organization fails to ensure sufficient involvement of medical and occupational health specialists.
—Organization fails to establish or enforce acceptable medical or health standards.

Maintenance

- Procedures.
  —Unwritten.
  —Unclear, undefined, or vague.
  —Not followed.
- Records.
  —Discrepancies entered but not deferred or cleared.
  —Entries not recorded or not recorded in correct book(s).
  —Improper entries or unauthorized signature or number.
  —Falsification of entries.
- Publications, manuals, guides.
  —Not current.
  —Were unused for the procedure.
  —Incorrect manual or guide used for procedure.
  —Not available.
- Training.
  —Not trained on procedure.
  —Training not documented.
  —Falsified.
  —Not current.
- Personnel.
  —Not properly licensed.
  —Insufficient (staffing).
  —Improper or insufficient oversight.
  —Not properly rested.
- Management.
  —Nonexistent.
  —Ineffective.
  —Understaffed.
  —Ineffective organization of assigned personnel.
  —Insufficiently trained.
- Quality assurance.
  —Nonexistent.
  —Insufficiently trained.
  —Ineffective.
  —Not used when available.
- Inspection guides.
  —Unavailable.
  —Procedures not followed.
  —Insufficient.
  —Not current.
  —Not approved.
  —Not signed off.
  —Falsified.
  —Unapproved signature or number.
- Tools or equipment.
  —Improper use or procedure.
  —Uncalibrated.
  —Used improperly.
  —Not trained for the special equipment or tool.
  —Not used.
  —No tool control program.

Exhibit 2–2

Exhibit 2–2—Human factors accident and incident analysis.

Exhibit 2–2

Chapter 3

Witness Statements and Interviews

Chapter 3—Witness Statements and Interviews

3.1 General

A. After visiting the accident site, it is generally best to begin the investigation by collecting witness statements. Anyone involved in the accident should be included. Witnesses are usually the best source of information for determining the sequence of events that led to the accident. Frequently, a unit administrative investigator or law enforcement officer on the site has taken initial statements prior to the investigation team's arrival. These should not be relied upon as the sole statements from witnesses.

B. The mental state of the witnesses should be taken into account. They could be experiencing stress or may be traumatized by the accident. They may be on medication and require the approval of a physician before making statements or being interviewed. On the other hand, witnesses frequently are anxious to talk about the accident to anyone who will listen. Providing them with an opportunity to talk may help them.

C. If the accident causes a psychological burden on a witness, critical-incident stress management services may be needed. Encourage the unit to contact the local Forest Service Employee Assistance Program (EAP) coordinator to arrange for the appropriate counseling services. If at all possible, a witness should not attend a group critical-incident stress debriefing before being interviewed. If the unit manager determines there is some critical need to provide an employee counseling before the team arrives, ask the unit manager to have the witness write a statement (exhibit 3–1) before the debriefing/counseling session.

D. In some situations, family members of injured employees or accident witnesses can help the investigation process by offering insight into character traits or behavior patterns.

3.2 Statements

A. To ensure candor, witnesses should be isolated from each other while making individual statements.

B. Investigators should inform witnesses that the primary purpose for taking their statements is for accident prevention purposes. Let the witnesses know that you cannot assure the confidentiality of their statements. Include the name of the witness, work address, phone number, date, and signature in the statement (exhibit 3–1).

3.3 Interviews

A. The chief investigator or QTI should prepare the questions for witness interviews. Other investigation team members may conduct interviews at the direction of the chief investigator. Interviews need to be taken in a quiet, private, comfortable location that is free from disruption. Provide frequent breaks. Depending on the amount of information needed, several sessions may be needed to conduct an interview (exhibit 3–2).

B. Ensure that the name, work address, phone number, date, and signature of the interviewer are included in the document. In some instances, the witness may have to be taken to the accident site or crash scene after the initial interview so the witness can clarify the initial statement.

C. If employees are concerned that the interview may result in disciplinary action being taken against them, they may request union representation before or during an interview as stated in the master agreement (Weingarten Right). If a representative is requested, stop the interview until representation is obtained.

D. All interviews should be recorded. An audiocassette tape can be used for this purpose. For complex investigations, it is best to have a court recorder who is a notary public or a videotape record of the interview. Always obtain the individual's consent before recording an interview.

E. After the interview is documented, the interviewer needs to review it and both the interviewer and witness need to sign that it is correct as stated. If telephone and transcribed statements cannot be signed because of the condition of a witness, timing, or availability, include a statement by the interviewer attesting to the time and date of the interview, followed by the interviewer's signature.

3.4 Conducting the Interview

A. The chief investigator or QTI will determine who will be interviewed. The interviewer begins by asking witnesses for their name, work address, and phone number, position (job title), and their location during the accident. Try to get the witnesses to tell you everything they know without influencing them with your questions. Other questions may refer to the history of events, human factors, equipment factors, or environmental factors. Usually, it is best to begin with general questions and ask specific questions later.

B. Considerations that should be taken into account during the interview are:

- Avoid collective interviews (interviewing more than one witness at a time).
- Whenever possible, limit team members participating in the interview to two members.
- Do not prejudge a witness. Keep an open mind so you can be receptive to all information, regardless of its nature. Be serious. Maintain control of the interview. Don't make promises you can't keep. Avoid contemptuous attitudes. Avoid controversial matters. Respect the emotional state of the witness.
- Place the witness at ease. Explain that the interview is for accident prevention and that you are only seeking the facts related to the accident.
- Inform the witness that you can't promise confidentiality.
- Read the witness' written statement (if available) before the interview.
- Allow witnesses to tell the story in their own words (do not interrupt).
- Be a good listener. Be unobtrusive when taking notes. Maintain your self-control during interviews. Don't become emotionally involved in the investigation.
- Investigation team members should coordinate their questions at the direction of the chief investigator or QTI.
- The interviewer should ask followup questions. Do not assist the witness in answering questions. Diagrams, maps, photos, models, and other items used to clarify information should be introduced at the end of the interview.
- Avoid revealing items discovered during the investigation to the witness.

3.5 Types of Questions

A. General Questions. General questions are open-ended questions that can help get the witness talking. For example:
- What did you see?
- What can you recall?
- Tell me more about that.

B. Directed Questions. Directed questions get the witness to focus on a specific subject, without biasing the answer. For example: Did you notice any lights on the vehicle?

C. Specific Questions. Specific questions are needed for specific information (such as information about a particular light). For example: Did you notice any lights on the vehicle? What color was the light?

D. Summary Questions. Summary questions help witnesses organize their thoughts and draw attention to possible additional information. Restate what you think the witness told you in your own words and ask if that's correct. Frequently, the witness will add more information.

E. Leading Questions. Avoid leading questions. A leading question contains or implies the desired answer. Once you ask a leading question, you have suggested what the witness is supposed to have seen. For example: Was a red light flashing?

F. Techniques That Do Not Require Questions. Some interview techniques do not require questions. A nod of your head or an expectant pause may encourage the witness to talk. To keep a witness talking, say something like "uh-huh," "really," or "continue." Another technique is to mirror or echo the witness' comments. Repeat what the witness said without agreeing or disagreeing. For example: You say you saw smoke coming from the vehicle?

3.6 Sample Witness Interview Questions

- What is your name, work address, and phone number?
- What is your duty station and position?
- What is your technical background, set of skills, or knowledge?
- How are you connected with others involved in the accident?
- When did you see the accident happen?
- What attracted your attention to the accident?
- When you first saw the accident, where was the vehicle or equipment? Where was the individual involved in the accident?
- What was the direction of travel of the vehicle or equipment involved in the accident? Where was the final resting place of the vehicle or equipment? (Have the witness draw a diagram, if appropriate.)

- Were any other witnesses around? Do you know the names of other witnesses?
- Do you wear glasses or other corrective lenses? Do you wear a hearing aid? What type? Were you wearing your glasses or hearing aid?
- Would you like to provide any additional information?

3.6

EXHIBIT 3–1

USDA Forest Service	WITNESS STATEMENT	Case/File Number ☐ Initial Report ☐ Followup

NATURE OF INVESTIGATION		
PERSON MAKING STATEMENT *(Last, first, middle)*		HOME PHONE NO. *(Area code)*
		( ) -
HOME ADDRESS *(Street, city, state, zip code)*		WORK PHONE NO. *(Area code)*
		( ) -
EMPLOYMENT *(Occupation and location)*		
LOCATION STATEMENT TAKEN	NAME OF INVESTIGATOR TAKING STATEMENT	DATE TIME STARTED
		/ /

STATEMENT

I have read the foregoing statement consisting of _____ pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I have made this statement freely and voluntarily, without threats or rewards, or promises of rewards having been made to me in return for it.

	DATE/TIME ENDED
_____ SIGNATURE OF PERSON GIVING STATEMENT	
INVESTIGATOR'S SIGNATURE	WITNESS' SIGNATURE *(If applicable)*

NOTE: This document is for OFFICIAL USE ONLY.

Exhibit 3–1—Witness statement.

EXHIBIT 3–1 (continued)

USDA Forest Service	WITNESS STATEMENT	Case/File Number ☐ Initial Report ☐ Followup

Exhibit 3–1

Exhibit 3–1—Witness statement.

EXHIBIT 3–2

USDA Forest Service	MEMORANDUM OF INTERVIEW	CASE NUMBER

NATURE OF INVESTIGATION

NAME OF PERSON INTERVIEWED *(Last, first, middle)*	HOME PHONE NUMBER
	- -
HOME ADDRESS *(Street, city, state, zip code)*	WORK PHONE NUMBER

EMPLOYMENT *(Occupation and location)*

LOCATION OF INTERVIEW	NAME OF INVESTIGATOR CONDUCTING INTERVIEW

OTHERS PRESENT	STARTED		ENDED	
	Date	Time	Date	Time

REMARKS

INVESTIGATOR'S SIGNATURE	WITNESS' SIGNATURE (*If applicable*)

NOTE: This document is for OFFICIAL USE ONLY.

Exhibit 3–2—Memorandum of interview.

Exhibit 3–2

Chapter 4

Physical and Photographic Evidence

Chapter 4—Physical and Photographic Evidence

4.1 Physical Evidence—General

Evidence is gathered for three primary reasons:
- To establish accident sequence
- To provide documentation to support the investigation facts, findings, and recommendations
- To identify causal and contributing factors

NOTE: Physical and photographic evidence gathered during accident investigations may be used in other official proceedings (administrative, civil, and criminal) and must be collected and processed correctly to maintain the integrity of the evidence. Generally the team's law enforcement representative is the most qualified individual to do this.

4.2 Physical Evidence Preservation and Collection

The chief investigator or QTI must determine what evidence is fragile or perishable and may be destroyed or lost due to weather or theft, or moved, in order to protect valuable equipment or evidence. This may require increasing the security personnel, expanding the site security perimeter, covering the site with plastic, obtaining a secured facility, or carefully packaging and removing evidence.

The chief investigator or QTI will, with cooperation from the law enforcement representative, establish:

- What evidence needs to be gathered.
- Procedures to be used.
- Who will gather the evidence.
- The evidence and chain-of-custody logs.
- Where evidence should be stored.

Physical evidence, such as equipment and parts, need to be "bagged and tagged" at the time of collection. Large items, such as vehicles or construction items, should be secured.

The law enforcement representative will establish logs for all ground accident evidence. It is imperative that all evidence be cataloged and accounted for at all times (exhibits 4–1 and 4–2). Some evidence may be perishable if not collected as soon as possible. The originals or a copy of important documents (evidence, potential evidence) should be placed in the investigation case file.

All aviation accident evidence gathered during aviation accident investigations will be maintained by the NTSB.

4.3 Types of Physical Evidence

There are three principal types of physical evidence: Human, material, and environmental.

Human evidence includes:

- Training records
- Qualifications and certifications
- Time and attendance records
- Dispatch logs
- Risk assessments (JHAs)
- Briefings
- Witness statements
- Policies and procedures
- Medical records and test results
- Autopsy and toxicology reports
  - —Autopsies can provide valuable information to the accident investigation team. The rules for autopsies vary from State to State. Most States require an autopsy if the death was not attended by a physician.
  - —The team leader or the law enforcement representative should determine if an autopsy will be conducted. If so, request analysis of samples of body fluids.
  - —If an autopsy is not planned, determine whether the family would agree to one if the information gained would benefit the investigation.
  - —Firefighter Autopsy Protocol: Firefighter beneficiaries will normally receive a death benefit only if an autopsy is completed. A waiver may be given on a case-by-case basis. The team leader should ensure that the medical examiner has a copy of this protocol.

Material evidence includes:
- Equipment
- Tools
- Machinery
- Vehicles

Environmental evidence includes:
- Weather reports
- Weather damage analysis
- Terrain analysis
- Environmental hazards
- River volume and flow

4.4 Photographic Evidence—General

A. One of the most useful tools the investigator can bring to the accident scene is a camera. The camera shows the view seen by a witness and can record documents. Digital cameras (3 or 4 megapixels) and cameras that process

their own film are ideal for this application. Film from 35 millimeter cameras can be converted to digital format if developed correctly.

B. While videocameras have their uses, photographs may be more useful because they can be enlarged, printed in multiple copies, and placed in the factual section.

C. Depending on the accident's complexity, a professional photographer may be needed.

4.5 Photographic Documentation

A. Photographs do not have to be taken in the order the investigator intends to look at them. Shoot all the distant and medium shots first. Those shots can be taken with a hand-held camera without extra equipment. Afterward, take closeup shots with a tripod, flash, or cable release. This method saves time because you do not have to switch back and forth between the two types of photography.

B. Basic Types of Documentary Photographs.

1. Perishable Evidence. These photographs document things that are likely to change or disappear if not photographed immediately. Such photographs may include shots of an accident's aftermath or a rescue in progress, gauge readings, ground scars, radio settings, fire damage, and the positions of switches on equipment.

2. Aerial Views. When performing aerial photography, photographers need an aviation plan, approved by the unit aviation officer. If possible, photograph aerial views early. The appearance of the accident site from the air will change rapidly as investigators move through it. Important locations on the ground can be marked with yellow flagging or other suitable material (for example, a yellow fire shirt). Shoot from different angles and at different altitudes.

3. Overviews of the Scene. Photograph the equipment wreckage at the accident site from the eight points of the compass (N., NE., E., SE., S., SW., W., NW.). If the accident scene is spread out, try a series of overlapping pictures. The prints can be matched at their edges to create a panoramic view.

4. Significant Scene Elements. Try to establish the terrain gradient through photographs. Photograph ground scars to record information that will allow their size and depth to be analyzed in the future.

5. Site Inventory. Photographs can help inventory the accident site and document personal protective clothing equipment and other safety equipment, including the victim's personal effects and clothing. The location of each item may be plotted on a scaled map using a fixed point of reference.

6. Closeups. Bracket exposures for closeups by taking two photographs with slightly different exposure adjustments (f-stop and shutter speed). Use a tripod or monopod, as appropriate.

7. Documents. Photographs can be used to record documents that cannot be retained. Such documents include licenses and logbooks, or maps and charts.

8. Witnesses' Views. It may be important to document the witnesses' views of the accident. Because the witnesses may have had wide-angle views, use a tripod and the panoramic technique to duplicate the views with photographs.

9. Exemplars. An exemplar is a model or a pattern for an actual object. Sometimes it is difficult to tell from a wreckage photograph what the part or component is supposed to look like. In some investigations, it is important to have pictures of an identical undamaged part or component for comparison.

10. Wildland Fire Photos. In addition to the types of photographs previously discussed, the following photographs are needed for fire management accidents:

- Final resting position of victims, equipment, trees, and other relevant items.
- Fireline construction at the accident site.
- Equipment carried or worn by personnel (personal and official gear).
- Firefighters' personal protective clothing and equipment.
- Safety equipment.
- Vegetative conditions (before and after, if possible).
- Surrounding terrain, structures, and orientation.
- Fire origin and buildup.
- Shelter deployment—shelter, packaging, and the position (side, back) where it was carried.
- Incident command post facilities or equipment.

11. Presentation. Photographs used in the factual section should be mounted and have captions attached. An example of a documentary caption would be: "View of damaged driver's door looking north." Each photo should include the name of the photographer and the date the photo was taken (exhibit 4–3).

EXHIBIT 4–1

Physical Evidence Log

Accident identification:_____

Evidence custodian:_____

Date collected	Name of person who collected the evidence	Name of person logging the evidence	Description of evidence	Remarks (location found, and so forth)	Evidence identification number	Sign in (signature required)	Date signed in

Exhibit 4–1

Exhibit 4–1—Physical evidence log.

EXHIBIT 4–2

Chain-of-Custody Log

Accident identification:_____

Evidence custodian:_____

Description of item	Evidence identification number	Name of person logging item out	Name and signature of person receiving item	Date item received	Name and signature of person receiving item back in	Date item received

Exhibit 4–2

Exhibit 4–2—Chain-of-custody log.

EXHIBIT 4–3

PHOTOGRAPHIC EVIDENCE

Accident	Location
Name of photographer	Date and time photograph was taken

Camera type	Photograph number	Film	ASA

Description of photograph:

Mount 4- by 6-inch photo here.

Remarks:

Exhibit 4–3—Photographic evidence.

Chapter 5

Guidelines for Establishing Findings, Identifying Causal Factors and Contributing Factors, and Developing Recommendations

Chapter 5—Guidelines for Establishing Findings, Identifying Causal Factors and Contributing Factors, and Developing Recommendations

The accident investigation should conclude with the team accomplishing five key tasks:

1. Agreeing on the accident sequence based upon the facts gathered

2. Establishing the findings of the investigation

3. Identifying causal factors

4. Identifying contributing factors

5. Developing recommendations

5.1 Establishing Findings

A. Findings are the conclusions of the investigation team based on the chronology of events and factual data, weight of evidence, professional knowledge, and good judgment.

- Each finding is an essential step in the accident sequence, but each finding is not necessarily the cause of the accident. Do not include any more information in each finding than is necessary to explain the event occurrence.

- Findings can refer to events which occurred months or years prior to the accident. Lack of training and poor equipment maintenance are examples.

- Where possible, findings should be supported by two or more facts discovered during the investigation.

- Findings are grouped by category (human, material, and environmental) in the findings section of the investigation report. Number each finding consecutively. Precede each number with the word “finding.” For example: Finding 01, Finding 02, Finding 03.

- At the end of each finding, reference the supporting documentation/evidence that supports it.

- Ensure critical events required to sustain the accident sequence have not been omitted.

B. Categories of findings—The following three categories can help organize findings during an accident investigation:

- Human (personnel involved or contributing to the accident or incident)

- Material (equipment involved or contributing to the accident or incident)

- Environmental (location of the accident or incident, geographic features, and weather conditions)

C. Developing findings—Write findings as full sentences, not bullet points. Use the past tense since the events have occurred in the past. For example: Due to lack of station maintenance, weather observations from remote automated weather stations were of questionable accuracy and provided potentially erroneous National Fire Danger Rating System indices.

5.2 Identifying Causal Factors

A. A causal factor is any behavior, omission, or deficiency that if corrected, eliminated, or avoided probably would have prevented the accident.

- Findings (events or conditions) that started or sustained the accident sequence are the basis of causal factors.

- Each causal factor must be supported by a finding. Although all findings are significant, not all of them relate to the accident sequence.

Occasionally, an investigator may not be able to conclusively determine a specific causal factor. In these special cases, the investigator may choose to list two or three most probable causal factors. In rare instances, the causal factors may remain unknown.

B. Developing causal factors—Write causal factors in the active voice, clearly identifying the actor(s) and causal action, along with any necessary explanation. For example: Active voice–The vehicle operator did not use wheel chocks

as required by policy. Passive voice–No wheel chocks were used by the vehicle operator.

If it is not obvious, indicate which finding(s) was used to determine the causal factor(s)

Apply the reasonable person concept. If a person's performance or judgment was reasonable considering the accident's circumstances, it is not appropriate to expect extraordinary or uniquely superior performance in such cases.

5.3 Identifying Contributing Factors

A. A contributing factor is any behavior, omission, or deficiency that sets the stage for an accident, or increases the severity of injuries or extent of property damage.

Examples of contributing factors are fatigue, conflicting resource priorities, delay in taking appropriate action, or environmental conditions, such as rain or poor illumination. Contributing factors may be present during an accident but may not have prevented or mitigated the accident if they had not been present.

B. Developing contributing factors— Base contributory factors on the findings discovered during the investigation. Indicate which findings were used to determine the contributing factors.

5.4 Developing Recommendations

A. Recommendations are reasonable courses of action, based on the identified causal factors that have the best potential for preventing or reducing the risk of similar accidents.

• The team leader and the chief investigator (or QTI) will lead the team in the development of recommendations.

B. Recommendations could include review of current policy, new policy, re-training personnel on existing requirements, or additional training needs. A recommendation is not needed for every causal factor. If an event was caused by failure to follow an existing policy, the recommendation may only require the people involved to be re-trained. Broad recommendations, such as to change the safety culture of the agency, are not appropriate.

C. The organization assigned responsibility for the corrective action should have authority commensurate with the nature of the recommendation. In some cases, more than one level in the agency or even other agencies will have action responsibilities.

D. Number recommendations consecutively, precede each number by the word "recommendation." For example: Recommendation 01, Recommendation 02, Recommendation 03.

E. If a recommendation depends on test results or analyses that are incomplete when the factual section of the investigation report is sent, explain this and reference the test or analysis. If such information is critical to the completion of the factual section, the team leader should request an extension from the individual authorizing the investigation (failure to incorporate critical information could result in having to reconvene the team at a later date.)

5.2
5.3
5.4

Recommendations Should Not:

- Propose any punitive actions.
- Propose briefing unit personnel on the accident. Such briefings are basic management responsibility and a normal function of safety managers and supervisors at all organizational levels.
- Recommend that a new policy, regulation, or standard operating procedure is needed when established guidelines exist but are not followed.


5.2
5.3
5.4

Chapter 6

The Investigation Report: Factual and Management Evaluation Sections

Chapter 6—The Investigation Report: Factual and Management Evaluation Sections

6.1 General

The accident investigation report will consist of a factual section and a management evaluation section. The sections shall be inserted into a three-ring binder with tabs identifying each. Follow formatting guidelines in this chapter.

The complete investigation report will be presented in draft form to the Accident Review Board (ARB) (exhibit 6–1).

Factual data, such as maps, pictures, and weather data may be included as appendixes to the factual section if they are needed for clarity or understanding of the sequence of events. Other evidence, such as witness statements, autopsy photos, portions of policy, emergency logs, and equipment that are not appropriate or are too bulky to include in the factual section should be placed in the case file. Even though items placed in the case file are not in the factual section, they are used by the ARB for their deliberations.

IMPORTANT: To the maximum extent possible, do not use names or other personally identifying information in the factual or management evaluation sections. Use of names or other personal information usually requires redaction to comply with Privacy Act regulations. To maintain the factual section of the investigation report as an accident prevention tool, use the positions of the individuals involved in the accident, such as dozer operator, crew boss 1, witness 3, instead of their names. This approach allows those interested to understand the roles of the participants and keeps the agency from being accused of covering up relevant data.

Follow the procedures in this chapter to develop the investigation report.

A. The factual section includes: the cover, title sheet, table of contents, executive summary, narrative, findings, causal and contributing factors, and appropriate appendixes. Examples of applicable appendixes are:
- Maps
- Fire behavior synopsis
- Weather summary

The purpose of the factual section for use as an accident prevention tool for management, employees, and other interested agencies. This information about the facts and the findings of the accident will help prevent similar types of accidents.

NOTE: Because the National Transportation Safety Board has the primary responsibility for investigating aviation accidents, the board will need to approve all aviation preliminary factual sections before they are sent to the ARB. Any subsequent changes by the ARB will need to be approved by the NTSB for accuracy.

With the assistance of the documentation specialist or writer/editor, the chief investigator will prepare the draft factual section for ground investigations and the QTI will prepare the preliminary factual section for aviation investigation accidents.

B. The management evaluation section includes an executive summary and recommendations to prevent or reduce the risk of similar accidents.

With the assistance of the documentation specialist or writer/editor, the chief investigator will prepare a draft management evaluation section for ground investigations, and the QTI will prepare the preliminary management evaluation section for aviation investigation accidents.

C. Formatting Guidelines – Factual section and management evaluation section. For aviation, also refer to the accident investigation template (exhibit 9–3).

Factual Section
- Cover. The Freedom of Information Act disclaimer statement (“This document contains materials for internal agency use only that are not releasable under the Freedom of Information Act,” exhibit 6–2).
  —For aviation, use exhibit 9–3.

- Title Sheet. The name and location of the accident or incident, the date of the accident or incident, and the list of investigation team members and their respective agencies (exhibit 6–3).
  —For aviation, use exhibit 9–3.

- Table of Contents. Use three-ring binders to set up the document, with dividers for each section of the document. Include page numbers. When a section includes supporting documents (such as maps, photos, or technical reports), refer to the tabs and page numbers of the exhibits and figures.

- Executive Summary. The summary briefly explains how the accident occurred. It normally should not exceed one page.

- Narrative. The narrative portion explains why the accident happened. It should provide a detailed chronology of the facts, before, during, and after the accident.

—Do not identify involved personnel by name in the narrative. Identify involved personnel by their position.
–Who had an active role in the accident?
–Who were injured in the accident?
–Whose actions or inactions initiated or sustained the accident sequence?

• Maps, photographs, illustrations, graphics, figures, and exhibits can be included or referenced in the factual section but need to be properly identified (for example: figure 1, figure 2).

• Findings. Conclusions of the accident investigation team based on the chronological facts, weight of evidence, professional knowledge, and good judgment. They are grouped in the factual section in the following categories: human, material, and environmental.

Each finding should, where possible, be supported by two or more facts from the investigation.

- Causal Factors. Any behavior or omission or deficiency that started or sustained the accident occurrence.

- Contributing Factors. Any behavior or omission or deficiency that contributed to, but did not directly cause or sustain the accident or incidence occurrence.

Appendixes

Appendixes can be used as reference information in the factual section.

Management Evaluation Section

- Executive Summary. The summary briefly explains how the accident occurred. It normally should not exceed one page.

- Recommendations. Suggested measures that management may take to prevent similar accidents. They must be reasonable, feasible, and relate to the causal or contributing factors of the accident. All recommendations must allow for a definite solution to the problem. Every causal factor should have recommendations for future prevention or mitigation, although exceptions may occur.

- Number recommendations consecutively (for example: Recommendation 01, Recommendation 02).

D. Case File

The accident investigation case file has two components: the accident investigation report (factual section and management evaluation section), and the supporting documentation and equipment that are not in the investigation report. Cassette tapes, photos not used or unfit for distribution, witness statements, and documents that may be too large, should not be included in the investigation report. They should be kept in the case file and only referenced in the accident investigation report to support the team's findings.

Any equipment that the chief investigator feels should be kept, such as a hardhat that failed, becomes part of the case file.

The Washington Office, Office of Safety and Occupational Health is the office of record for all Chief's level investigations. The office of record for delegated Chief's level investigations is the safety office of the region or station delegated responsibility to conduct the investigation. However, a copy of the accident investigation report will be forwarded to the Washington Office, Office of Safety and Occupational Health.

Case files will be maintained for the time period required by Forest Service records management rules or FOIA rules as appropriate and then destroyed, except one copy of the accident investigation report that will be kept permanently.

6.2 Distribution of the Report

After completing the investigation:

- Label copies of the investigation report: DRAFT—FOR OFFICIAL USE ONLY, and number them: 1 of 10, 2 of 10, and so forth.

- The team leader will contact the appropriate safety manager to determine the number of draft copies that should be forwarded.
—For aviation investigations, a draft copy of the investigation report will also be sent to the National Aviation safety and training manager for a quality assurance review of format and content, and approval before distribution by the appropriate safety manager.

- The appropriate safety manager will establish the Accident Review Board and supply a draft copy of the investigation report for each board member.

EXHIBIT 6–1

USDA United States Department of Agriculture	Forest Service	Washington Office	1400 Independence Ave. SW. Washington, DC 20250

File Code: 6730 Date:
Route To:

Subject: Draft Factual and Management Evaluation Sections
(Name and location of accident)
(Date of accident)

To: (Appropriate safety manager)

—FOR OFFICIAL USE ONLY—

Enclosed are the draft factual and management evaluation sections to be presented to the Accident Review Board (ARB). Please contact me when scheduling the ARB so that I can coordinate with the investigation team, which may be required to attend.

If you need additional assistance in this matter, please contact me at (phone).

(Name)
Team Leader

Enclosure

Caring for the Land and Serving People

Exhibit 6–1

Exhibit 6–1—Draft factual and management evaluation sections transmittal letter.

EXHIBIT 6–2

United States Department of Agriculture
Forest Service

THIS DOCUMENT CONTAINS MATERIALS FOR INTERNAL AGENCY USE ONLY THAT ARE NOT RELEASABLE UNDER THE FREEDOM OF INFORMATION ACT

Accident Investigation Report

(Type of accident)
(Unit, location)
(Region/station/area/institute)
(City, state)

(Date of accident or incident)

Draft copy ____of____

Exhibit 6–2—Accident investigation report cover page.

EXHIBIT 6–3

Accident Investigation Report

Accident: (Type of accident or incident and name of individual involved)

Location: (Unit and location where accident occurred)

Date: (Date of accident)

Investigation team leader: (Name, title, location of home unit)

_____ _____

Signature Date

Investigation chief investigator or qualified technical investigator: (Name, title, location of home unit)

Investigation team members:

(Name, title, location of home unit)

(Name, title, location of home unit)

(Name, title, location of home unit)

(Name, title, location of home unit)

Investigation technical consultants:

(Name, title, location of home unit)

(Name, title, location of home unit)

Exhibit 6–3

Exhibit 6–3—Accident investigation report title sheet.

Chapter 7

Accident Review Board

Chapter 7—Accident Review Board

7.1 Purpose

The Accident Review Board (ARB) reviews the draft accident investigation report.

The board reviews for adequacy and accepts, modifies, or rejects the accident investigation report. The board's last task is to prepare the accident prevention action plan. This plan is based on the recommendations approved by the ARB.

7.2 Composition of the Accident Review Board

A. The approving authority at the level authorizing the investigation will designate the chairperson and ARB members within 21 days after the accident investigation report has been completed (exhibit 7–1).

B. For aviation, the composition of the ARB shall be determined jointly by the national aviation safety and training manager and the Washington Office, Office of Safety and Occupational Health director.

The director of fire and aviation management will determine the need to convene an ARB for incidents with potential.

C. The ARB is comprised of representatives with expertise and knowledge in areas appropriate for reviewing this accident (exhibit 7–2). The members should be limited to three to five individuals.

Persons who are not members of the board may need to attend. These are usually line officers representing the unit where the accident occurred and technical experts to advise the ARB on the feasibility of contemplated actions. Attendees will be limited to individuals who have a connection to the accident or incident and who can contribute in a positive manner. Parties to litigation, insurance representatives, and news media are specifically prohibited from attending any portion of the proceedings. Attendance by non-board members is at the discretion of the chairperson.

7.3 Duties and Responsibilities

A. Chairperson. The chairperson is appointed by the approving authority at the level authorizing the investigation and is charged with managing the ARB proceedings. The chairperson will transmit the final accident investigation report, recommendations, and action plans from the ARB to the approving official (voting).

B. Management Official(s). A management official(s) is selected from outside the unit where the accident occurred. The official provides information and advice to the ARB on management-specific policies, procedures, and so forth, as related to the accident (voting).

C. Safety Manager. A safety manager (usually from outside the unit that experienced the accident) is selected to provide information on safety and occupational health management as related to the accident (nonvoting).

D. Local Management Representative. A local management representative is selected to provide information on local management-specific policies, procedures, and other matters related to the accident (nonvoting).

E. Team Leader. The team leader presents the accident investigation report to the ARB and helps the board develop the accident prevention action plan (nonvoting).

F. Chief Investigator or QTI. The chief investigator or QTI helps the team leader present the accident investigation report (nonvoting).

G. Technical Specialists. These individuals are selected from outside the investigation team and provide technical assistance to the ARB (nonvoting).

H. Recorder. The recorder will document the board's decisions and action plans, and submit that documentation to the chairperson (nonvoting).

7.4 Convening the Accident Review Board

A. Call to order.

The chairperson:
- Calls the ARB to order.
- Introduces the ARB members and others attending the meeting.
- Discusses the review process.

B. Presentation of the draft factual (ground) section/preliminary factual (aviation) section and the draft management evaluation (ground) section/preliminary management evaluation (aviation) section.

The team leader and the chief investigator or QTI:
- Present the draft sections.

The chairperson:
- Opens the discussion and comments.

The voting members:

- May move into closed session to review the draft sections.

- The report will be accepted or rejected based on the following:
  —Contents (narrative, findings, causal factors, contributing factors, and recommendations)
  —Format (required as outlined in chapter 6)
    –If the draft report is accepted, the voting members and the rest of the board resume the meeting.
    –If the draft report is accepted, and the board makes additional recommendations, the recommendations must be feasible, reasonable, and relate to the causes of the accident. (See section 5.4, Developing Recommendations)
    –If the report is rejected, the chairperson will direct the team leader to initiate action to resolve the ARB's concerns and resubmit the report. The chairperson will reconvene the board when the revised report is received.

C. Preparation of the Accident Prevention Action Plan. The ARB, using the report recommendations, prepares an accident prevention action plan. This plan outlines prevention measures, develops timelines, and assigns responsibility for completion of action items. Progress of the plan will be tracked through completion by the appropriate safety official.

Each recommended action from the team must be considered individually to make sure that it would be reasonable to implement. The resources required to implement a recommended corrective action must be weighed against the value received and the practicality of implementation. Corrective actions must allow for a definite solution to the problem. Following are examples of possible recommendations:

- Referral to a management official for corrective actions related to hazardous conditions or practices.

- Referral to a staff area (health and safety, the Missoula Technology and Development Center, or a resource staff) for design of equipment or job procedures to correct the problem.

- Referral to a specialized team for further analysis to determine why specific causal factors existed. The team should include individuals in the areas of concern, such as management, contracting, procurement, personnel, budget and finance, health and safety, and engineering.

Each action must specify who has lead responsibility, and others with responsibility, for completing the action and any other activities that are needed to support its accomplishment.

The Washington Office, Office of Safety and Occupational Health sends the recommended actions to the responsible staffs for review and comment. Responsible staffs have 10 working days to respond.

Issues that are not directly related to the accident's cause must be administratively separated from the accident prevention recommendations. These subsidiary issues shall be addressed in a separate letter from the team leader or ARB chairperson recommending that the approving authority take action they deem appropriate.

7.5 Final Approval of the Accident Prevention Action Plan and Distribution of the Report

7.4
7.5
7.6

The chairperson forwards the final investigation report, the draft accident prevention action plan and its transmittal letter to the Chief's office for approval (exhibits 7–4 and 7–3). When the Washington Office DASHO assigns the ARB responsibilities to a Region, the final investigation report and the draft accident prevention action plan will be forwarded to the Washington Office, Office of Safety and Occupational Health for review and approval.

7.6 Disposition of the Report and the Case File

A. After completing the ARB process, the chairperson will collect all copies of the draft investigation report and notes, and ensure that all are destroyed.

B. The case file will remain in the custody of the safety official at the level where the investigation was authorized for internal use only. The case file includes factual data, evidence, witness statements, interviews, and other records that were used during the investigation.

C. The chairperson will forward the final investigation report and two copies of the report to the safety manager at the organizational level authorizing the investigation. These

documents must be mailed by a traceable means (such as certified mail).

One copy of the accident investigation report and the accident prevention plan will be sent to the Washington Office Safety and Occupational Health director. One copy of the preliminary aviation accident investigation report will be also sent to the national aviation safety and training manager. One copy of accident investigation reports involving fire operations will also be sent to the national fire operations safety manager.

D. Before returning any physical evidence, the chairperson and the team leader shall contact any other agency that is conducting an ongoing collateral ground investigation to approve release of the physical evidence. When approved, physical evidence will be returned to the property manager, insurance company, or owner under signed receipt. Return of contractor property will be coordinated through the appropriate contracting officer.

For aviation accident investigations and other collateral aviation investigations, release of physical evidence must be approved by the NTSB.

7.6
7.7
7.8

7.7 Release of the Accident Investigation Report and Documents

On approval and release by the WO Forest Service Chief, the accident investigation report will be forwarded to the Forest Service freedom of information officer for review of Freedom of Information Act/Privacy Act issues.

On completion of the review, information and lessons learned from the accident investigation report will be released on the Forest Service Web site and to the public.

Any request made under the Freedom of Information Act for copies of factual section and management evaluation section and supporting documents shall be forwarded immediately to the appropriate Forest Service freedom of information officer. Sections prepared during an investigation may contain information that must be kept private, and they may contain another agency's documents.

If there are privacy or personnel issues and redactions covered by the Freedom of Information Act, a partial release of the factual section and management evaluation section may occur.

7.8 Briefings, Press Releases, Family Meetings

Each accident investigation will have some level of interest and involvement from other governmental agencies, the media, family members, and Forest Service employees. The team leader and chief investigator may be asked to participate in meetings, briefings, and possibly congressional testimony. These contacts should always be done in coordination with the appropriate region, station, or Washington Office liaison personnel. Presentations should emphasize that the investigation is for accident prevention purposes only and should be restricted to factual data and findings from the report. Team recommendations should not be discussed. Instead, reference the ARB action plan if it has been issued.

EXHIBIT 7–1

USDA United States Department of Agriculture	Forest Service	Washington Office	1400 Independence Ave. SW. Washington, DC 20250

File code: 6730 Date:
Route to:

Subject: Delegation of Authority
(Name and location of accident)
(Date of accident)

To: (Chairperson, Accident Review Board)

This memorandum formalizes your appointment as chairperson of the Accident Review Board to review the Chief's Office Investigation Report on the _____ fatality that occurred near _____, on _____.

Using the *Accident Investigation Guide* (most current edition), your board will:

- Review the report for content and format.
- Accept or reject the report.
- Develop an action plan based on the report's recommendations.
- Submit the action plan to the Chief for approval.

The (level authorizing the investigation) safety office will assist you with selecting the members of your board and arranging for logistical support.

All travel and associated costs related to the board should be charged to (job code). For additional information, please contact (safety manager at level authoriziing the investigation).

Title (Name of official authorizing the board)

cc:
Safety Manager (at level authorizing the investigation)

Caring for the Land and Serving People

Exhibit 7–1

Exhibit 7–1—Accident Review Board delegation of authority.

EXHIBIT 7–2

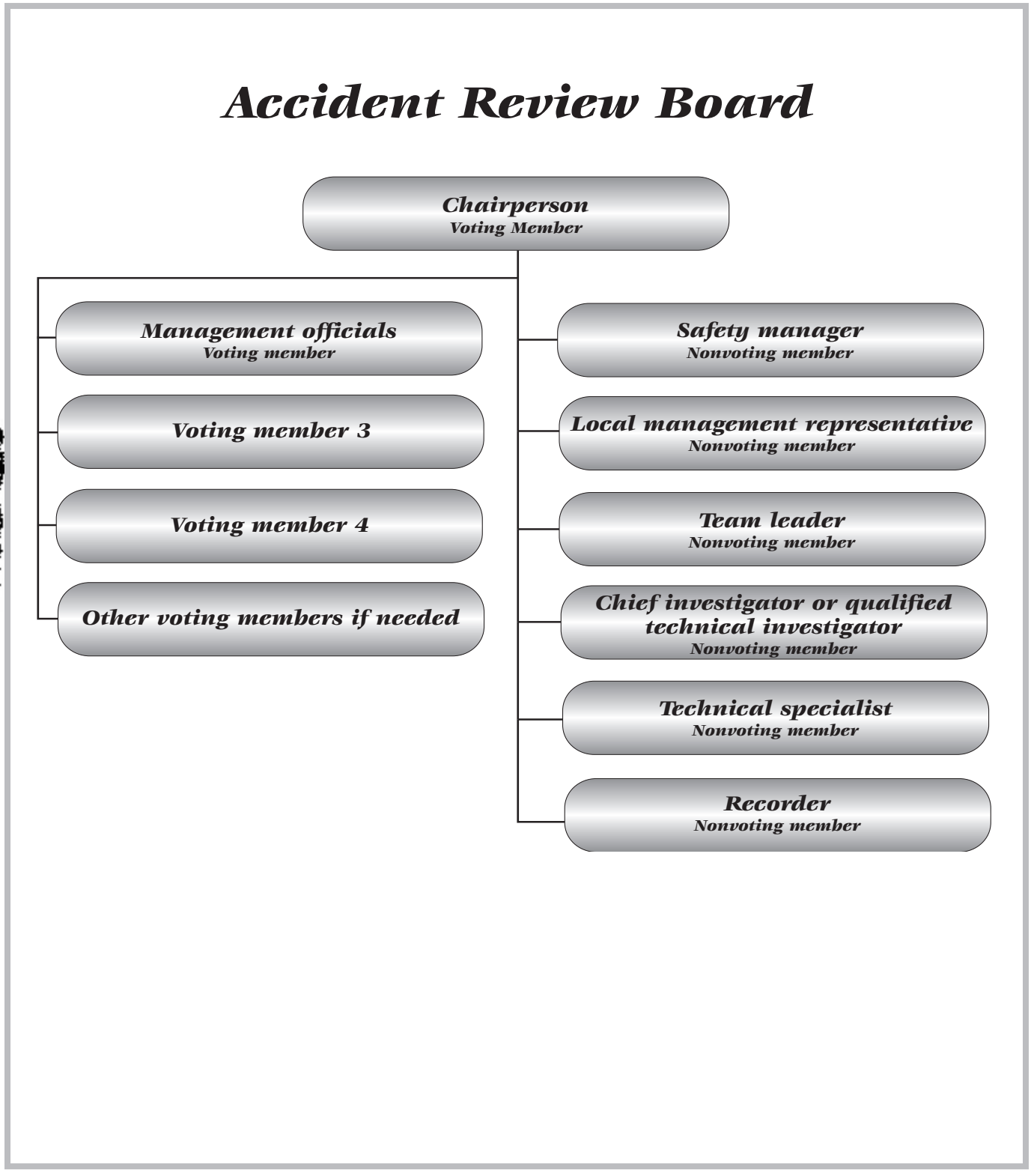

Exhibit 7–2

Exhibit 7–2—Accident Review Board organization chart.

EXHIBIT 7–3

USDA United States Department of Agriculture	Forest Service	Washington Office	1400 Independence Ave. SW. Washington, DC 20250

File code: 6730 Date:
Route to:

Subject: Accident Review Board Letter of Transmittal
(Name and location of accident)
(Date of accident)

To: Chief

On (___date___) employees working on the (___name___) Forest in Region (___) died when the (brief statement of circumstances). A Chief's level accident investigation team was dispatched to investigate the accident. The investigation team's draft factual section and draft management evaluation section were presented to the Chief's Accident Review Board and were accepted (accepted with some revision).

The board has recommended actions to help prevent similar accidents from occurring in the future. Please review and approve the enclosed action plan and letter of transmittal.

If you would like to discuss these actions please contact me.

Chairperson, Accident Review Board

(Enclosure)

Caring for the Land and Serving People

Exhibit 7–3

Exhibit 7–3—Accident Review Board letter of transmittal.

EXHIBIT 7–4

USDA United States Department of Agriculture	Forest Service	Washington Office	14th and Independence Ave. SW. Washington, DC 20250

File code: 6730 Date:
Route to:

Subject: Accident Review Board Action Plan, (name and date of accident)

To: (Deputy Chiefs, Regional Foresters, Station Directors concerned with accident or action plan)

A Chief's Office Accident Review Board (ARB) was convened on (date), regarding (type accident and location). The victim was a Forest Service employee who was a member of (unit and region or station).

The Chief's Office Accident Investigation Team presented the factual section and management evaluation section to the ARB. These sections were reviewed and approved (approved after some revision). An action plan was developed by the ARB to focus on key actions that, when implemented, would best help prevent similar mishaps in the future.

I approved the Board's recommended action plan for implementation by the responsible units. Please review the enclosed action plan and take the appropriate steps to ensure completion of each respective action by the assigned date.

When an action item is completed, notify the Office of Safety and Occupational Health (OSOH). Quarterly status reports should be sent to the OSOH for action items with out-year completion dates.

Chief

(Enclosure)

cc:
Directors, (responsible for action items)

Caring for the Land and Serving People

Exhibit 7–4

Exhibit 7–4—Accident prevention action plan.

Chapter 8

Wildland Fire Shelter Entrapments, Deployments, and Fatalities

Chapter 8—Wildland Fire Shelter Entrapments, Deployments, and Fatalities

8.1 General

The following information is specific for wildland fire shelter entrapments, deployments, and fatalities. The investigation process and development of the factual and management evaluation sections need to follow procedures already established in this guide.

8.2 Scope and Purpose

Wildland firefighters are members of a relatively small community and operate under a concept of total interagency mobilization that moves firefighters across the country as easily as rural departments move across county lines. Because of this mobility, information about specific fire-related accidents or incidents and the lessons learned from these situations must be disseminated to all firefighters quickly and thoroughly. Most wildland fire agencies that experience a burnover or fatality conduct an investigation to review the circumstances of the incident. Such a review can provide important insights and recommendations to improve wildland fire safety.

8.3 Wildland Fire Shelter Entrapments, Deployments, and Fatalities Protocol

In a wildland fire environment:

- A deployment refers to the use of a fire shelter.

- "An entrapment is a situation where personnel are unexpectedly caught in a fire-behavior-related, life-threatening position where planned escape routes or safety zones are absent, inadequate, or have been compromised. An entrapment may or may not include deployment of a fire shelter for its intended purpose." (*Investigating Wildland Fire Entrapments: 2000 Edition*, 0051–2869–MTDC)
  —All motorized fire equipment vehicles (such as engines) involved in a burnover will be considered an entrapment.
  —A fatality is any death that occurs in the line of fire duty.

A. Initial Response. The unit or incident management team that has experienced a fire entrapment, deployment, and/or fatality needs to take some immediate actions before the investigation team arrives. The fire entrapment/fatality first-response form needs to be completed and transmitted to the agency administrator and investigation team leader (exhibit 8–1).

Also, the unit or incident management team shall report preliminary information about a fire entrapment, deployment, and fatality associated with wildland fire operations on the wildland fire fatality and entrapment initial report form (NFES No. 0869). This form must be forwarded to the agency administrator and the National Interagency Coordination Center within 24 hours of the fire-related accident or incident (exhibit 8–2).

B. Team Composition. As soon as a fire entrapment, deployment, and/or fatality occurs, the agency having jurisdiction establishes an investigation team for the incident.

A chief investigator is assigned from the lead agency on whose land the entrapment occurred or whose firefighters were involved. The memorandum of understanding between the United States Departments of the Interior and Agriculture documents the assignment (exhibit 8–3). In cases where two jurisdictions are involved, dual chief investigators may be named. Other individuals normally assigned to a fire-related investigation in addition to the regular team members are:

- Fire operations expert
- Fire behavior analyst (with experience in the fuel type where the incident occurred)
- Fire weather meteorologist from the United States Department of Commerce National Oceanic and Atmospheric Administration's Fire Weather Service
- Fire equipment specialist from the Missoula Technology and Development Center
- Technical (professional) photographer
- Fire information officer

These team members should be selected from outside the region/forest unit where the accident or incident occurred.

C. Notification. As soon as an entrapment, deployment, and/or fatality are verified, the local unit dispatcher should make the following contacts:

1. Forest Service law enforcement personnel should be requested to help secure the site.

2. In the case of a fatality, notify the county sheriff who will notify the coroner/medical examiner.

3. Other notifications that should take place are:

- National Interagency Coordination Center.
- Higher level headquarters (region, station, and area safety managers).
- United States Department of Labor Occupational Safety and Health Administration. (Notification within 8 hours for all fatalities and hospitalizations of three or more employees.)
- Other agencies and individuals as required by incident response plans.

D. Activities at the Accident Site. When a fatality occurs during a fire-related accident, the victim should not be moved without specific permission of the county sheriff or coroner/medical examiner. Injured persons should receive emergency medical treatment and be taken to a medical facility as soon as possible.

Tools, vehicles, personal equipment, personal protective equipment (including fire shelters), and other associated items should be left where they are until the chief investigator clears them for removal. Law enforcement personnel should secure the site from outside disturbance and from unauthorized visits by the media. Information gathered at the site of an entrapment is often critical in reconstructing the events that occurred and for identifying lessons that can be learned to avoid similar accidents in the future.

Review the fire entrapment/fatality first-response form for additional steps to be taken before the investigation team arrives (exhibit 8–1).

E. Investigation Elements.
- Fire behavior
- Environmental factors
- Incident management
- Control mechanisms
- Personnel profiles of those involved
- Equipment

Exhibit 8–4 shows the entrapment investigation elements matrix. It is designed as a checklist to assist team members involved in entrapment investigations in identifying elements involved in the accident/incident event. It is not designed to be used as a report format.

F. Investigation Team Activities.

- Once the investigation team arrives, the team undertakes the following tasks at the direction of the Chief Investigator:
- Photograph the entire scene before any items are removed. Specific areas requiring photographic documentation include overviews of the accident or incident scene from the air. Aerial photographs show critical factors such as fuel types and burn patterns that may have contributed to the accident or incident. When photographing from helicopters, avoid disturbing the site with rotor downwash.
- Include general area photographs of the scene from the ground and large-format closeups of damage to personal protective equipment and other firefighting equipment. Laying a new yellow Nomex shirt and green Nomex trousers where an individual was burned over helps to show conditions as they were found.
- Prepare a detailed site diagram showing the specific location of individuals, equipment, roads, structures, and other important features. Small accident or incident scenes can be mapped using a compass and the pacing method from known landmarks or control points. At accident or incident scenes covering more than a $^3/_8$-mile area, Global Positioning System (GPS) locations may be useful. A detailed site diagram is an essential part of the final investigation report.
- After the visual review has been completed, individual items of personal protective clothing and other equipment should be collected, tagged to indicate who used them, and taken to the investigation team headquarters. These items should be protected and secured in the same manner as evidence.
- Natural terrain features at accident or incident scenes can provide valuable information. Slope, aspect, drainage, fuel type, fuel loading, heat-set on grass and needles, and evidence of winds can help the investigator determine the events that led to the entrapment.

G. Analysis of Personal Protective Equipment. PPE should be inspected for compliance with Forest Service policies for mandatory and optional equipment for wildfires. It should also be inspected to determine the manufacturer and whether the equipment was constructed in accordance with accepted standards. The National Fire Protection Association (NFPA) 1977 compliance label is a good indicator of compliance.

Clothing subjected to radiant heat or direct flame should be compared with industry examples to show temperature ranges in the deployment, entrapment, or fatality. Comparing the condition of burned equipment with the design standard can often help determine the survivability of a fire-related accident.

EXHIBIT 8–1

Fire Entrapment/Fatality First-Response Form

	PERSON RESPONSIBLE	DATE/TIME ASSIGNED
AT THE SCENE		
1. ***Have law enforcement personnel isolate the scene.*** Night or day, involve your law enforcement personnel so that they can help preserve all evidence.		
2. Once the injured have been treated, retrieve their PPE and line gear. The equipment specialists need to examine all PPE to determine its performance and to help calculate fire intensities, heat loads, and so forth.		
3. All entrapped persons, those uninjured, and others directly involved must be removed from the incident. However, keep them isolated from the media—do not begin interviews!		
4. In the event of fatalities, notify the county sheriff. If possible, leave the bodies in place until investigators arrive. If remains are removed before the investigation team arrives, ensure that photos are taken. Do not process exposed film in uncontrolled facilities.		
5. Initiate an airspace restriction (FAR 91.137).		
6. Restrict any low-level helicopter flights over the area. Rotor downwash may disturb or cover evidence.		
7. Instruct all persons at the incident that their photos and notes (weather observations, times, and so forth) may be needed.		
8. Contact a critical-incident stress debriefing team.		
INJURED PERSONS		
1. Assign a person to act as liaison with the hospital. This person should perform this important function full time through the first critical days. Avoid assigning someone with collateral duties that would interfere with the duties of hospital liaison.		
2. Secure the PPE of persons who were injured. In the past, fire shirts, fire pants, and boots have been disposed of by hospital personnel. It is important that these items be preserved.		
3. Protect the victims' privacy. They have just suffered acute mental and/or physical trauma, and they and their families should not be subjected to intense outside scrutiny.		
AT THE OFFICE		
1. Secure dispatch logs and radio tapes.		
2. If an incident command team is managing the fire, consider ordering a replacement team.		
3. Notify your agency line officer and the National Interagency Coordination Center.		
4. Assign a local fire information officer to handle initial media contacts.		
5. Order a Type III helicopter for photography and transportation of the investigation team.		
6. Assign a local agency person to act as liaison to the investigation team.		
7. Prepare a list of names, organizations, and telephone numbers of all persons involved in the incident, and those who may offer witness statements (such as pilots, dispatchers, line officers, and civilian observers).		
8. Obtain topographic maps, planimetric maps, and aerial photos of the area for the investigation team.		
9. Arrange for an initial meeting room/team headquarters that can be secured.		
10. Assemble relevant paperwork, such as weather observations, forecasts, fire training and qualifications records, mobilization plans, time records of those involved, and so forth.		

Exhibit 8–1

Exhibit 8–1—Fire entrapment/fatality first-response form.

EXHIBIT 8–2

Wildland Fire Fatality and Entrapment
INITIAL REPORT

Complete this report for fire-related entrapment and/or fatalities. Timely reporting of wildland-related entrapments or fatalities is necessary for the rapid dissemination of accurate information to the fire management community. It will also allow fire safety and equipment specialists to quickly respond to these events as appropriate. This initial report does not replace agency reporting or investigative responsibilities, policies, or procedures. Immediately notify the National Interagency Coordination Center (NICC). Submit this written report within 24 hours—**even if some data are missing**—to the address given below.

NICC—National Interagency Fire Center
3833 South Development Ave.
Boise, ID 83705-5354

Phone: 208–387–5400
Fax: 208–387–5414

NICC Intelligence Section
E-mail: *nicc_intel@nifc.blm.gov*

Submitted by:_____ Position:_____

Agency:_____ Location:_____

Phone:_____ E-mail:_____

Exhibit 8–2

1. General Information

- Date of event_____ Time_____
- Number of personnel involved_____
- Number of: Injuries_____ Fatalities_____
- Fire name, location, agency, etc.

_____

_____

_____

_____

2. Fatalities

- Type of accident:
  - ❑ Aircraft
  - ❑ Natural (lightning, tornado, etc.)
  - ❑ Medical (heart, stroke, heat, etc.)
  - ❑ Struck by falling object
  - ❑ Vehicle
  - ❑ Smoke
  - ❑ Entrapment
  - ❑ Other
- Where fatality/entrapment occurred:
  - ❑ Fire site
  - ❑ Incident base
  - ❑ In transit
  - ❑ Other

Note: In the event of fatality(s), do not release name(s) until next of kin are notified.

- Employing agency_____
- Unit name_____
- Address_____
- For further information, contact_____

  Home unit address_____

  Phone_____

Exhibit 8–2—Wildland fire fatality and entrapment initial report.

EXHIBIT 8–2 (continued)

3. Fire-Related Information

- Fuel model_____
- Temperature_____ RH_____ Wind_____mph
- Topography_____
  _____ Slope_____%
- Fire size at the time of the incident/accident___acres
- Incident management type at the time of the incident/ accident (circle one): 1 2 3 4 5
- Urban/wildland intermix? ❑ Yes ❑ No
- Cause of fire: ❑ Natural ❑ Incendiary ❑ Accidental ❑ Unknown

4. Entrapment Information

A situation where personnel are unexpectedly caught in a fire-behavior-related, life-threatening position where escape routes or safety zones are absent, inadequate, or have been compromised. An entrapment may or may not include deployment of a fire shelter. Note: Engine and dozer burnovers also constitute entrapments.

- Brief description of the accident_____

_____

_____

_____

_____

_____

_____

_____

Entrapment Description

- Person trapped ❑ With fire shelter ❑ Without fire shelter
- Burns/smoke injuries incurred while in fire shelter ❑ Yes ❑ No
- Burns/smoke injuries incurred while escaping entrapment ❑ Yes ❑ No
- Burns/smoke injuries incurred while fighting fire ❑ Yes ❑ No
- Fire shelter performed satisfactorily ❑ Yes ❑ No
- Fire shelter was available, but not used ❑ Yes ❑ No

Personal Protective Equipment Used

Fire shelter	❑ Yes	❑ No
Protective pants	❑ Yes	❑ No
Protective shirt	❑ Yes	❑ No
Face/neck protection	❑ Yes	❑ No
Gloves	❑ Yes	❑ No
Hardhat	❑ Yes	❑ No
Boots	❑ Yes	❑ No
Goggles	❑ Yes	❑ No

NFES No. 0869 (Revised 2/01) PMS No. 405-1

Exhibit 8–2—Wildland fire fatality and entrapment initial report *(continued)*.

EXHIBIT 8–3

MEMORANDUM OF UNDERSTANDING

Between the United States Department of the Interior and the United States Department of Agriculture

I. Purpose. This Memorandum of Understanding establishes the basis for interagency investigation of serious fire-related accidents.

II. Introduction. If the causal factors of a serious fire-related accident are identified, effective corrective actions to prevent a recurrence can be taken. Interagency investigations add perspective and enhance the mix of skills and knowledge on the investigation team. Interagency investigations are especially important where there are common management and corrective action issues.

III. Policy. Interagency investigations will be conducted whenever a serious fire-related accident occurs on a USDA Forest Service managed fire, Department of the Interior managed fire, or a jointly managed fire. Aircraft accidents occurring during wildland fire operations will be investigated by the National Transportation Safety Board, the USDA Forest Service, and the Department of the Interior in accordance with established laws and agreements.

IV. Definitions.

A. *Serious Fire-Related Accidents*. Accidents occurring to personnel participating in wildland fire suppression or prescribed burning operations, or to personnel working in direct support of those activities, which result in one or more fatalities or the hospitalization of three or more personnel.

B. *Co-Lead Investigations*. Team leaders from both Departments and team members from both Departments.

C. *Agency-Lead Investigations*. Single team leader and team members from both Departments.

V. Procedures. Interagency investigation teams will include personnel from both the Department of the Interior and the Department of Agriculture. Representatives of the Department of Labor, Occupational Safety and Health Administration will be invited to participate in these investigations, or will be given full support to conduct their own investigation.

A. *Co-Lead Investigations* will be conducted whenever:

1. A serious fire-related accident occurs on a USDA Forest Service/Department of the Interior jointly managed fire, or,

2. A serious fire-related accident involving USDA Forest Service personnel occurs on a Department of the Interior managed fire, or,

3. A serious fire-related accident involving Department of the Interior personnel occurs on a USDA Forest Service managed fire.

B. *Agency-Lead Investigations* will be conducted whenever only one agency is responsible for managing a fire, and a serious fire-related accident occurs affecting only personnel of that same agency. The agency responsible for managing the fire will lead the investigation.

VI. Timeframes. The report should be completed and a copy submitted to the appropriate Departmental Designated Safety and Health Official(s) within 45 calendar days of the accident.

VII. Training and Qualifications. Team leaders, investigators, and specialists will meet minimum training and qualification standards as jointly established by the Department of Agriculture, the Department of the Interior, and the National Wildfire Coordinating Group.

Wardell C. Townsend, Jr.
Assistant Secretary Operations
U.S. Department of Agriculture

Claudia P. Schecter
Director of Operations
U.S. Department of the Interior

10/26/95

Exhibit 8–3—Memorandum of understanding between the U.S. Departments of the Interior and Agriculture.

EXHIBIT 8–4

Entrapment Investigation Elements

	Did not contribute	Influenced	Significant contribution
FIRE BEHAVIOR			
Fuels			
Weather			
Topography			
Predicted v. observed			
ENVIRONMENTAL FACTORS			
Smoke			
Temperature			
Visibility			
Slope			
Other			
INCIDENT MANAGEMENT			
Incident objectives			
Strategy			
Tactics			
Safety briefings/major concerns			
Instructions given			
CONTROL MECHANISMS			
Span of control			
Communications			
Ongoing evaluations			
10 Standard Fire Orders/18 Watchout Situations			
PERSONNEL PROFILES OF THOSE INVOLVED			
Training/qualifications/physical fitness			
Length of operational period/fatigue			
Attitudes			
Leadership			
Experience levels			
EQUIPMENT			
Availability			
Performance/nonperformance			
Clothing and equipment			
Used for intended purpose?			

DO NOT SUBMIT THIS FORM WITH YOUR INITIAL REPORT!

Exhibit 8–4—Entrapment investigation elements.

Chapter 9

Aviation Investigations

Chapter 9—Aviation Investigations

9.1 Introduction

Aviation resources operate under the concept of total interagency mobilization that moves across agency boundaries. Because of this mobility, information about specific accidents or incidents and the lessons learned from these situations must be disseminated quickly and thoroughly.

9.2 Scope and Purpose

The National Transportation Safely Board (NTSB) has the responsibility to investigate all Forest Service aviation accidents.

The investigation process and report should follow procedures already established in this guide. Specific differences that apply to aviation mishaps (accidents and incidents with potential) are identified in this chapter.

9.3 National Transportation Safety Board Investigations

Working with the NTSB creates unique interagency working relationships due to differences in policies and procedures.

The NTSB will conduct the investigation in one of the following ways.

1. The NTSB investigator in charge (IIC) conducts the onsite investigation.

- When the IIC conducts the onsite investigation, the qualified technical investigator assists the IIC as requested in the collection of data to support the NTSB factual report.

2. The IIC delegates the onsite investigation to the Federal Aviation Administration (FAA).

- When the FAA conducts the onsite investigation, they do so with the full authority of the NTSB. The QTI will be the liaison with the FAA onsite investigator.

3. The IIC delegates the onsite investigation to the Forest Service.

- When neither the NTSB nor the FAA conduct the onsite investigation, the QTI will conduct the onsite investigation and provide all data collected to the IIC.

9.4 Forest Service Investigations

A. NTSB Led Investigations

The NTSB will appoint an investigator in charge (IIC) to perform the NTSB factual investigation. The investigation process and direction is under the authority of the IIC.

The Forest Service investigation team will conduct their investigation following the investigation guide procedures in this guide concurrent with the NTSB. The Forest Service QTI will be a member of the NTSB investigation and will be the liaison between the Forest Service and the NTSB.

The NTSB IIC will lead the factual investigation. NTSB investigations, whether conducted by the NTSB or its agent, shall have precedence over all other activities.

B. FAA Lead Investigations

All onsite investigations conducted by the FAA shall be accomplished in the same manner as the NTSB conducted investigations.

C. Forest Service Led Investigations

Forest Service accident investigation teams shall follow the procedures outlined in this guide.

9.5 Composition of the Investigation Team

Refer to chapter 1.5 for composition of the investigation team.

9.6 Forest Service Accident Investigation Report

A. The NTSB IIC will produce an official NTSB Factual Report. Due to the Forest Service requirement for a report within 45 days, a preliminary accident investigation report is produced that includes a factual section and a management evaluation section. The QTI will coordinate closely with the NTSB IIC to produce the Forest Service preliminary report for agency use, following the procedures established in chapter 6. This Forest Service preliminary report must be reviewed and approved for release by the NTSB IIC before going to the Accident Review Board (exhibit 9–1). The Forest Service preliminary report will remain preliminary until release of the NTSB Factual Report.

B. The NTSB is responsible for the factual investigation of all Forest Service aircraft accidents. The NTSB report is prepared using NTSB forms and format and may take up to 12 months to complete. When the NTSB Factual Report is released, the National Aviation Safety Center will evaluate and determine whether any significant factual findings differ with the Forest Service preliminary report. If significant differences are found, the national aviation safety manager may request, through the appropriate authorities, to reconvene the Accident Review Board.

C. The Forest Service preliminary factual section is used for developing the management evaluation section (exhibit 9–3).

9.7 Aviation Investigation Sequence

A. The aviation investigation sequence will follow the format established in chapter 1.7. The aviation investigation sequence is unique in that the QTI must collaborate closely with the NTSB IIC and the Forest Service team leader to ensure information sharing and release of information.

B. The QTI will attend all NTSB meetings and will brief the Forest Service team leader.

EXHIBIT 9–1

NTSB Transmittal Letter

To: NTSB IIC,_____(Name of person)_____

From:_____(Name)_____

Subject: **Review of Forest Service Draft Preliminary Accident Investigation Report**

Registration number:_____
Make and model:_____
Location:_____
Date:_____

The Forest Service has completed a draft preliminary aviation accident investigation report of the Forest Service accident that occurred on _____(date)_____. Our internal requirement is for this report to be completed within 45 calendar days of the accident occurrence. This report does not state a probable cause and remains a preliminary agency report until the NTSB issues their final report with a probable cause. Our report is for agency use in accident prevention.

As a party member to your investigation, I am asking for your review of the attached accident report that we have completed for release to our agency personnel and interagency partners for accident prevention purposes. With your approval we would like to post these on the Internet so that we may share the lessons learned with our personnel and interagency partners as soon as possible. If there is anything you feel is not releasable, please provide your remarks in the comments section of the attached form and return a signed copy at your earliest opportunity.

(QTI signature)

NTSB IIC review of Forest Service draft preliminary accident investigation report.

Comments:_____

_____

_____

_____

_____

_____

_____

Release of report(s) approved with the comments listed above.

Date:_____

NTSB IIC

Exhibit 9–1—NTSB transmittal letter.

EXHIBIT 9–2

Aviation Human Factors Analysis

Sensory and Perceptual Factors

• Misjudgment of distance, clearance, altitude, speed, and so forth.

• False perception caused by visual illusion. Conditions that impair visual performance:
  —Featureless terrain (such as a desert, dry lake, water, or snow).
  —Darkness and poor visibility.
  —Smoke and changing smoke patterns.
  —"Black-hole" effect.
  —No horizon or false horizon (unreliable visual attitude reference).
  —Mountainous terrain or sloping runway.
  —Helicopter-rotor downwash effects.
  —Anomalous light effects that cause flicker vertigo.
  —Low contrast of objects to background or poor illumination.
  —View into bright sunlight or moonlight.
  —Shadows.
  —Whiteout (such as rotor downwash in snow).

• False perception because of inner-ear (vestibular) disturbance. Types:
  —Spinning sensation caused by inner ear over stimulation (coriolis).
  —Gravity-induced false sensation of a pitch-up (somatogravic).
  —False sensation of rotation (somatogyral).

• Spatial disorientation and vertigo. Types:
  —Unrecognized loss of attitudinal awareness.
  —Recognized vertigo.
  —Incapacitating (such as vestibular-ocular decoupling induced by rapid acceleration and deceleration forces).

• Conditions that affect sense of body position or aircraft attitude:
  —Loss of visual cues and attitude reference. (especially with no natural horizon).
  —Acceleration (G-forces).
  —Adverse medical condition or physiological condition (alcohol and drug effects, hangover, dehydration, fatigue, and so forth).
  —Moving head up and down, looking in and out to change radios, making notes in a low-level environment while banking, accelerating, climbing, and descending.

• Loss of situational awareness. Types:
  —Geographic disorientation at low level in similar terrain, frequently in adverse conditions.
  —Geographic disorientation (such as deviation from route, operation outside chart limits, loss of position awareness).
  —General loss of situational awareness (such as failure to perceive hazardous condition).
  —Erroneous situational assessment (misinterpretation of situation or condition).
  —Failure to predict or anticipate changing conditions.
  —False hypothesis confirmation bias (persistent false perception or misconception of situation).

• Attention failure (such as failure to monitor or respond when correct information is available). Types:
  —Failure to visually scan outside the aircraft for terrain and other aircraft.
  —Omission of checklist items, standard calls, or crew challenge.
  —Failure to monitor flight progress or to maintain instrument scan.
  —Failure to respond to communication or warning.
  —Control-action error:
    • Failure to set, move, or reset control switch (lapse).
    • Unintentional activation of control switch (slip).
    • Control-substitution error (slip).
    • Control-reversal error (slip).
    • Control-adjustment or precision error (slip).

• Conditions that affect attention and situational awareness:
  —Inattention (focus on information unrelated to flight-deck tasks or flying).
  —Channelization, fixation (psychological narrowing of perception).
  —Distraction (preoccupation with internal [mental] event or with external event).
  —Task overload due to aircraft systems.
  —Task overload due to aircraft systems mission factors.
  —Cognitive workload (problem-solving concentration or information overload).
  —Habit influence or interference.
  —Excessive flight crew stress or fatigue.
  —Excessive mission tasking or workload.
  —Inadequate briefing or flight preparation.
  —Inadequate training or experience for mission.
  —Miscommunication (such as during transition to new aircraft).

(Continued)

Exhibit 9–2—Aviation human factors analysis.

EXHIBIT 9–2 (continued)

Aviation Human Factors Analysis

—Adverse meteorological conditions.
—Tactical-situation overload or display-information overload.
—Inadequate flight crew motivation or inadequate flight vigilance.
—Inadequate flightdeck design (control or display location or data format).

Medical and Physiological

• Carbon monoxide poisoning.

• Self-medication (without medical advice or against medical advice).

• Motion sickness.

• Incompatible physical capabilities.

• Overexertion while off duty.

• Influence of drugs or alcohol.

• Cold or flu (or other known illness).

• Excessive personal stress or fatigue.

• Inadequate nutrition (such as omitted meals).

• G-induced loss of consciousness or G-induced illusion.

• Hypoxia.

• Heat.

• Cold.

• Stress induced by heightened state of alertness.

• Affects of smoke.

• Dehydration.

• Other medical or physiological condition. Conditions that may cause adverse medical or physiological state:
—Mission tasking or job fatigue (such as being on duty more than 14 hours, performing late-night or early morning operations).
—Cumulative fatigue (such as excessive physical or mental workload, circadian disruption, or sleep loss).
—Cumulative effects of personal or occupational stress (beyond stress-coping limit).
—Emergency flight condition or workload transition (from normal operation to emergency operation).
—Medical or physiological preconditions (health and fitness, hangover, dehydration, and so forth).

Knowledge and Skill

• Inadequate knowledge of systems, procedures, and so forth (knowledge-based errors). Types:
—Knowledge-based.
—Inadequate knowledge of systems, procedures.
—Use of improper procedure.
—Ill-structured decisions.
—Failure in problem solving.

• Inadequate flight control and airmanship, or inadequate accuracy and precision of flight maneuvering (skill-based error). Types:
—Breakdown in visual scan.
—Failure to see and avoid.
—Poor flight control and airmanship.
—Over or under reacting.
—Over or under controlling.
—Inadequate experience for complexity of mission.
—Improper takeoff technique.
—Improper landing technique.

• Misuse of procedures or incorrect performance of flight-deck tasks (rule-based error), such as:
—Failure to perform required procedure.
—Use of wrong procedure or rule(s).
—Failure to conduct step(s) in prescribed sequence.
—Failure to complete performance computations for flight.

• Conditions that lead to inadequate operational performance:
—Lack or variation of standards.
—Loss of situational awareness in varying environment.
—Performance below required proficiency standards or currency standards.
—Inadequate performance or documented flight-aptitude deficiencies.
—Limited flight hours (total or type).

(Continued)

Exhibit 9–2

Exhibit 9–2—Aviation human factors analysis.

EXHIBIT 9–2 (continued)

Aviation Human Factors Analysis

—Inadequate essential training for specific task(s).
—Inadequate recent experience or inadequate experience in flight condition (such as instrument flight rules, night, weather).
—Transition (learning new aircraft system).
—Lack of sensory input.
—Limited reaction time.

Mission Factors

• Failure of dispatch to provide correct critical information (such as frequencies, location, other aircraft).

• Poor communication with other resources (such as ground personnel or other aircraft).

• Inadequate or faulty supervision from supervisory tactical aircraft.

• Inadequate or faulty supervision of tactical aircraft by ground personnel.

• Lack or variation of standards.

• Nonparticipant or noncommunicative aircraft onscene.

• Loss of situational awareness in varying environment.

• Change of plans or tactics (change of teams on incidents).

• Unanticipated change of radio frequencies.

• Intentional deviation from procedures.

• Unintentional deviation from procedures.

• Performance below required or current proficiency standards.

• Inadequate performance or documented flight-aptitude deficiencies.

• Limited flight hours (total or type).

• Inadequate essential training for specific task(s).

• Inadequate recent experience or inadequate experience in flight condition (such as instrument flight rules, night, weather).

• Transition (learning new aircraft system).

• Inadequate knowledge of tactical situation.

• Lack of sensory input.

• Limited reaction time. Conditions that lead to inadequate special-use mission performance:
—Smoke.
—Wind shifts.
—Changes in fire behavior.
—Low visibility.
—Turbulence.
—Unexpected or nonparticipant aircraft.
—Mission intensity.
—Mission creep (scope of the mission increases).
—Mission urgency.
—Failure to recognize deteriorating conditions.
—Time compression.
—Diversion to new incidents.
—Excessive communication demands.
—Past mission success was based on high-risk behavior.

Personality and Safety Attitude

• Overconfidence in flying ability.

• Excessive motivation to achieve mission.

• Reckless operation.

• Anger or frustration on the job.

• Stress-coping failure (such as anger).

• Overly assertive or nonassertive.

• Inadequate confidence to perform tasks or activities.

• Acquiescence to social pressure (from organization or peers) to operate in hazardous situation or condition.

(Continued)

Exhibit 9–2—Aviation human factors analysis.

EXHIBIT 9–2 (continued)

Aviation Human Factors Analysis

- Failure to report or act upon incidents of misconduct.
- Tolerance of unsafe acts and behaviors.
- Poor flight preparation.

Judgment and Risk Decision

- Acceptance of a high-risk situation or mission.
- Misjudgment of mission risks (complacency).
- Failure to monitor flight progress or conditions (complacency).
- Use of incorrect task priorities.
- Intentional deviation from safe procedure (imprudence).
- Intentional violation of standard operating procedure or regulation. Types:
  - —Violation of orders, regulations, SOP.
  - —Crew rest requirements.
  - —Inadequate training.
  - —Violation of agency policy or contract.
  - —Failure to comply with departmental manuals.
  - —Night training or special mission with PAX.
  - —VFR filing in marginal weather conditions.
  - —Failure to use radar advisories from ATC.
  - —PIC knowingly accepted noncurrent crew.
  - —Performance of unauthorized acrobatic maneuver.
  - —Scud running (avoiding a weather pattern).
  - —Failure to obtain valid weather brief.
  - —Acceptance of unnecessary hazard.
  - —Not current or qualified for mission.
- Intentional disregard of warning (by human or aircraft system).
- Noncompliance with personal limits.
- Noncompliance with published aircraft limits.
- Noncompliance with prescribed mission profile or parameters.
- Acquiescence to social pressure (from organization or peers). Conditions leading to poor safety attitude and risky judgment:
  - —History of taking high risks (personality-driven).
  - —Pattern of overconfidence (aggrandized self-image).
  - —Personal denial of wrongdoing.
  - —Documented history of marginal performance or failure.
  - —Excessive motivation (did not know limits).
  - —Reputation as a reckless pilot.
  - —Failure to cope with life stress (anger or frustration).
  - —Overly assertive or nonassertive (interpersonal style).
  - —Influenced by inadequate organizational climate or safety culture (such as lack of adequate supervision).

Communication and Crew Coordination

- Inadequate mission plan or brief or preflight.
- Inadequate or wrong mission information conveyed to flight crew (dispatch errors).
- Failure to communicate plan or intentions.
- Failure to use standard or accepted terminology.
- Failure to work as a team.
- Inability or failure to contact and coordinate with other aircraft or ground personnel.
- Inadequate understanding of communication or failure to acknowledge communication.
- Interpersonal conflict or crew argument during flight. Conditions leading to inadequate communication or coordination:
  - —Inadequate training in communication or crew coordination.
  - —Inadequate standard operating procedures for use of crew resources.
  - —Inadequate support from organization for crew-coordination doctrine.
  - —Failure of organizational safety culture to support crew resource management.
- Internal communication on aircraft:
  - —Inadequate crew coordination (challenge, cross-check).
  - —Intentional withholding, by a crewmember, of vital safety data.
  - —Failure of the pilot-in-command to lead or delegate.

(Continued)

Exhibit 9–2

Exhibit 9–2—Aviation human factors analysis.

EXHIBIT 9–2 (continued)

Aviation Human Factors Analysis

—Failure of the pilot-in-command to use all available resources.

System Design and Operation

- Use of wrong switch, lever, or control.
- Misinterpretation of instrument indication.
- Inability to reach or see control.
- Inability to see or interpret instrument or indicator.
- Failure to respond to warning.
- Selection or use of incorrect avionics system-operating mode (mode confusion).
- Overreliance on automated system (automation complacency). Conditions that contribute to design-induced flight crew errors:
  - —Inadequate primary aircraft control or display arrangement.
  - —Inadequate primary display data or data format.
  - —Incompatible flightdeck control or display activation, or aircraft-response mapping.
  - —Inadequate hazard advisory or warning display.
  - —Inadequate flight deck design (controls or displays outside crew vision or reach).
  - —Inadequate human-computer-display interface or usability (error-prone design).
  - —Inadequate system instructions or documentation.
  - —Inadequate aviation-system support or facilities. (navigation aids, airport, air traffic control).
  - —Nonstandard flightdeck layouts that may cause confusion.
  - —Inappropriate type or level of automation, or excessive mode complexity.
  - —Maintaining current skills in operating multiple aircraft.

Supervisory and Organizational

- Failure to adhere to rules and regulations.
- Inappropriate scheduling or crew assignment.
- Failure to monitor crew rest or duty requirements.
- Failure to establish adequate standards.
- Failure to provide adequate briefing for mission.
- Inadequate training.
- Lack of professional guidance.
- Failure to support or poor support of flight crews.
- Failure to monitor compliance with standards.
- Failure to monitor crew training or qualifications.
- Failure to identify or remove a known high-risk pilot.
- Failure to correct inappropriate behavior.
- Failure to correct a safety hazard.
- Failure to establish or monitor quality standards.
- Failure of standards, either poorly written, highly interpretable, or conflicting.
- Risk outweighs benefit.
- Poor crew pairing.
- Excessive mission tasking or workload.
- Intentional violation of a standard or regulation.
- Failure to perceive or to assess mission risks correctly, with respect to:
  - —Unseen or unrecognized hazards.
  - —Environmental hazards or operating conditions.
  - —Mission tasking and flight crew skill level.
  - —Aircraft and equipment limitations.
- Conditions leading to supervisory failures:
  - —Excessive operations or organizational workload (imposed by the organization or imposed by organizational chain of command).
  - —Inadequate organizational safety culture.
  - —Supervisor is over-tasked.
  - —Supervisor is untrained.
  - —Inattention to safety management (inadequate safety supervision).

(Continued)

Exhibit 9–2

Exhibit 9–2—Aviation human factors analysis.

EXHIBIT 9–2 (continued)

Aviation Human Factors Analysis

—Inadequate work standards or low performance expectations.
—Inadequate or poor example set by supervisors.
—Inadequate safety commitment or emphasis by supervisors.
—Organization lacks an adequate system for monitoring and correcting hazardous conditions.
—Supervisors do not promote and reward safe behavior or quickly correct unsafe behaviors.
—Organization lacks adequate policies and procedures to ensure high quality work performance.
—Organization had inadequate job qualification standards or a training program.
—Organization lacks internal communication.
—Organization has no system or an inadequate one for management of high-risk pilots.
—Organization lacks adequate process or procedures for operational risk management.
—Organization provide inadequate aeromedical or human factors training.
—Organization lacks sufficient involvement of medical and occupational health specialists.
—Organization has not established or enforced acceptable medical or health standards.

Maintenance

- Procedures.
  —Unwritten.
  —Unclear, undefined, or vague.
  —Not followed.

- Records.
  —Discrepancies entered—but not deferred to—or resolved.
  —Entries not recorded or not recorded in correct book(s).
  —Improper entries or unauthorized signature or number.
  —Falsification of entries.

- Publications, manuals, guides.
  —Not current.
  —Not used for the procedure.
  —Incorrect manual or guide used for procedure.
  —Not available.

- Training.
  —Not trained on procedure.
  —Training not documented.
  —Falsified.
  —Not current.

- Personnel.
  —Improperly licensed.
  —Insufficient (staffing).
  —Improper or insufficient oversight.
  —Insufficiently rested.

- Management.
  —Nonexistent.
  —Ineffective.
  —Understaffed.
  —Ineffective organization of assigned personnel.
  —Insufficiently trained.

- Quality Assurance.
  —Nonexistent.
  —Insufficient training.
  —Ineffective.
  —Not used.

- Inspection Guides.
  —Unavailable.
  —Procedures not followed.
  —Insufficient.
  —Not current.
  —Not approved.
  —Not signed off.
  —Falsified.
  —Unapproved signature or number.

- FAA 337s.
  —Not completed for major repair or alteration.
  —Incomplete.
  —Not turned into the Federal Aviation Administration.
  —Not with records or flight manual.
  —Not being complied with (inspection or procedure or limitations).
  —Falsified (improper signature or number).
  —Instructions for Continued Airworthiness (ICAs).
  —Nonexistent.
  —Not followed.
  —Insufficient.

- Tools or Equipment.
  —Improper use or procedure.
  —Not calibrated.
  —Not trained for the special equipment or tool.
  —Not used.
  —No tool control program.

Exhibit 9–2

Exhibit 9–2—Aviation human factors analysis.

EXHIBIT 9–3

Aviation Accident Investigation Template

General

This template is designed to serve as a checklist for the writer of the report. Delete portions that do not apply to the accident under investigation. Review chapter 6 of the Accident Investigation Guide.

Do not identify involved personnel by name in the narrative. Identify involved personnel by their position. Involved personnel are individuals:

- Who had an active role in the accident
- Who were injured in the accident
- Whose actions or inactions initiated or sustained the accident sequence

---

Photographs, maps, illustrations, exhibits, and so forth, will be referenced in the section where applicable and properly identified as figure 1, figure 2, and so on.

Photographs should be taken before the accident scene (wreckage) is disturbed. General views of the scene from several different directions is recommended. The location and direction of each photo should be recorded. The following kinds of items should be photographed.

- Aircraft site
- Instruments
- Controls in cockpit
- Radio settings
- Fuel valve setting
- Switch locations
- Control surface positions
- Suspicious bends or breaks
- Vegetation strike points
- Propeller blades showing pitch positions
- Engine control positions in cockpit and engine
- Fire damage
- Ground impact marks
- Seats and seat belts
- Approach paths
- Terrain and obstacles, if relevant
- Photographic documentation of crash sequence
- Aerial pictures documenting the site and wreckage orientation

Location maps (include as appropriate)

- General location map
- Profile of flight/probable path of flight
- Diagram/sketches of the airport layout/helibase
- Accident scene or aerial photo identifying important features
- Suppression plan and initial action plan
- Shelter deployment location diagram
- Fire progress maps

Physical Evidence

- Analysis reports from any aircraft components

Records

Factual data and documents used to substantiate facts involving the accident. Witness statements and interviews shall be signed. If telephone and transcribed statements cannot be signed due to witness' condition, timing, or availability, insert a statement by the investigator or interviewer attesting to the time and date of the interview, followed by the investigator's or interviewer's signature. These records should not be part of the factual section or the management evaluation section. These records shall reside in an official case file. They may be used by the ARB for their deliberations. Examples of records are witness statements and interviews, training records, licenses, and aircraft and pilot cards.

You must delete these general pages and the checklist items as you fill in the sections and proceed through the report. Do not address items that do not apply.

(Continued)

Exhibit 9–3—Aviation accident investigation template.

EXHIBIT 9–3 (continued)

United States Department of Agriculture
Forest Service

THIS DOCUMENT CONTAINS MATERIALS FOR INTERNAL AGENCY USE ONLY AND MAY NOT BE RELEASED UNDER THE FREEDOM OF INFORMATION ACT WITHOUT OFFICE OF GENERAL COUNSEL REVIEW

Draft Preliminary Aircraft Accident Investigation Report

(Type of accident)
(Unit, location)
(Region/station/area/institute)
(City, State)
(Date of accident or incident)

Mount 4- by 6-inch photo here.

DRAFT – FOR OFFICIAL USE ONLY Copy _____of_____

This report will remain preliminary until the NTSB releases the final report.

(Continued)

Exhibit 9–3

Exhibit 9–3—Aviation accident investigation template.

EXHIBIT 9–3 (continued)

Preliminary Aircraft Accident Investigation Report

Accident: (Aircraft tail number, make, and model, and accident type)

_____

_____

Location: (Unit and location where accident occurred)

_____

Date: (Date of accident)_____

Signatures:

_____
Investigation team leader: (Name, title, and location of home unit)

_____
Qualified technical investigator: (Name, title, and location of home unit)

Investigation team members: (Names, titles, and locations of home units)

_____

_____

_____

_____

_____

Investigation technical consultants: (Names, titles, and locations of home units)

_____

_____

_____

_____

_____

(Continued)

Exhibit 9–3—Aviation accident investigation template.

EXHIBIT 9–3 (continued)

Table of Contents

(Continued)

Exhibit 9–3—Aviation accident investigation template.

EXHIBIT 9–3 (continued)

Preliminary Factual Section

Executive Summary

Briefly describe the mission being performed and the event that occurred to initiate the accident investigation. It normally should not exceed one page.

Narrative

Mission

1. Describe the mission events leading up to the accident.

2. Include brief statement describing the weather, terrain, obstacles, and other operational information concerning the mission.

3. Indicate who communicated with and/or observed the mission, including those who witnessed the accident.

4. List the personnel involved.
A. Describe the seating location in the aircraft.
B. List the capacity of each crewmember or passenger.

5. Identify the make, model, and serial number of each aircraft.

6. Describe the aircraft configuration and loading.

7. Identify who authorized (ordered) the flight.

8. Identify who dispatched and provided flight following for the aircraft.

9. Identify who provided operation control of the aircraft other than the pilot. (For example; the forest or district dispatcher, the Incident Commander, the District Ranger, or the regional office).

Accident Chronology/Sequence of Events

10. Using a timeline, describe each significant event prior to the accident, including discovery, rescue, and recovery.

11. Include a brief statement describing the weather, terrain, obstacles, and other operational information concerning the mission.

12. Indicate who communicated with and/or observed the mission including those who witnessed the accident.

Crash Sequence/Accident Response

13. Describe the flight regime of the aircraft during the final moments of flight, detailing each evolution, until the aircraft comes to a complete and final resting position and all personnel have exited the aircraft.

14. Include all external factors involved in the accident scenario such as fire, blade strikes, seat belt integrity, component separation, and wreckage movement.

15. Provide a disintegration sequence from the first point of impact, or inflight separation.

16. Describe briefly the actions taken concerning:
A. Crash rescue efforts/body removal, and so forth.
B. Accident plan availability and utilization.

17. Describe briefly the problems encountered concerning:
A. Communication.
B. Availability of personnel/equipment.
C. Transportation and other resources.
D. Interagency cooperation.

Injury and Damage Descriptions

18. Personnel.
A. Briefly describe all personnel injuries.
B. List expected time of hospitalization/treatment.

19. Aircraft.
A. Describe essential damage to the aircraft.
B. State whether damage was minor, substantial, demolished or burned.
C. State whether the accident was survivable and whether the cabin retained structural integrity.
D. Photographic documentation.
E. Other.

20. Accident site
A. Describe accident site and damage.

21. Omit details or circumstances that are unrelated to the accident.

(Continued)

Exhibit 9–3—Aviation accident investigation template.

EXHIBIT 9–3 (continued)

Preliminary Factual Section

Operational History

22. Operation Base.
- A. Briefly describe the operation base supporting the mission.
- B. Include only information that is related to the mission and accident.
- C. Describe the appearance, accessibility, location, suitability, organization, and management of the facility, including deficiencies.
- D. Describe communication between the facility and dispatch including aircraft communications.
- E. Describe the safety measures for the base, including the condition and suitability of equipment.
- F. Equipment inspection currency.
- G. Accident planning and response.

23. Aircraft and pilot.
- A. Discuss the following concerning the aircraft.
  - Maintenance history.
  - Inspections and approval.
  - Mission loading.
- B. Discuss contractor performance.
- C. Discuss the following items concerning the pilot.
  - Performance and habits.
  - Manifesting and records management.
  - Establish a 24-hour history (longer if necessary).
  - Inspection and approval.
  - Document last days off and flight and duty limitations compliance.

24. Organizational structure and management relationships.
- A. Prepare an organizational structure chart for the personnel involved in the accident and identify relationships to the mission flown. Discuss supervision and staffing levels if relevant.
- B. Identify the agency person who was in operational command of the mission. Establish why and how this individual was selected.
- C. Identify the individuals both inside and outside the organization who were in a position to exercise some form of control over the mission, including accident prevention (i.e., dispatcher, district ranger, helicopter manager, forest aviation officer, and so forth).
- D. Discuss the relationships as they are relevant to the investigation.

25. Aircraft dispatching and aircraft management.
- A. Discuss the communications involved in the mission.
  - When was the mission ordered?
  - How was it controlled?
  - Was there a flight plan?
  - Were communications recorded? Timely?
- B. Discuss accident response.
  - Timeliness.
  - Availability of personnel and equipment.
- C. Discuss use of checklists (crash/rescue, risk analysis, pilot and aircraft, and so forth).
- D. Does the forest aviation plan address these issues? Is it adequate? Current? Utilized?

26. Operational inspections and followup.
- A. List the contract inspections performed on the pilot and aircraft since award.
- B. Document and discuss operations inspections performed on mission personnel.

27. Physical environment.
- A. Discuss the effects of altitude, temperature, terrain, weather, and turbulence on the accident mission.
- B. Discuss the accident mission in relation to other missions performed by the pilot or unit.
  - Was the mission more difficult than normal?
  - Were environmental factors considered ? By pilot, crew, or dispatching?
  - Was management involved in the decision process?
- C. What was the workload on the pilot and crew? Was this taken into consideration by managers and at what levels?
- D. Was the departure and arrival base or site suitable for the mission undertaken?

Compliance With Directives

28. Operational procedures.
- A. Were standard procedures followed?
  - Pilot proficiency/currency.
  - Weight and balance/manifests.
  - Load calculations/manifest.
  - Aircraft and preflight checklists.
  - Power trend checks.
  - Go/no-go checklists.
  - Personal protective equipment, PPE, (worn/used).
  - Pilot and aircraft approvals.
  - Flight following.
  - Passenger controls (exposure to hazards).

(Continued)

Exhibit 9–3

Exhibit 9–3—Aviation accident investigation template.

EXHIBIT 9–3 (continued)

Preliminary Factual Section

- Flight and duty limitations.
- Contracting.
- Airport guides.
- Minimum altitudes.
- Safety briefings.
- Other.

B. Identify and discuss special mission procedures as they are related to the accident.

29. Training and Qualifications

A. The purpose of this section is to evaluate the training and qualifications of personnel including supervisors involved or directly associated with the accident.

B. Identify and discuss specific violations of established policy.

30. Records management.

A. Identify and discuss whether directives, operational guides, contracts, manifest, and so forth, were readily available and properly utilized by personnel associated with the accident. Were they current?

B. Other records to consider:

- Timesheets and overtime records.
- Dispatching logs and communications records.
- Forest aviation plan, fire plan, and so forth.
- Daily diaries.
- Other ICS forms, and so forth.

31. Accident prevention opportunities.

A. Attitudes and performance

- Discuss attitudes of personnel involved in the accident and their peers concerning:
  —Use of PPE.
  —Records management.
  —Training guide and handbook compliance.
  —Pilot and contractor performance.
  —Past operational practices.
  —Weather, terrain, and fire behavior predictions.
  —Safety practices and standard orders.
  —Management oversight.

32. Incident reports. The purpose of this section is to determine whether 5700–14s, SAFECOMs, safety documents, and other operational information is routinely completed and submitted. Establish the following:

A. History of submission by the unit/individual. Determine whether any are related to the accident being investigated. If relevant include a listing of reports and actions taken to correct at the field and Forest level.

B. Who reviews these documents on the unit? What is done about problems identified? Determine timeliness of submission including review.

C. Were other unit incident reports reviewed and discussed by the individuals involved in the accident? Is a file available?

D. Are other unit reports or safety alerts available and used?

33. Mission risk factors.

A. Determine whether a risk analysis has been performed and by whom. Is it current and applicable to the accident mission? Who was involved; management, pilot, crew, incident commander?

B. Determine whether risk determination is a consideration in mission planning. How frequent? Supervision and oversight?

C. Establish what part the risk analysis played in the accident mission.

34. Safety emphasis. The objective of this section is to determine the safety emphasis at each level of the organization as it applies to this accident.

A. Who provides emphasis on safety?

B. How is it provided? Accountability?

C. What is the frequency of briefings?

D. When was the last safety briefing held?

E. Do the district ranger, fire management officer, forest fire staff, forest aviation officer, and others participate?

Findings

35. Develop findings from supporting data. Findings are the conclusions of the accident investigation team based on the facts, weight of evidence, professional knowledge, and good judgment. Each finding should, where possible, be supported by two or more facts from the investigation.

A. Divide the listing of findings into sections by subject matter. For example:

- People
  —Pilot
  —Personnel
  —Management
- Equipment
  —Aircraft
  —Fuel Truck

(Continued)

Exhibit 9–3

Exhibit 9–3—Aviation accident investigation template.

EXHIBIT 9–3 (continued)

Preliminary Factual Section

- Environment
  —Weather
  —Terrain

Sample findings:

• The accident/incident was partially survivable due to the limited cabin structural damage and absence of fire following the accident (page xxx).

• The flight crewmembers were properly certified and inspected (page xxx).

• The load calculation and passenger manifest were properly completed and accurately depicted conditions at the destination helispot (page xxx).

• Dispatch had not received a position report or contact for more than 30 minutes, and no attempt had been made during this period to contact the aircraft or firefighters (page xxx).

• The Forest Aviation Officer (or FMO) position had been vacant for 6 months, and no assignments had been made to another individual to perform this task (page xxx).

• Three 5700-14's, SAFECOM's reports had been prepared on the pilot in the 12 days prior to the accident (page xxx-xxx).

• The last entry in the suppression crewmember's training record was dated 21 months prior to the accident. No helicopter training was provided in 2000 (page xxx).

Causal and Contributing Factors

36. Causal factor definition:
- A. Any behavior, acts, or omission that starts or sustains an accident/incident occurrence. These can occur individually or in combination. An event(s) which sustain the occurrence sequence but were normal to the situation as it developed are not causal factors.
- B. Base the causal factor(s) on the findings. Although all the findings are significant, not all of them relate to the cause of the accident.
- C. Reference which findings were used to determine each causal factor.

37. Contributing factor definition:
- A. Any behavior, act, or omission, which contributes to—but does not directly cause—an accident/incident occurrence.
- B. Management actions, failures, and behavior frequently contribute to an accident scenario, but by themselves do not cause the accident to happen. These actions meet this definition of contributing factor.
- C. Reference which findings were used to determine each contributing factor.

Appendixes

38. Appendixes. Appendixes can be used as reference information in the report. They should not be part of the case file. Examples of appendixes are:
- A. Weather reports/summaries.
- B. Aviation Human Factors Classification Analysis (HFACS).
- C. PPE analysis.
- D. Teardown analysis.
- E. Equipment analysis.
- F. NTSB Form 6120 1/2.

(Continued)

Exhibit 9–3—Aviation accident investigation template.

EXHIBIT 9–3 (continued)

Preliminary Management Evaluation Section

Preliminary Recommendations

Recommendations

Recommendations suggest measures that management may take to prevent similar accidents. They must be reasonable, feasible, and relate to the causal factors of the accident. All recommendations must allow for a definite solution to the problem. Every causal factor should have recommendations for future prevention or mitigation, although exceptions may occur. Upon completion of the report, preliminary recommendations will be developed. This last step culminates in the investigation report and represents the purpose for which the investigation was conducted. Considerable effort should be expended to ensure that the Accident Review Board (ARB) develops quality recommendations for further review and action. Number the recommendations consecutively.

Recommendation number 1:
Recommendation number 2:
Recommendation number 3:

Case File

The accident investigation case file has two components: the accident investigation report (factual section and management evaluation section), and the supporting docu-mentation and equipment that are not in the investigation report. Cassette tapes, photos not used or unfit for distribution, witness statements, and documents that may be too large, should not be included in the investigation report. They should be kept in the case file and only referenced in the accident investigation report to support the team's findings.

The Washington Office, Office of Safety and Occupational Health is the office of record for all Chief's level investigations. The office of record for delegated Chief's level investigations is the safety office of the region or station delegated responsibility to conduct the investigation. However, a copy of the accident investigation report will be forwarded to the Washington Office, Office of Safety and Occupational Health.

Case files will be maintained for the time period required by Forest Service records management rules or FOIA rules as appropriate and then destroyed, except one copy of the accident investigation report that will be kept permanently.

Examples of records that would go in the case file are:

1. Witness statements and interviews.

2. Contract and equipment records.
- A. Applicable portions of contracts and equipment records. Include contract number and date signed. Identify the contracting officer and contraction officer's representative (COR).
- B. COR diary or records.
- C. Rental equipment (as necessary and relevant).

3. Aircraft records.
- A. FS aircraft inspection records.
- B. Discrepancy sheets and FS data cards.
- C. Aircraft log sheets relevant to the accident.
- D. Power check forms.
- E. Load calculation forms.
- F. Load manifests and weight and balance forms.

4. Pilot records.
- A. Federal Aviation Administration (FAA) certificates.
- B. Medical certificates.
- C. Electrocardiogram (EKG).
- D. FS application and check-ride forms.
- E. Pilot approval card and date.
- F. Pilot training and flight time records.
- G. Medical injury report.
- H. Autopsy (relevant portions only).
- I. Death certificates.
- J. Previous 24-hour history.
- K. Pilot safety briefing and contract briefing.

5. Personnel records.
- A. Aircraft crewmembers, helitack, and suppression personnel.
  - Training and qualification records
  - Medical records of injured personnel
  - Other related records
  - Pay records (as needed)

(Continued)

Exhibit 9–3—Aviation accident investigation template.

EXHIBIT 9–3 (continued)

Preliminary Factual Section

6. Weather and terrain description.
A. Accident site.
B. Flight service station, FS fire weather, lookout reports, and so forth.
C. Fire behavior, predicted and actual.
D. Other.

7. Communications record.
A. Radio and dispatch logs.
B. Tapes and other communication records.

8. NTSB Records.
A. Transmittal letter.
B. Preliminary accident report.

9. Other.

Exhibit 9–3—Aviation accident investigation template.

Glossary and Abbreviations

Used in Investigations

Glossary and Abbreviations Used in Investigations

Accident—An unplanned event that results in an injury, illness, or damage to Forest Service property (see glossary) involving Forest Service employees, volunteers, youth program members, contractors, cooperators, emergency personnel, or the public.

Accident (aircraft)—An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and the time all such persons have disembarked, and in which any person suffers death or serious injury or the aircraft receives substantial damage.

Accident Review Board—The Accident Review Board is an internal Forest Service entity that serves as an independent evaluative body representing Forest Service management regarding an accident or incident.

Aerially Delivered Firefighters—Aerially delivered firefighters are smokejumpers, helitack crew members, rappellers, or other personnel deployed by aircraft to wildland fires or prescribed burns. Accidents associated with aerial delivery systems will be considered aircraft related if they occur before personnel have safely disembarked from the aircraft.

Agency Administrator—The authorized official on the unit where the accident occurred.

Briefing, Expanded (72-hour)—This document contains a brief narrative of the accident based on factual information gathered at the site. It is drafted by the chief investigator within 72 hours after the team arrives at the accident site and is released under the signature of the team leader. The team leader sends the expanded briefing to the safety manager at the organizational level that authorized the investigation. This information is subject to change and may contain errors. Any errors will be corrected when the factual section is completed.

Briefing, Preliminary (24-hour)—This document contains the first details of the accident. It is prepared by the unit and transmitted within 24 hours of the accident to the safety manager at the organizational level that authorized the investigation. This information is subject to change, and may contain errors. Any errors will be corrected when the factual section is completed.

Causal Factor—A causal factor is any behavior, omission, or deficiency that if corrected, eliminated, or avoided probably would have prevented the accident. A causal factor may be related to persons or machines.

Contributing Factor—A contributing factor is any behavior, omission, or deficiency that sets the stage for an accident, or increases the severity of injuries or extent of property damages.

C**ollateral Investigation—**A collateral investigation is an independent, concurrent investigation of a management issue that becomes known during the factual investigation that has no direct causal relationship to the accident. The investigation team leader will notify the appropriate line officer that an issue or issues with management implications has been discovered and will need to be investigated. This notification may result in a collateral investigation.

Entrapment—The National Wildfire Coordinating Group defines entrapment as a situation where personnel are unexpectedly caught in a fire-behavior-related, life-threatening position where planned escape routes and safety zones are absent, inadequate, or have been compromised. An entrapment may or may not include deployment of a fire shelter for its intended purpose. These situations may or may not result in injury.

Equipment—A term used to describe the “hardware” involved in an accident, such as vehicles, systems, and equipment.

Fact—Reality, actuality, truth.

Fatal Injury—Any injury that results in death within 30 days of the accident.

Findings—Findings are statements of significant events or conditions leading to the accident. They are based on facts, the investigation team’s professional knowledge, and the team’s best judgment. Findings are arranged in chronological order. Each finding is an essential step in the accident sequence, but each finding is not necessarily a causal factor.

First Aid—Any medical treatment provided that does not involve a medical bill. If a physician prescribes medical treatment for and charges for this service, that injury becomes one requiring “medical attention.”

Forest Service Property—Includes lands and resources managed by the Forest Service and privately owned and commercially leased or rented motor vehicles, watercraft, aircraft, specialized equipment, or any other motor vehicle used for official business.

Hazard—A condition associated with an operation that poses an avoidable or unacceptable threat to the safety of personnel, equipment, or property, but has not yet resulted in an accident.

Incident (aircraft)—An occurrence, other than an accident, associated with the operation of an aircraft that affects, or could affect, the safety of operations. Aircraft incidents are documented on Form FS–5700–14, SAFECOM, which is also approved for interagency use as Form OAS–34.

Incident With Potential (aviation)—An incident that narrowly misses being an accident, and in which the circumstances indicate serious potential for substantial damage or injury. The Forest Service national aviation safety and training manager determines classification of an incident with potential.

Incident—Any situation that narrowly misses being an accident in which the circumstances indicate serious potential for substantial damage, injury, or death.

Management Evaluation Section—A management documentation tool for gathering information to develop action plans and make appropriate policy decisions that can help prevent future accidents or incidents.

Medical Attention—An injury, less than a serious injury, for which a physician prescribes medical treatment and charges for this service.

Mishap—A broad term that includes accidents, incidents with potential, and aircraft incidents, but does not include hazards.

Occupational Illness—A physiological harm or loss of capacity produced by systemic infection; continued stress or strain; exposure to toxins, poisons, fumes, and so forth, or other continued and repeated exposures to conditions of the work environment over a long period of time. For practical purposes, an occupational illness is any reported condition that does not meet the definition of occupational injury.

Occupational Injury—A wound or other condition of the body caused by external force, including stress or strain. The time and place the injury occurred and the part of the body or bodily function affected can be identified. An occupational injury is caused by a specific event or series of events within a single day or work shift.

Recommendations—Recommendations are reasonable courses of action, based upon the identified causal factors, which have the best potential for preventing or reducing the risk of similar accidents.

Serious Non-Aviation Accident. Any accident that involves either:
- A death.
- Three or more persons hospitalized for other than observation.
- Wildland fire shelter deployments or entrapments
- Property damage that exceeds $250,000.

Abbreviations Used in Investigations

ARB ..... Accident Review Board
CFR ..... Code of Federal Regulations
CI ..... Chief Investigator
CISD ..... Critical incident stress debriefing
CISM .... Critical incident stress management
DASHO . Designated agency safety and health official
DOI ..... U.S. Department of the Interior
DOT ..... U.S. Department of Transportation
FOIA ..... Freedom of Information Act
FS ..... Forest Service
FSM ..... Forest Service Manual
GPS ..... Global positioning system
ICP..... Incident command post
JHA..... Job hazard analysis
LEI ..... Law enforcement and investigations
MER..... Management evaluation report (now referred to as the management evaluation section)
NFES .... National fire equipment system
NFFE .... National Federation of Federal Employees
NFPA .... National Fire Protection Association
NIOSH .. National Institute of Occupational Safety and Health
NTSB .... National Transportation Safety Board
NWCG .. National Wildfire Coordinating Group
NWS ..... National Weather Service
OSHA ... Occupational Safety and Health Administration
PPE ..... Personal protective equipment and clothing
QTI ..... Qualified technical investigator
RO ..... Regional office
SES ..... Senior Executive Service
SM ..... Safety manager
TL ..... Team leader
USDA.... United States Department of Agriculture
WO ..... Washington Office

Notes

Notes

Notes

About the Authors

Chuck Whitlock has been a project leader at MTDC since 1998, specializing in safety and health and fire management safety projects. He has served as a Type I safety officer on national incident management teams and as a zone fire management officer on the Wallow-Whitman National Forest. Chuck worked on the Cleveland, Plumas, and Fremont National Forests before coming to the center. Chuck retired from MTDC in December 2003. Please direct all questions and comments to Safety Program Leader Gary Hoshide, e-mail: *ghoshide@fs.fed.us*

Jerry Taylor Wolf received a bachelor's degree in education from Indiana State University. She began her Forest Service career as a civil engineering technician on the Flathead National Forest. She served as a survey party chief on the Beaverhead-Deerlodge and Lolo National Forests. In 1994 she came to the Missoula Technology and Development Center to work as a mechanical engineering technician. She is now a technical writer/editor.

Library Card

Whitlock, Chuck; Wolf, Jerry Taylor. 2005. Accident Investigation Guide: 2005 Edition. Tech. Rep. 0567—2806—MTDC. Missoula, MT: U.S. Department of Agriculture, Forest Service, Missoula Technology and Development Center. 106 p.

Describes the procedures used by the Washington Office chief's investigation team for serious accidents, aviation accidents, and incidents with potential. These procedures also apply to all accident and incident investigations conducted at any unit level by any individuals working under the direction and authority of the Forest Service. The guide can be used at the regional, area, forest, or district level by following the investigation process.

Keywords: aviation, fatalities, fire fighting, firefighting, guidebooks, incidents, safety at work

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Additional single copies of this document may be ordered from:
USDA Forest Service, MTDC
5785 Hwy. 10 West
Missoula, MT 59808–9361
Phone: 406–329–3978
Fax: 406–329–3719
E-mail: *wo_mtdc_pubs@fs.fed.us*

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http://www.fs.fed.us/t-d/ (Username: t-d, Password: t-d)

For additional information, contact Gary Hoshide at MTDC.
Phone: 406–329–1029
Fax: 406–329–3719
E-mail: *ghoshide@fs.fed.us*

Forest Service and Bureau of Land Management employees can search a more complete collection of MTDC's documents, videos, and CDs on their internal computer networks at:
http://fsweb.mtdc.wo.fs.fed.us/search/