

United States
Department of
Agriculture

Forest Service

**Technology &
Development
Program**

6700 Safety & Health
May 2003
0367-2808-MTDC



Accident Investigation Guide

2003 Edition



United States
Department of
Agriculture

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Accident Investigation Guide

2003 Edition



Chuck Whitlock
Project Leader

USDA Forest Service
Technology & Development Program
Missoula, MT

7E72H46—Accident Investigation Guide

May 2003

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Chapter



Chapter 1 – Accident Investigation

1.1 Introduction

- A. Supervisors and managers at all organizational levels are responsible for ensuring employee safety and health and for providing a work environment that is free from recognized hazards. 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. Hazards or hazardous practices must be corrected to prevent accidents and incidents.
- B. The accident investigators gather and interpret information to help managers understand how and why an accident or incident occurred. Recommendations can then be developed for corrective actions to prevent future physical hazards 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). A serious nonaviation accident may involve:
- A death.
 - Three or more persons who are hospitalized longer than for observation only.
 - Wildland fire shelter deployments or entrapments.
 - Property damage that exceeds \$250,000.

For aviation accidents, refer to chapter 9.3.

1.2 Authority

The authority for the investigation of accidents is established in:

- 41 CFR 101–37.1104–1109, Code of Federal Regulations (29 CFR 1960).
- Public Law 107–203.
- Executive Order 12196.
- Chapter 6732.1, Forest Service Manual (FSM) 6700.
- The aviation safety program (FSM 5700, chapter 5720).

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 preparing the factual and management evaluation reports, documenting witness statements, interviewing witnesses, photographing evidence, conducting accident boards of review, and managing records. The guide also includes the investigation protocol for wildland fire shelter entrapments, deployments, and fatalities, and aviation accidents and incidents with potential (defined below).

1.4 Scope

- A. The *Accident Investigation Guide* is designed for Washington Office chief's investigation teams. These teams, at the direction of the designated agency safety and health official (DASHO), will investigate all fatalities, wildland fire shelter deployments or entrapments, accidents when three or more persons are hospitalized longer than for observation only, and property damage that exceeds \$250,000. The chief's investigation team may also be mobilized anytime the DASHO believes an investigation is warranted. An example is an "incident with potential." An incident with potential is any situation that narrowly misses being an accident and could have resulted in substantial damage, injury, or death. For further clarification of aviation accidents, refer to chapter 9.

The DASHO determines who will be the team leader and the other team members.

When an accident occurs that results in a fatality, or three or more persons hospitalized longer than for observation, or property damage that exceeds \$250,000, the DASHO may delegate responsibility to conduct the investigation to the regional forester in the region where the accident occurred. In these cases, the DASHO may appoint at least one member to the investigation team.

The process outlined in the guide also applies—entirely or in part—to all accident and incident investigations conducted at any unit level by any individuals working under the direction and authority of the USDA Forest Service.

Collateral Investigations. Collateral investigations are conducted independently of the accident or incident investigation and record the facts for litigation, claims, and other administrative and disciplinary actions. These investigations are a result of significant issues that arise from an accident or incident investigation. Such issues have no direct correlation to causal or contributing factors of the accident or incident, but need to be investigated and monitored by Forest Service management.

Interagency Investigations. The degree of Forest Service participation in joint investigations or the involvement of other Federal, State, or municipal agencies in Forest Service accident or incident investigations depends on the circumstances of the accident or incident and memorandums of understanding or interagency agreements in effect.

- B.** Forest Service and U.S. Department of the Interior wildland firefighting resources involved in a “serious fire-related accident” are investigated in accordance with the memorandum of understanding between the United States Departments of Agriculture and the Interior (exhibit 8–4).
- C.** A Forest Service firefighter fatality involving a burnover or entrapment requires the USDA Office of the Inspector General to conduct an independent investigation. That investigation shall be independent of the Forest Service investigation. As soon as possible after completing the investigation, a report containing the results of the investigation shall be submitted to the Secretary of Agriculture and to Congress (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, helicopter rappelling, and aviation short-haul accidents are considered Forest Service aviation accidents if they occur before the employee or equipment is safely on the ground.
- E.** The U.S. Department of Transportation’s National Transportation Safety Board (NTSB) has the responsibility to investigate all USDA Forest Service aviation accidents and certain incidents with potential (mishaps). This creates unique interagency working relationships, policies, and procedures when conducting aviation accident investigations. For all aviation accidents, a Forest Service investigation shall be conducted concurrent with, but separate from, the technical NTSB investigation (chapter 9.7). The aviation safety program (chapter 5720 of FSM 5700) provides the direction for aviation investigations.

1.5 Composition of the Investigation Team

The investigation team normally includes: a team leader, safety manager, chief investigator, technical specialist(s), a documentation specialist, and a union 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. It is recommended that the team leader, chief investigator or QTI, and all team members be recruited from outside of the unit experiencing the accident. For fire-

related investigations, investigators and technical specialists may need certification that addresses firefighters’ red-card requirements for unassisted investigation site visits. A delegation of authority memorandum documents the official appointment of the team leader (exhibit 1–1).

Duties and responsibilities of team members (exhibit 1–2) are:

- A.** Team Leader. The team leader is normally a line officer or higher-level agency official. Individuals are 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 outside of the region, forest, or unit that incurred the accident. A team leader investigation checklist (exhibit 1–3) is provided at the end of chapter 1.
 1. Qualifications. Senior management official (senior executive service level) for Washington Office (WO) investigations; Regional Office (RO) director or forest supervisor for Regional Office investigations.
 2. Duties and Responsibilities.
 - a. Organizes, conducts, and controls the Forest Service investigation effort and provides access and support to team activities as requested by the chief investigator or QTI.
 - b. Contacts the unit that had the accident to determine the status of the local investigation in progress and to obtain other pertinent information.
 - c. Provides briefings for affected personnel and agency officials.
 - d. Conducts investigation team meetings and coordinates information exchange between team members.
 - e. Maintains liaison with regions, stations, areas, labs, forests, units, and the Washington Office.
 - f. Approves requests for resources from the chief investigator or QTI and approves a team member for the investigation or for release from the investigation.
 - g. Forwards the preliminary (24-hour) and expanded (72-hour) briefings to the safety manager at the organizational level that authorized the investigation.
 - h. 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.

- i. Arranges critical-incident stress debriefing for investigation team members as needed.
- j. Coordinates with the unit information officer for all media releases. For aviation, coordinates with the NTSB before the release of information to the public.
- k. Forwards the draft factual and management evaluation reports to the safety manager at the organizational level that authorized the investigation.
- l. With the chief investigator or QTI, conducts the close-out meeting for the agency administrator to provide information on the status of the investigation.
- m. Presents the draft factual and management evaluation reports to the authority authorizing the investigation and to the Accident Review Board (ARB).
- n. Coordinates with the appropriate Forest Service human resources office to ensure 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 are addressed.

B. Chief Investigator. The chief investigator or QTI is responsible for the direct management of the technical investigation activities.

1. **Qualifications.** Satisfactorily completed an 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. Specific aviation qualifications for the QTI are in chapter 9.5.
2. **Duties and Responsibilities.**
 - a. Directs investigations by providing information and guidance to the team leader.
 - b. 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 preliminary and expanded briefings, factual report, and management evaluation report.
- g. Completes the human factors analysis.
- h. Ensures coordination with local law enforcement, the coroner's office, and others, as required.
- i. Confirms that drug testing, autopsies, medical reports, and other appropriate tests are conducted when required.
- j. Helps the team leader present the factual report to the authority authorizing the investigation and to the Accident Review Board.
- k. Takes possession 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. 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 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.
 - c. Ensures team members have the necessary training (such as Standards for Survival) for any activity they will be performing.
 - d. Ensures team members use the required personal protective clothing and equipment as prescribed by the job hazard analysis.

D. Technical Specialists (as needed). Technical specialists, such as fire equipment specialists 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. (Specific aviation qualifications are in chapter 9.5.)

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

E. 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 report and the draft management evaluation report.

F. 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.

G. Law Enforcement Liaison. A Forest Service law enforcement official who is selected by the Washington Office safety manager and the Washington Office law enforcement director.

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, equipment, and property; estab-

lishes appropriate chain of custody; and requests toxicology reports and autopsies, if needed.

c. Ensures all evidence collected by the investigation team is safeguarded.

1.6 Report Use

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

It is not intended to be used for purposes such as:

- Making any determination affecting the interest of an individual giving a statement.
- 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.

1.7 Investigation Reports

A. Preliminary (24-Hour) Briefing. This document, prepared by the chief investigator or QTI, contains the first details of the accident. Within 24 hours of the team's arrival, it is transmitted by the team leader to the safety manager at the organizational level that authorized the investigation (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 report, 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. This information does not necessarily become part of the factual report, but is retained as part of the case file.

- C. **Safety Alert.** If a safety hazard or action item is identified during the course of the accident investigation or Accident Review Board, a Safety Alert will be developed to address the concern and abate any known hazard (exhibit 1–6). Proposed Safety Alerts will be submitted to the appropriate unit safety manager. The safety manager will coordinate the release of all Safety Alerts with the unit’s affected staffs.
- D. **Factual Report.** This document contains the facts involving the accident and the findings developed from the factual information (exhibits 6–2 and 6–3). The chief investigator will forward the draft factual report under signature of the team leader by a letter of transmittal (exhibit 7–3) within 45

days of the accident to the safety manager at the organizational level authorizing the investigation (the approving official). The report 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 report and the management evaluation report, refer to chapter 6.

- E. **Management Evaluation Report.** This document identifies the causal and contributing factors to the accident and includes recommendations to prevent or reduce the risk of similar accidents. The chief investigator or QTI will forward the draft management evaluation report under signature of the team leader by a letter of transmittal (exhibit 7–3) within 45 days of the accident to the safety manager at the organizational level authorizing the investigation (the approving official). The report 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.

EXHIBIT 1-1



United States
Department of
Agriculture

Forest
Service

Washington
Office

14th and Independence Ave. SW.
P.O. Box 96090
Washington, DC 20090-6090

File code: 6730
Route to:

Date:

Subject: Delegation of Authority

To: (Investigation team leader)

This memorandum formalizes your appointment as team leader to investigate the accident or incident which occurred on the (location and date). Your duties include, but are not limited to:

- Organizing, conducting, and controlling the accident investigation.
- Providing for inbriefings and outbriefings with affected personnel and agency officials.
- Coordinating information exchange between team members, local law enforcement, coroner's office, and others.
- Maintaining liaison with affected units.
- Approving requests and allocating funding for resources.
- Providing access and support to team activities as requested by the chief investigator or QTI.

The draft factual report and management evaluation report are to be completed within 45 working days of the accident and presented to an Accident Review Board. An extension may be granted based on valid justification.

All travel and associated costs related to this investigation should be charged to (job code).

For additional information, please contact (name; work, home, and cell phone numbers; and address).

(Name of official authorizing the investigation)
(Title)

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



Caring for the Land and Serving People

Exhibit 1-1

EXHIBIT 1-2

Accident Investigation Team

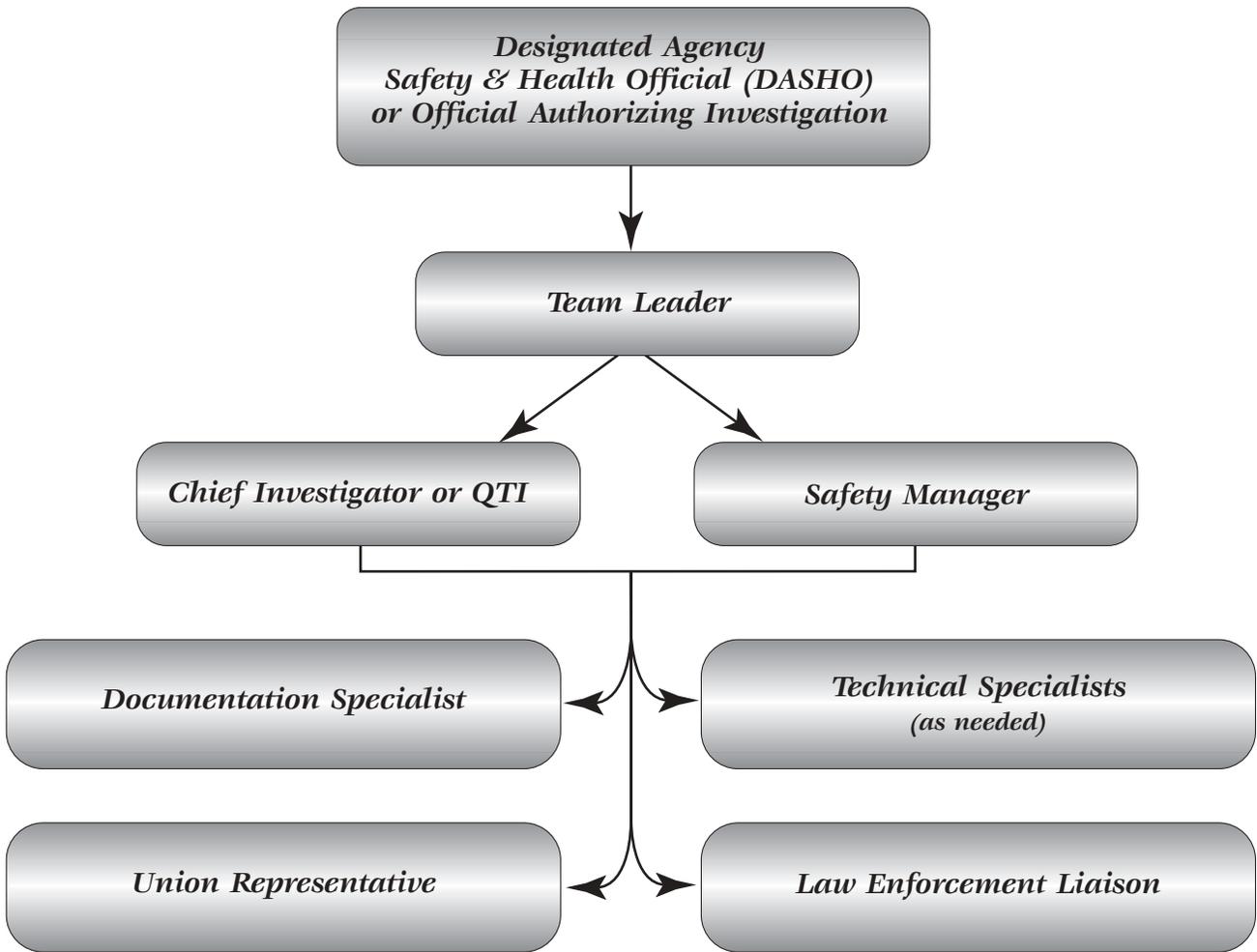


Exhibit 1-2

Exhibit 1-2—The ground and aviation accident investigation team's organizational chart.

EXHIBIT 1-3

INVESTIGATION CHECKLIST

- Accident or incident name:
- Location:
- Jurisdiction:
- Date of accident/incident:
- Brief description of accident/incident:

- Co-lead or agency lead 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:
- Other key contacts at incident:

(Continued) ➤

EXHIBIT 1-3 (continued)

INVESTIGATION CHECKLIST
(continued)

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

- 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 megapixel)
- VHS video camera with blank tape
- Fire shirt and pants
- Laced boots, 8 inches high
- Hardhat
- Fire shelter
- Other needs:

EXHIBIT 1-4



United States
Department of
Agriculture

Forest
Service

Washington
Office

14th and Independence Ave. SW.
P.O. Box 96090
Washington, DC 20090-6090

File code: 6730
Route to:

Date:

Subject: Preliminary (24-Hour) 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)



Caring for the Land and Serving People

Exhibit 1-4

EXHIBIT 1-5



United States
Department of
Agriculture

Forest
Service

Washington
Office

14th and Independence Ave. SW.
P.O. Box 96090
Washington, DC 20090-6090

File code: 6730
Route to:

Date:

Subject: Expanded (72-Hour) 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 1-6

United States Department of Agriculture
Forest Service

Safety Alert

NO. 2000-01

Page 1 of 1

SUBJECT: Chain Saw Fueling

AREA OF CONCERN: All Operations

DISCUSSION: (Narrative discussion)

(Name)
(National-level safety manager)

Exhibit 1-6

Chapter

2



Chapter 2—Investigation Overview

2.1 Introduction

The complexity of the accident determines the scope of the investigation. An overview of the four accident components provides a framework for the investigation. They include:

- Accident sequence.
- Human factors.
- Equipment factors.
- Environmental factors.

Exhibit 2–1 shows the accident investigation process.

2.2 Accident Sequence

The accident sequence is established based only on the facts determined during the investigation.

- 
- A.** 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 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.
 - B.** Accident. Describe the accident.
 - C.** 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 contributing factors to events that occurred after the accident, such as rescue and medical response.
 - D.** Injuries. Record all injuries and describe rescue, first aid, and evacuation efforts. Identify all medical facilities that provided treatment, document the condition of the patients, and summarize autopsy reports, if applicable.
 - E.** Damage. Estimate the cost of the equipment or property

damage and define the damage as minor, major, destroyed, or repairable.

2.3 Human Factors

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 (exhibit 2–2).

- 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 the 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), off-duty 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 job hazard analysis (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.** Establish the communications 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 analysis was developed. Establish the role that the JHA played in the performance of the work project or activity. Determine whether a tailgate safety session was held before work began.
 - I. Analysis.** Use the human factors accident and incident analysis checklist to determine additional items that may have contributed to the situation (exhibit 2–2).
- 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.
 1. Impact conditions and crash (dynamic) forces.
 2. Restraint and rollover protection systems. Were such systems installed? Were they used?
 3. Personal protective clothing and equipment, and safety equipment.
 4. Backup and emergency systems.
 5. Safety design.
 - C. Laboratory or Teardown Analysis.** Review the results of any equipment component analyses. Special studies or tests may need to be conducted by another agency or private laboratory.

2.4 Equipment Factors

- A. Systems.** Determine the equipment that 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.

2.5 Environmental Factors

- 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.

2.3
2.4
2.5

EXHIBIT 2-1

Accident Investigation Process

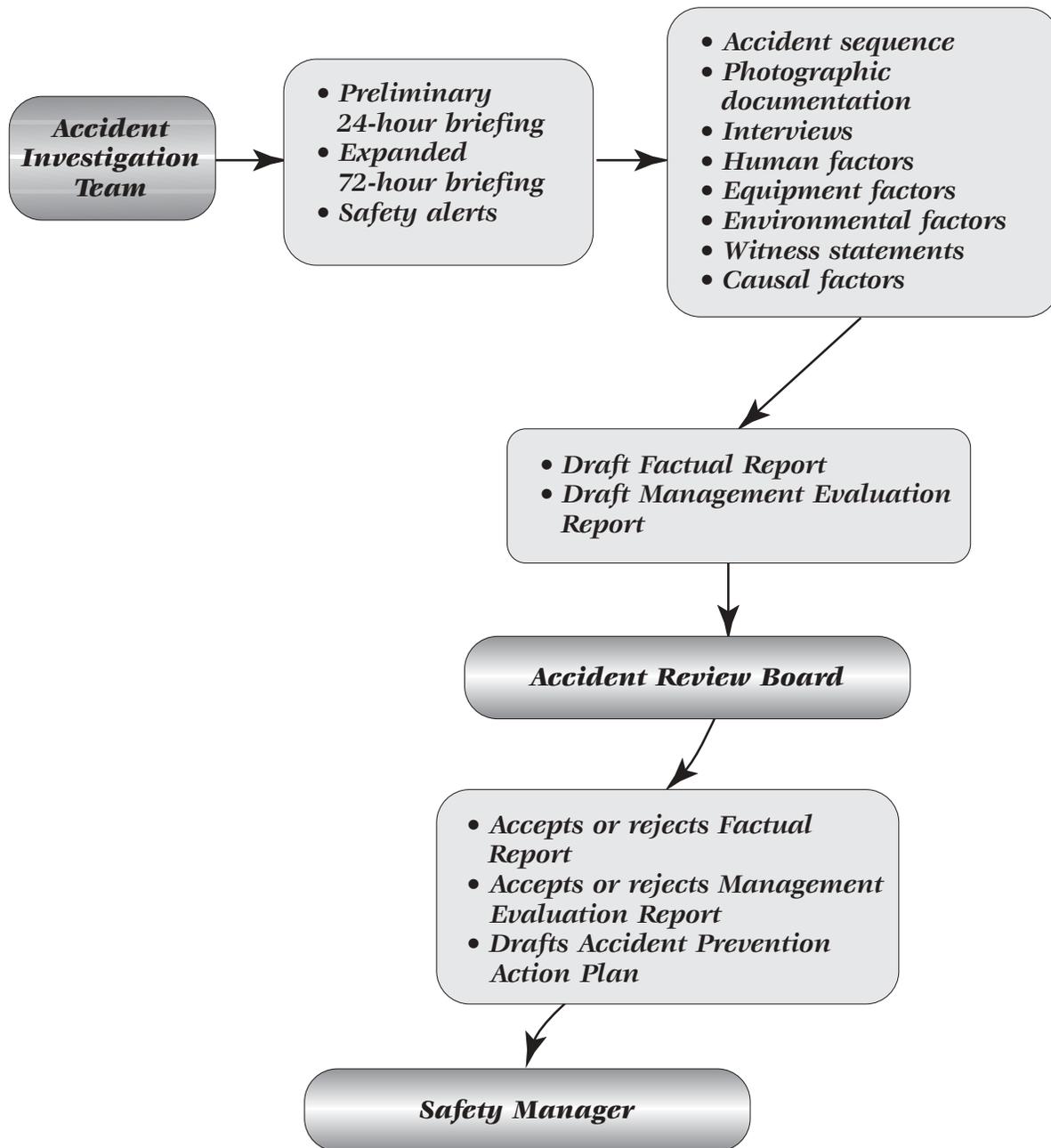


Exhibit 2-1

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

- 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.
- Conditions that may cause adverse medical or physiological state:

(Continued) 

EXHIBIT 2-2 (continued)

Human Factors Accident and Incident Analysis

- Assignment tasking or job fatigue (such as 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

- Inadequate knowledge of systems, procedures, and so forth (knowledge-based errors). Types:
 - Knowledge-based.
 - Inadequate knowledge of systems, procedures.
 - Used improper procedure.
 - Illstructured 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 currency 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 currency 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 special-use assignment performance.
 - Smoke.
 - Wind shifts.
 - Changes in fire behavior.
 - Low visibility.
 - Unexpected or nonparticipant 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 (continued)***Human Factors Accident and Incident Analysis*****Personality and Safety Attitude**

- Demonstration of overconfidence.
- Demonstration of excessive motivation to achieve assignment.
- Reckless operation.
- Demonstration of anger or frustration on the job.
- Demonstration of 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.
 - Not current or qualified 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 errors 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.

System Design and Operation

- Use of wrong switch or 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).

(Continued) 

EXHIBIT 2-2 (continued)

Human Factors Accident and Incident Analysis

- 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.
- 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:
 - Hazards go unseen or unrecognized.
 - 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 lacked an adequate system for monitoring and correcting hazardous conditions.
 - Supervisors did not promote and reward safe behavior or quickly correct unsafe behavior.
 - Organization did not have adequate policies and procedures to ensure high quality work performance.
 - Organization had inadequate job-qualification standards or training program.
 - Organization had inadequate internal communication.
 - Organization had no system or an inadequate system for management of high-risk employees.

Supervisory and Organizational

- 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.
- Failure to support or negative support of 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.

EXHIBIT 2-2 (continued)***Human Factors Accident and Incident Analysis***

- Organization had inadequate process or procedures for operational risk management.
- Organization did not provide adequate human factors training.
- Organization did not ensure sufficient involvement of medical and occupational health specialists.
- Organization did not 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 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.
 - Not properly licensed.
 - Insufficient (staffing).
 - Improper or insufficient oversight.
 - Not properly rested.
- Management.
 - Nonexistent.
 - Ineffective.
 - Understaffed.
 - Ineffective organization chart.
 - 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.
 - Not calibrated.
 - Not used properly.
 - Not trained for the special equipment or tool.
 - Not used.
 - No tool control program.

Chapter

2



Chapter 3—Witness Statements and Interviews

3.1 General

A. It is generally best to begin the investigation by interviewing witnesses. Anyone involved in the accident is included. Witnesses are usually the best source of information for determining the sequence of events that led to the accident. Investigators should conduct interviews as soon as possible. A unit administrative investigator or law enforcement officer on the site normally takes initial statements before the investigation team arrives. Witness statements and interview records are not to be construed as formal written depositions. Record the number of witnesses interviewed and identify each witness by duty location.

B. The mental state of the witnesses should be taken into account. They could be experiencing critical incident stress or may be in shock or trauma after 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, a critical-incident stress debriefing counselor may be needed. Contact the local Forest Service Employee Assistance Program coordinator to arrange for critical-incident stress debriefing counseling before taking a statement.

gator or QTI. 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 witness 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, discontinue the interview until representation is obtained.

D. Interviews will be recorded by audio or videotape with the knowledge and consent of the witness, and transcribed.

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.

3.2 Statements

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

B. Investigators should inform witnesses that their statements will be used only 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). Each witness will sign their statement. If telephone and transcribed statements cannot be signed due to the condition of a witness, timing, or availability, insert a statement by the investigator attesting to the time and date of the interview, followed by the investigator's signature.

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 investi-

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:

1. Avoid collective interviews (interviewing more than one witness at a time).

2. 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.

3. 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.
4. Inform the witness that you can't promise confidentiality.
5. Read the witness' written statement (if available) before the interview.
6. Allow witnesses to tell the story in their own words (do not interrupt).
7. Be a good listener. Be unobtrusive when taking notes. Maintain your self-control during interviews. Don't become emotionally involved in the investigation.
8. Investigation team members should coordinate their questions at the direction of the chief investigator or QTI.
9. The interviewer should ask followup questions. Do not assist the witness in answering questions. Diagrams, maps, photos, models, and other items may be used to clarify information.
10. Avoid revealing items discovered during the investigation to the witness.

3.5 Types of Questions

- A. General Questions.** General, open-ended questions 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.)
- What was the weather at the time of the accident? What were the wind conditions?
- What actions did you take at the accident site?

3.4
3.5
3.6

- 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? Did you have your glasses or hearing aid on?
- Would you like to provide any additional information?

EXHIBIT 3-1 (continued)

	<p>USDA Forest Service</p> <p style="text-align: center;">STATEMENT</p>	<p>Case/File Number</p> <p><input type="checkbox"/> Initial Report <input type="checkbox"/> Follow-Up</p>

Exhibit 3-1

Exhibit 3-1—Witness statement.

EXHIBIT 3-2

 USDA Forest Service	MEMORANDUM OF INTERVIEW			1. CASE NUMBER	
2. NATURE OF INVESTIGATION					
3. NAME OF PERSON INTERVIEWED <i>(Last, First, Middle)</i>			4. SOCIAL SEC. NO.	5. DOB	6. SEX
			- -	/ /	
7. HOME ADDRESS <i>(St., City, State, ZIP Code)</i>			8. DRIVER'S LIC. NO.	9. PHONE (H) <i>(Area Code)</i>	
				() -	
10. EMPLOYMENT <i>(Occupation and Location)</i>				11. PHONE (W) <i>(Area Code)</i>	
				() -	
12. LOCATION OF INTERVIEW			13. NAME OF INVESTIGATOR CONDUCTING INTERVIEW		
14. OTHERS PRESENT		15. STARTED		ENDED	
		Date	Time	Date	Time
16. REMARKS					
17. INVESTIGATOR'S SIGNATURE			18. WITNESS' SIGNATURE <i>(If Applicable)</i>		
NOTE: This document is for OFFICIAL USE ONLY					

Exhibit 3-2

Exhibit 3-2—Memorandum of interview.

Chapter



Chapter 4—Photographic Documentation

4.1 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 to 4 megapixels) and cameras that process their own film are ideal for this application.
- B. While video cameras have their uses, photographs may be more useful because they can be enlarged, printed in multiple copies, and placed in the factual report.
- C. Depending on the accident's complexity, a professional photographer may be needed.

4.2 Photography

- 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 using 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.

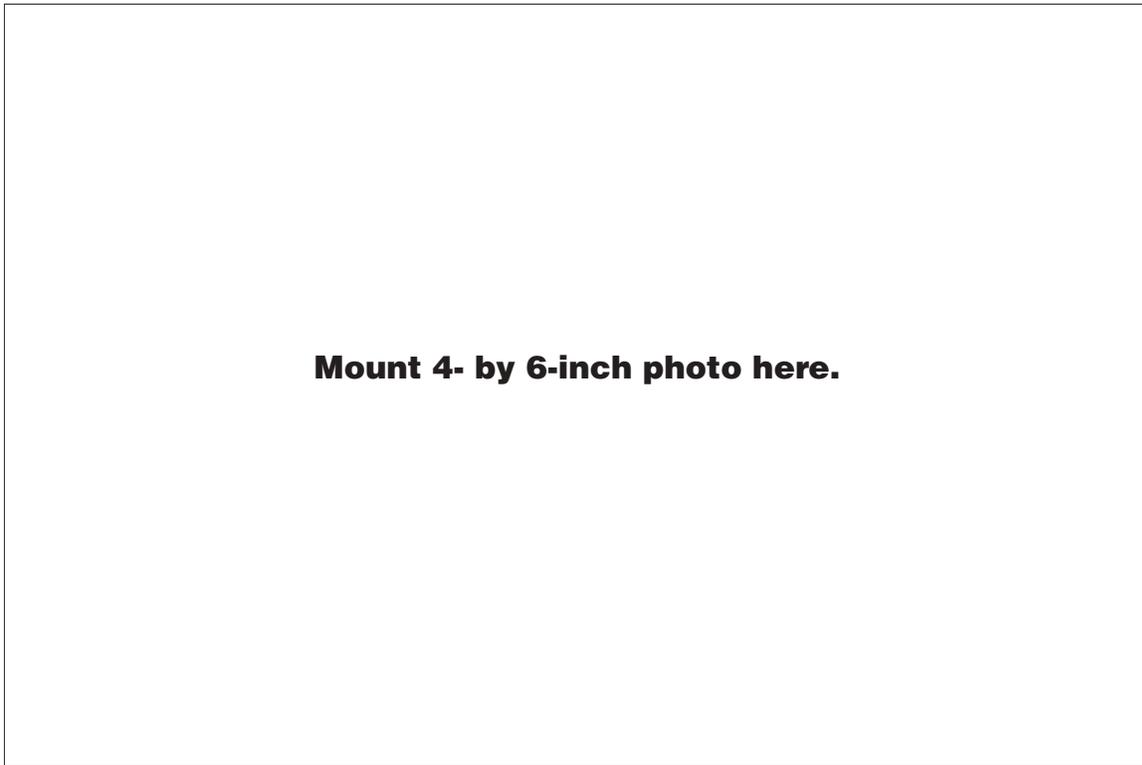
5. **Site Inventory.** The camera can help inventory the accident site and document personal protective clothing equipment and other safety equipment, including the victim's personal effects and clothing. The location of each item may be plotted on a scaled map using a fixed point of reference.
6. **Closeups.** Bracket exposures for closeups by taking two pictures with slightly different exposure adjustments (f-stop and shutter speed). Use a tripod or monopod, as appropriate.
7. **Documents.** The camera can be used to copy 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.
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 report should be mounted, numbered, 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 4-1).

EXHIBIT 4-1

PHOTOGRAPHIC DOCUMENTATION

Accident		Location	
Name of photographer		Date and time photograph was taken	
Camera type	Photograph number	Film	ASA

Description of photograph:



Remarks:

Exhibit 4-1

Chapter



Chapter 5 – Guidelines for Identifying Causal Factors and Developing Recommendations

The accident investigation should conclude with two key tasks. The first task is to identify the causal and contributing factors supported by the findings of the investigation. The second task is to develop recommendations, based on the causal factors, that prevent or reduce the risk of similar accidents.

5.1 Identifying Causal Factors

A causal factor is any behavior or omission that starts or sustains an accident occurrence. The following four categories can help organize causal factors during any accident investigation:

- People (personnel involved or contributing to the accident or incident).
- Management (personnel involved or contributing to the accident or incident).
- Equipment (involved or contributing to the accident or incident).
- Environment (location of the accident or incident).

5.2 Developing Recommendations

Recommendations are reasonable solutions, based on the causal factors of an accident, that prevent or reduce the risk of similar accidents. All causal factors do not have to have a recommendation.

The chief investigator or QTI, the team leader, and the entire team are responsible for developing draft recommendations. The Accident Review Board members may accept, reject, or make additional recommendations. Each of these groups (the accident investigation team and the Accident Review Board) works cooperatively to develop the final recommendations for accident prevention. Remember that “nothing changes in safety management unless management causes it to happen.” Well thought-out recommendations could be the catalyst for change.

5.1
5.2

Chapter



Chapter 6—Factual and Management Evaluation Reports

6.1 Factual Report

The factual report contains the facts and the findings of the investigation. For aviation, the preliminary factual report serves the same purpose (exhibit 9–2). Submit the factual report with the Management Evaluation Report, using the cover letter (exhibit 6–1).

A. The chief investigator or QTI will assist the documentation specialist in preparing the draft factual report for the team leader using the following format:

1. Cover. The Freedom of Information Act (FOIA) disclaimer statement—“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” (exhibit 6–2).
2. 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).
3. Table of Contents. Include page numbers. Use dividers for the different sections of the report.
4. Executive Summary. A brief narrative of the facts involving the accident.
5. Narrative. A detailed chronological record of the facts before, during, and after the accident. When possible, determine the facts based on two or more sources of evidence or proof. Using evidence or proof from any one person or source could be incomplete, inaccurate and/or selective. By collecting information from more than one source to determine a fact, the investigation team can reduce errors and increase the credibility of the factual report.
6. Findings. Findings are the conclusions of the accident investigation team based on the facts. They are arranged in chronological order in the factual report. Each finding should, where possible, be supported by two or more facts from the investigation. Findings are not opinions, conjecture, or recommendations, nor are they conclusions drawn from sources other than the facts of the investigation.

Issues that did not cause or contribute to the accident should not be part of the factual or management evaluation reports. Those issues should be brought to the attention of the team leader who will forward them to the appropriate agency personnel for further action or investigation, independent of the accident investigation.

7. Maps, Illustrations, and Photographs. Graphic information used to document and visually portray facts.
8. 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.
9. Appendixes. Excerpts, test results, and similar items used as reference information for documented facts involving the accident.

6.2 Management Evaluation Report

The management evaluation report identifies the causal and contributing factors to the accident and includes recommendations to prevent or reduce the risk of similar accidents (exhibits 6–4 and 6–5).

A. The chief investigator or QTI will prepare a draft management evaluation report for the team leader using the following format. This document contains material intended for internal agency use only.

1. Cover. The Freedom of Information Act disclaimer statement—“This document contains materials for internal agency use only and may not be released under the Freedom of Information Act,” (exhibit 6–4).

2. 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 6–5).
3. Table of Contents. Include page numbers.
4. Executive Summary. A brief narrative of the facts involving the accident.
5. Causal Factors and Contributing Factors. These items are developed from the findings of the factual report (glossary).
6. 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 need not have a recommendation.
7. Enclosures. Witness statements and similar information that are not part of the factual report.

6.3 Distribution of Reports

After completing the investigation, the team leader will forward draft copies of the factual and management evaluation reports to the appropriate safety manager. For aviation investigations, draft copies of the preliminary factual report and the management evaluation report are sent to the national aviation safety and training manager for a quality assurance review of format and content, and approval before distribution. The appropriate safety manager will establish the Accident Review Board and supply copies of the reports for each board member. The reports will be labeled *DRAFT—FOR OFFICIAL USE ONLY*, and numbered (1 of 10, 2 of 10, and so forth).

6.4 Disposition of Reports and the Case File

- A. After completing the Accident Review Board process, the chairperson will collect all numbered draft factual and management evaluation reports and notes, and ensure that all are destroyed. The chairperson will forward the final original factual and management evaluation reports and a copy of each 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).
- B. Case files include factual data and other items that were gathered during the investigation but are not in the report. Case files will remain in the care of the safety manager at the organizational level authorizing the investigation.
- C. Before returning any physical evidence, the chairperson and the team leader shall contact any other agency that is conducting an ongoing collateral investigation to approve release of the physical evidence. 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.

6.5 Release of Accident Reports and Documents

Any request made under the Freedom of Information Act for copies of factual and management reports and supporting documents shall be forwarded immediately to the appropriate Forest Service Freedom of Information Act officer. Reports 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 and management reports may occur.

EXHIBIT 6-1



United States
Department of
Agriculture

Forest
Service

Washington
Office

14th and Independence Ave. SW.
P.O. Box 96090
Washington, DC 20090-6090

File Code: 6730
Route To:

Date:

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

To: (Appropriate safety manager)

—FOR OFFICIAL USE ONLY—

Enclosed are the draft factual and management evaluation reports 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 6-2



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**

Accident Investigation Factual Report

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

(Date of accident or incident)

Draft copy ____ of ____



Caring for the Land and Serving People

Exhibit 6-2

EXHIBIT 6-3

Accident Investigation Factual 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)

Investigation technical consultants:

(Name, title, location of home unit)

(Name, title, location of home unit)

EXHIBIT 6-4



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**

Management Evaluation Report

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

(Date of accident or incident)

Draft copy ____ of ____

Exhibit 6-4

EXHIBIT 6-5

Management Evaluation 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: (Name, title, location of home unit)

Investigation team members:

(Name, title, location of home unit)

Investigation technical consultants:

(Name, title, location of home unit)

(Name, title, location of home unit)

Chapter



Chapter 7—Accident Review Board

7.1 Purpose

The Accident Review Board reviews the draft factual and management evaluation reports. The board accepts or rejects the reports for adequacy and reviews, accepts, or modifies recommendations contained in the management evaluation report. The board's last task is to prepare the accident prevention action plan. This plan is based on the recommendations approved by the Accident Review Board.

7.2 Composition of the Accident Review Board

- A. The approving authority at the level authorizing the investigation will designate the chairperson and Accident Review Board members within 21 days after the factual report and management evaluation report have been completed (exhibit 7-1).
- B. The Accident Review Board is made up of representatives with expertise and knowledge in appropriate areas (exhibit 7-2). The members should be held to a minimum, usually about five. Persons who are not members of the board may need to make comments during the Accident Review Board proceedings. Such participation is at the discretion of the chairperson. However, attendees must 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.

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 Accident Review Board proceedings. The chairperson will transmit the final factual and management evaluation reports, recommendations, and action plans from the Accident Review Board 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 Accident Review Board on management-specific policies, procedures, and so forth, as related to the accident (voting).
- C. Safety Manager. A safety manager (usually outside the unit that experienced the accident) is selected to provide information on safety 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 draft factual and management evaluation reports to the Accident Review Board 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 draft factual and management evaluation reports (nonvoting).
- G. Technical Specialists. These individuals are selected from outside the investigation team and provide technical assistance to the Accident Review Board (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. The chairperson calls the Accident Review Board to order, introduces the Accident Review Board members and others attending the meeting, and discusses the objectives of the accident review process.
- B. The team leader and the chief investigator or QTI present the draft factual report. The chairperson opens the discussion and comments by the Accident Review Board members. The voting Accident Review Board members move into closed session to accept or reject the draft factual report. If the draft factual report is accepted, the Accident Review Board resumes with all Accident Review Board members present. If the draft factual report is rejected, the chairperson reconvenes the Accident Review Board once additional factual information has been collected.
- C. The team leader and the chief investigator or QTI present the draft management evaluation report for final action by the Accident Review Board. The chairperson opens the discussion and comments by the Accident Review Board members. The voting Accident Review Board members move into closed session to accept or reject the draft management evaluation report. If the draft is accepted, the Accident Review Board resumes with all Accident Review Board members present. If the Accident Review Board makes additional recommendations, the recommendations must be feasible, reasonable, and relate to the causes of the accident. Every cause need not have a recommendation. Each recommendation 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.

Vague recommendations, such as those addressing the importance of doing one's job properly, are inappropriate. 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 transmittal letter from the chairperson recommending that the approving authority authorize a collateral investigation.

The Accident Review Board develops a draft accident prevention action plan (exhibits 7-3 and 7-4) to prevent similar accidents. The final management evaluation report includes causal factors, contributing factors, findings, and recommendations.

- D. After completing the final factual and management evaluation reports, the chairperson collects all numbered **draft** factual and management evaluation reports and ensures that all draft reports are destroyed.
- E. The chairperson forwards the final original reports and three copies of each document (factual report, management evaluation report, and draft accident prevention action plan), as well as a disk containing each document, by a letter of transmittal to the appropriate Washington Office safety manager and to the safety manager at the organizational level that authorized the investigation. These documents must be mailed by a traceable means.

The DASHO will initial and forward the recommendations from the management evaluation report to the applicable staffs for comments. When reviewed, approved, and returned to the DASHO, the DASHO presents the recommendations to the Washington Office Forest Service chief. The chief signs the recommendations, creating the accident prevention action plan.

Provide three copies of the final accident prevention action plan to the Washington Office safety manager.

EXHIBIT 7-1



United States
Department of
Agriculture

Forest
Service

Washington
Office

14th and Independence Ave. SW.
P.O. Box 96090
Washington, DC 20090-6090

File code: 6730
Route to:

Date:

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 and develop recommendations to prevent similar accidents in the future. The board is to be convened and is expected to complete its work by (date). An extension may be granted based on valid justification.

Please contact and make arrangements with the following board members, advisors, and accident investigation team members as soon as possible.

Title	Member Name	Phone	E-mail
Management official Address			
Safety manager Address			
Local management representative Address			
Team leader Address			
Chief investigator or QTI Address			
Technical specialist Address			
Recorder Address			

All travel and associated costs related to the board should be charged to (job code). For additional information, please contact (name, phone, and address)

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 7-2

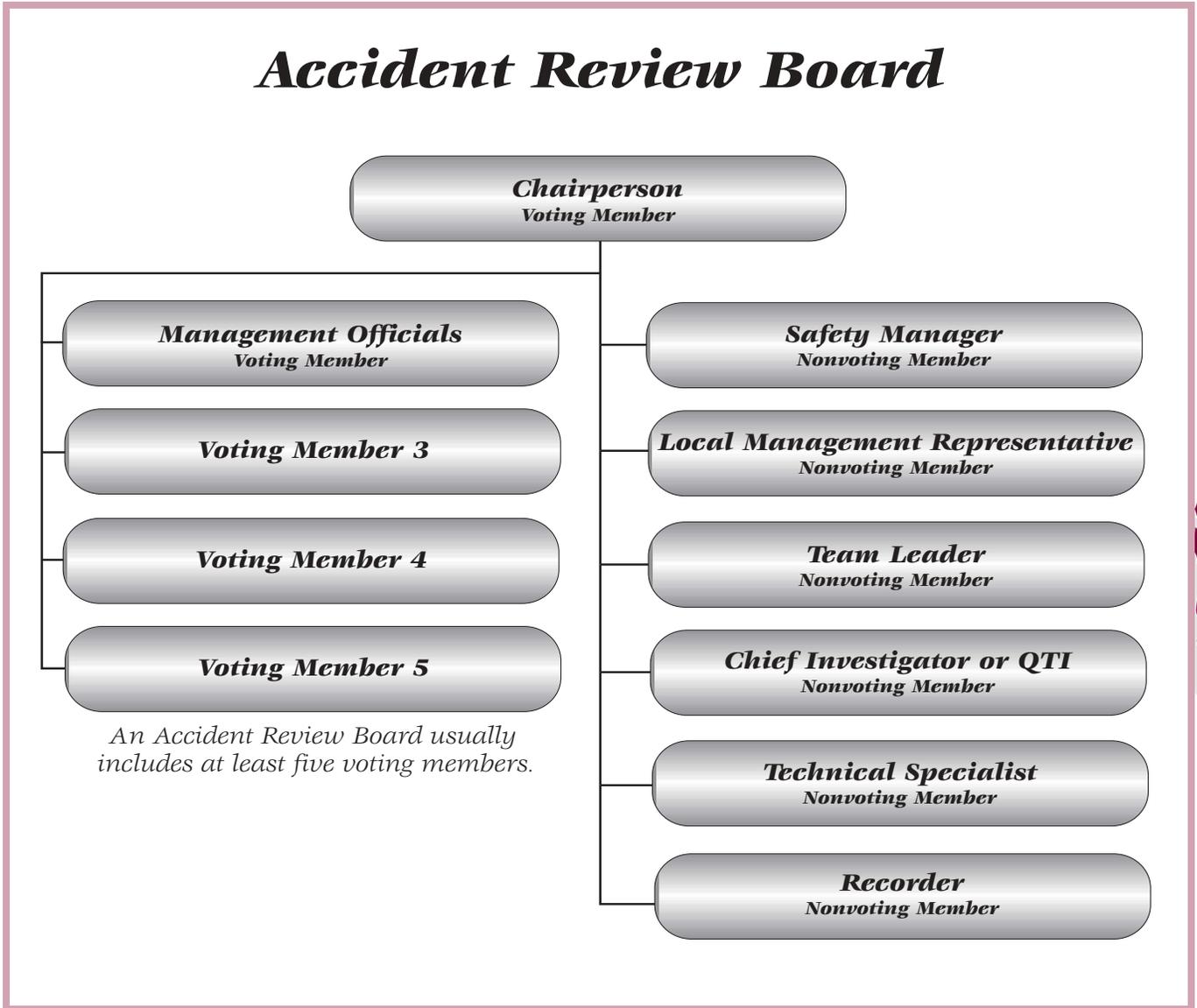


Exhibit 7-2

Exhibit 7-2—Accident Review Board organization chart.

EXHIBIT 7-3



United States
Department of
Agriculture

Forest
Service

Washington
Office

14th and Independence Ave. SW.
P.O. Box 96090
Washington, DC 20090-6090

File code: 6730
Route to:

Date:

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

To: (Approval official)

—FOR OFFICIAL USE ONLY—

The investigation team's factual report was presented at the Accident Review Board and accepted by the board. Enclosed are the board's management evaluation report containing the causal factor(s), contributing factors, findings, recommendations, and enclosures, and a draft accident prevention action plan.

If you would like to discuss any of these efforts further, please contact me at (phone).

Name (of chairperson)
Chairperson, Accident Review Board

Attachments

Accident prevention action plan for (name and location of accident) is:

APPROVED DISAPPROVED with remarks: _____

DATE _____

(Signature here)



Caring for the Land and Serving People

Exhibit 7-3

EXHIBIT 7-4



United States
Department of
Agriculture

Forest
Service

Washington
Office

14th and Independence Ave. SW.
P.O. Box 96090
Washington, DC 20090-6090

File code: 6730
Route to:

Date:

Subject: Accident Review Board Accident Prevention Action Plan
(Name and location of accident)
(Date of accident)

To: SEE DISTRIBUTION

—FOR OFFICIAL USE ONLY—
REPLY DUE _____

A (Chief's Office) Accident Review Board was convened at the (Washington Office) on (date), for the above accident. Completion of action plans developed from accident investigations, and approved by the Accident Review Board and the (official authorizing the investigation) is an important step in ensuring that the same or similar accident does not recur. Therefore, we are tracking all Accident Review Board action plans through to completion.

Attached for implementation by the assigned units is the Accident Review Board's action plan for the above accident. Please review this plan and take the appropriate steps to ensure completion of each item assigned to you. A status report should be submitted to me by the above date and quarterly thereafter until the item is completed. Your report should contain the following information:

- Action taken to date.
- Whether or not the item is completed.
- Date completed (if applicable).
- Description of the actions needed for completion.
- Revised completion date (as appropriate).

If you have any questions regarding this process or require additional information, contact (safety manager at the level authorizing the investigation) by e-mail at (address) or by calling (phone number).

Name (of official authorizing the investigation)
(Title)

DISTRIBUTION LIST: (List assigned units)



Caring for the Land and Serving People

Exhibit 7-4

Chapter



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

8.1 General

The following information is specific for wildland fire shelter deployments, entrapments, and fatalities. The investigation process, factual reports, and management evaluation reports 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 as 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/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. Investigation Elements.

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

Exhibit 8–3 shows the entrapment investigation element matrix.

- C. 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 team leader 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. In cases where two jurisdictions are involved, dual team leaders may be named (exhibit 8–4). Other individuals normally assigned to a fire-related investigation are:

- Fire operations expert.
- Safety manager.
- Fire behavior analyst (with experience in the fuel type where the incident occurred).
- Fire weather meteorologist from the 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.
- Union representative.

D. Notification. As soon as a deployment, entrapment, 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).
 - Federal 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.

E. 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).

Once the investigation team arrives, the team undertakes the following tasks:

- 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 $\frac{3}{8}$ -mile area, global positioning system (GPS) locations may be useful. A detailed site diagram is an essential part of the final investigation report.
- Investigators should observe the position of all items to help reconstruct the events that took place. 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.

F. 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.

G. Critical-Incident Stress Debriefing. Ensure that surviving firefighters or personnel involved in a fire-related accident are monitored, whether they are at the scene, at a hospital,

or at the dispatch center. They should undergo a critical-incident stress debriefing within 24 hours and have additional support available. Effective debriefing helps firefighters and others involved with the incident to cope with the experience and better relate the events to interviewers.

Firefighters who have undergone critical-incident stress debriefing can normally begin giving witness statements within 24 to 72 hours after a fire-related accident has occurred. Witness statements must be obtained before personnel are reassigned to other incidents.

EXHIBIT 8-1

Fire Entrapment/Fatality First-Response Form

AT THE SCENE

1. **Have law enforcement isolate the scene.** Night or day, involve your law enforcement 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.

PERSON RESPONSIBLE	DATE/TIME ASSIGNED

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: _____

1. General Information

- Date of event _____ Time _____
- Fire name, location, agency, etc. _____
- Number of personnel involved _____
- Number of: Injuries _____ Fatalities _____

2. Fatalities

- Type of accident:
 - Aircraft
 - Natural (lightning, drowning, 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
- Employing agency _____
- Unit name _____
- Address _____
- For further information, contact _____
- Home unit address _____
- Phone _____

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

Exhibit 8-2

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
- Boots Yes No
- Goggles ... Yes No
- Hardhat ... Yes No

Exhibit 8-2

EXHIBIT 8-3

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?			

Exhibit 8-3

Exhibit 8-3—Entrapment investigation elements.

EXHIBIT 8-4

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

Chapter



Chapter 9—Aviation Investigations

9.1 Introduction

The investigation process, factual reports, and management evaluation reports 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.

9.2 Scope and Purpose

The Department of Transportation's National Transportation Safety Board has the responsibility to investigate all Forest Service aviation accidents and certain incidents with potential (mishaps). This presents unique interagency working relationships, policies, and procedures when conducting aviation investigations. For all aviation accidents, a Forest Service investigation shall be conducted concurrent with—but separate from—the technical NTSB investigation (chapter 9.7). The aviation safety program (FSM 5720) provides the direction for aviation investigations. Smokejumping, helicopter rappelling, and aviation short-haul accidents are considered Forest Service aviation accidents if they occur before the employee or equipment is safely on the ground.

9.3 Forest Service-Conducted Aviation Investigations

All aviation investigations conducted by the Forest Service for the NTSB shall be in accordance with direction in chapter 5720 of FSM 5700 and chapter 6730 of FSM 6700, FSH 6709.12, Code of Federal Regulations (29 CFR 1960), Executive Order 12196, 41 CFR 101-37.1104-1109, and this guide. The assigned qualified technical investigator (QTI) performs the onsite factual portion of a Forest Service-conducted mishap investigation and coordinates with the NTSB investigator in charge.

A. Aviation Accident with Fatalities. When acting as an agent for the NTSB, the Forest Service DASHO is responsible for the investigation of accidents involving fatalities and for the selection of the investigation team.

For accidents involving one fatality, the Forest Service DASHO may delegate the responsibility to conduct the accident investigation to the regional forester in the region where the mishap occurred. However, the chief shall appoint at least one investigation team member.

B. Aviation Accident Without Fatalities. When acting as an agent for the NTSB, the DASHO is responsible for the investigation of accidents. However, the DASHO may delegate the responsibility to the regional forester in the region where the accident occurred. In this case, the Forest Service chief in the Washington Office may select the investigation team members. Notification of change of responsibility to the regional forester by a letter delegating authority is required.

C. Aviation Incidents With Potential. The Washington Office director of fire and aviation management shall make the determination for the level of investigation and review.

The director may delegate the responsibility to conduct the investigation to the regional forester in the region where the mishap occurred.

The investigator shall be a QTI, who may be the sole investigator, or may include an additional investigator and/or technical specialist as team members.

9.4 Investigation Teams

A. NTSB Investigation Team. The NTSB investigator-in-charge will lead the factual investigation. The NTSB investigations, whether conducted by the NTSB or its agent, shall have precedence over all other activities. A Forest Service aviation QTI shall be assigned to participate in all NTSB investigations. Designation will be in writing. The NTSB may designate the Forest Service QTI or the Federal Aviation Administration (FAA) to conduct the onsite factual investigation.

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

B. Forest Service Investigation Team. For all aviation accidents, a Forest Service investigation and management evaluation shall be conducted concurrent with—but separate from—the NTSB factual investigation. The Forest Service investigation team will focus primarily on developing a preliminary factual report and the completion of a draft management evaluation report to submit to the Accident Review Board for final approval.

The management evaluation determines the adequacy of, and adherence to, Forest Service policy and standards, and develops recommended managerial actions intended to prevent future mishaps.

Forest Service accident investigation teams shall follow the management evaluation report procedures in chapter 6.2 and the aviation report formatting guidelines (exhibit 9–1).

9.5 Composition of the Investigation Team

Refer to chapter 1.5 for composition of the investigation team. Duties and responsibilities of team members are:

- A. Team Leader.** Qualifications, duties, and responsibilities are the same as described in chapter 1 with the following additional responsibilities.
1. Qualifications. Refer to chapter 1.
 2. Duties and Responsibilities.
 - a. Coordinates information exchange and release of information to the public with the NTSB.
 - b. Monitors draft report(s) preparation, ensures report(s) contains relevant facts, and removes unrelated information with the assistance of the QTI.
 - c. Coordinates with and advises the DASHO, and the director of fire and aviation management, Washington Office, and the regional forester of any significant developments.
 - d. Coordinates release of wreckage with the NTSB through the appropriate contract officer.
- B. Qualified Technical Investigator.** The director of fire and aviation management, Washington Office, shall maintain a current roster of QTIs and technical specialists. Each region shall have at least one Washington Office-approved QTI (FSM 5700, chapter 5720). Qualifications, duties, and responsibilities are the same as described in chapter 1 with the following additional qualifications and responsibilities.
1. Qualifications.
 - a. Must meet the requirements in 41 CFR 101–37.1109.
 - 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.
 - 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 by NTSB, serves as the Forest Service representative as a member in the factual investigation conducted by the NTSB.
 - 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. Submits the preliminary factual report (exhibit 9–2) to the NTSB area field office within 10 days.
 - f. Obtains pilot’s agency-issued qualification card and submits it to the regional aviation officer, as appropriate.
 - g. Completes human factors analysis (exhibit 9–3).
 - h. Ensures that a job hazard analysis is developed and completed for the investigation.
 - i. Assigns tasks, organizes, and directs technical team members. Typical assignments include:
 - Planning, maps, records, and data collection.
 - Photography.
 - Investigation narrative.
 - Record coordination and duties.
 - Pilot and aircraft information.
 - Contracting information.
 - Compliance with aviation directives and standards.
 - Risk analysis determination, oversight controls.
 - Operational matters, communications, and dispatch.
 - Weather, terrain, and operating environment.

- j. In conjunction with the team leader, presents the preliminary factual report and the draft management evaluation report to the Accident Review Board.

C. Technical Specialist (Investigator).

1. **Qualifications.** Completion of a Washington Office-approved course in accident investigation or equivalent within the previous 5 years or participation in an aviation accident investigation within the previous 5 years.
2. **Duties and Responsibilities.** Assists the team in the area of their specialty.

C. Final Factual Report. The final factual report deals with the technical circumstances of the accident, pilot, aircraft, individuals involved, and operational environment. The NTSB is responsible for the factual investigation of all Forest Service aircraft accidents. The report is prepared using the NTSB forms and format and will take 6 to 12 months to complete.

D. Management Evaluation Report. Due to the fact that the NTSB final factual report takes 6 to 12 months to complete, and the agency's need to address safety concerns in a timely manner, the preliminary factual report is used for developing the management evaluation report as outlined in chapter 6.3. The Accident Review board can reconvene if additional information is found.

9.6 Investigation Team Selection

For Washington Office-level accident investigations, the deputy chief of business operations who serves as the DASHO, shall notify the appropriate regional forester immediately after selecting the investigation team (exhibit 1–1). The DASHO will also notify the deputy chief of state and private forestry.

If the accident investigation is assigned by the DASHO to the region, the DASHO will provide a letter of delegation of authority authorizing selection of the team members to the regional forester.

Notification should include:

- Name of the QTI.
- When and where the team is to be in the region.
- Responsibility for the Accident Review Board.
- Possible inclusion of a regional representative as a team member.

9.7 Reports

- A. Preliminary (24-Hour) Briefing, Expanded (72-Hour) Briefing, and Safety Alerts.** Prepared as described in chapter 1.
- B. Preliminary Factual Report.** The QTI will coordinate closely with the NTSB investigator-in-charge (IIC) and produce a preliminary factual report for agency use. This report includes what has been learned and what the NTSB is able to release at that time. The report is completed using the NTSB form 6120.1/2 (exhibit 9–2) and photographic documentation.

9.8 Accident Review Board

Conduct an accident review for all aviation accidents and certain incidents with potential. The composition of the Accident Review Board shall be determined jointly by the National Aviation Safety and Training manager and the Forest Service safety and occupational health director. Refer to chapter 7 of this guide, chapter 5720 of FSM 5700, and FSH 6709.12 for the responsibilities of the Accident Review Board.

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

9.9 Aviation Investigation Sequence

Every accident has some unique aspects associated with the procedures and conduct of the investigation. The following information should be used as guidelines for aviation investigations.

- A. Initial Response.** The investigation team will not usually arrive at the accident location until the day after the event. Many activities should occur at the forest, district, and region while the team is traveling. All regions have an emergency response guide that includes information for use by the local unit in preparing for the arrival of the investigation team. The QTI should ensure that these actions are underway while the team is being formed.
- B. Inbriefing of Team Members.** Soon after the team arrives at the mishap location, they should hold a formal inbriefing

with the agency administrator to get an overview of the activities that have occurred before their arrival. 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 liaison, obtain clerical support, determine transportation needs, and whether a public information officer is available.

C. Accident Site. Once the team reaches the accident location, going to the accident site is not a priority if the forest has done the job of securing and protecting the scene. The QTI should coordinate Forest Service investigation team site visits with the NTSB investigator-in-charge to familiarize members with the accident scene. Team members must know their specific assignments before visiting the site. Take into consideration hazards that have been identified at the scene and the physical condition of individual team members.

D. Team Meetings.

1. **Initial Team Meeting.** Review the Accident Investigation Guide (chapter 9) and ensure that all investigation team members are familiar with the investigation sequence process. Determine if the NTSB is going to conduct the onsite investigation or if they are going to delegate that responsibility to the Forest Service or the FAA. Explain the role and the interaction of the team leader, the QTI, the FAA, and the NTSB. As appropriate for the level of onsite investigation responsibility, discuss the following topics:

a. **Assignments.** The QTI and team leader need to establish the structure of the team: Who are designated members and who are designated support personnel. Is additional technical or administrative assistance needed? The QTI will make team assignments based on information needed to complete the investigation.

After the initial team meeting, the team leader and the QTI jointly arrange two team meetings each day, one in the morning and one in the evening. Items to cover include:

- Priorities.
- Specific team assignments.
- Review of daily findings.

Individual sections of the aviation report formatting guidelines (exhibit 9–1) may be assigned to specific team members for their use in gathering data to complete the report.

b. **Questions.**

- Is the accident site safe?
- Identify aircraft type, model, and serial number. How was it ordered, dispatched, and controlled? What airbase was it operating from? Does the team have sufficient technical specialists to provide the expertise needed?
- What was the mission of the aircraft? Who authorized it? Was a risk analysis performed? Was the mission environment unique?
- How many people were involved? Where were they located? What were their injuries? What equipment were they using and what were they wearing? How many were restrained by seat belts? Did the emergency locator transmitter function?
- What was the cargo? Was it secured properly? How was it manifested?
- What records and documentation are needed? Where are they located?
- What was the agency organizational structure at the time of the accident?
- Who was in charge? What were their qualifications?
- What communications preceded the accident?
- Was there an aviation operational plan to cover this mission? Did the plan emphasize the risks involved? Who prepared the plan and was it implemented?
- What were the environmental conditions of the mission (weather, terrain, and so forth)?
- How were the aircraft and pilot approved and inspected? How many hours had the pilot flown? What followup inspections were performed and by whom?
- Who is going to locate and interview the witnesses? When?
- What photographic and mapping support is needed?
- How will the team be transported? Who needs to go and where do they need to go?

2. Onsite Visit. Visit the accident site and operating base(s). Work through possible accident scenarios at the operating environment. Gather accident photography and location map information.
3. Post Onsite Meeting. Review information gathered at the onsite meeting. Prepare a chronological sequence of events depicting all relevant information leading up to the accident including survivor rescue and care. Complete accident photography and a location map. Discuss what is needed among team members to ensure that individual task assignments can be completed. Determine whether additional assignments need to be made.

At each daily team meeting:

- Compare notes, establish facts and chronology of events, discuss preliminary findings (prepare a list), and highlight problems and areas of concern.
- Identify and document additional items needed and prioritize assignments.

4. Final Team Meeting.
 - a. Develop a findings list based on the chronology of events and factual data. Findings are based on facts or conditions that are material to the accident.
 - b. Determine which findings are causal factors and which findings are contributing factors to the accident. Often a number of causal factors can be technical and management related. Some accidents may not have any management causal factors, but may have contributing factors (which are related to the accident, but did not cause it to happen).

- c. Develop preliminary recommendations. Team participation in this process is important. Each item should be discussed thoroughly.
- d. Prepare and review drafts of the required reports (chapter 6).
5. Closeout Meeting With Units. With the QTI, the team leader conducts the closeout meeting and provides information on the status of the investigation to the agency administrator.

9.10 Aviation Report Process

Each management evaluation of an accident is unique. However, as outlined in chapter 6, the approach is always the same. Use a building-block method to arrive at preliminary recommendations, the final objective of the evaluation. Gather documents and information that can be used as factual material before findings are developed so the management evaluation report can be completed.

Factual data, records, findings, causal factors, and recommendations comprise the management evaluation report.

In the aviation report formatting guidelines (exhibit 9–1), the table of contents outlines the report formats. Individual sections may be assigned to specific team members for their use in gathering data to complete the report. Additional information may be needed, because each investigation is different.

Assembly and Distribution of the Reports. Refer to chapter 6.



EXHIBIT 9-1

Aviation Report Formatting Guidelines

C O N T E N T S

Introduction

- The Mission
- Accident Chronology
- Sequence of Events
- Crash Sequence
- Accident Response
- Injury and Damage Descriptions
- Photographic Documentation
- Location Maps

Accident Background

- Operational History
- Compliance with Directives
- Accident Prevention Opportunities

Management Evaluation Report

- Narrative
- Preliminary Actions
- Investigation Support

Human Factors Analysis (exhibit 9-3)

Investigation Findings

Causal and Contributing Factors

- Causal Factor Definition
- Contributing Factor Definition

Preliminary Recommendations

Witness and Interview Statements

Accident Records

- Contract and Equipment Records
- Aircraft Records
- Pilot Records
- Personnel Records
- Weather and Terrain Descriptions
- Communications Records
- All Other Records

Exhibit 9-1

Introduction

The Mission

- Briefly describe the mission being performed.
- List the personnel involved.
 - Describe the seating location in the aircraft.
 - List the capacity of each crewmember or passenger.
- Identify the make, model, and serial number of each aircraft.
- Describe the aircraft configuration and loading.
- Identify who authorized (ordered) the flight.
- Identify who dispatched and provided flight following for the aircraft.
- Identify who provided operation control of the aircraft other than the pilot. For example: the forest or district

dispatcher, incident commander, district ranger, or the regional office.

Accident Chronology

- Describe, using a time line, each significant event prior to the accident, including discovery, rescue, and recovery of personnel.

Sequence of Events

- Describe, in narrative form, the mission events leading up to the accident.
- Include a brief statement describing the weather, terrain, obstacles, and other operational information concerning the mission.
- Do not include details or circumstances that are unrelated to the accident.
- Indicate who communicated with and/or observed the mission, including those who witnessed the accident.

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EXHIBIT 9-1 (continued)

Aviation Report Formatting Guidelines

Crash Sequence

- 1—Describe the flight regime of the aircraft during the final moments of flight, describing in detail each evolution, until the aircraft comes to a complete and final rest, and all personnel have exited the aircraft.
- 2—Include all external factors involved in the accident scenario such as fire, blade strikes, seat belt integrity, component separation, and wreckage movement.
- 3—Provide a disintegration sequence from the first point of impact, or inflight separation.

Accident Response

- Describe briefly the actions taken concerning:
 - Crash rescue efforts, body removal, and so forth.
 - Accident plan availability and use.
- Describe briefly the problems encountered concerning:
 - Communication.
 - Availability of personnel and equipment.
 - Transportation and other resources.
 - Interagency cooperation.

Injury and Damage Descriptions

- Personnel.
 - Briefly describe all personnel injuries.
 - List expected time of hospitalization and treatment.
- Aircraft.
 - Describe essential damage to the aircraft.
 - State whether damage was minor or substantial, or whether the aircraft was demolished or burned.
 - State whether the accident was survivable and whether the cabin retained structural integrity.
 - Other.

Photographic Documentation

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

- Instruments.
- Controls in cockpit.
- Radio settings.
- Fuel valve setting.
- Switch positions.
- 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 the crash sequence.
- Aerial pictures orienting the site and wreckage.

Location Maps (Include as Appropriate)

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

Accident Background

Operational History

- Operation base.
 - Briefly describe the operation base supporting the mission.
 - Include only information that has a relationship to the mission and accident.
 - Describe the appearance, accessibility, location, suitability, organization, and management of the facility, including deficiencies.

(Continued) ↗

EXHIBIT 9-1 (continued)**Aviation Report Formatting Guidelines**

- Describe communication between the facility and dispatch including aircraft communications.
- Describe the safety measures for the base, including the condition and suitability of equipment.
- Verify that equipment inspections are current.
- Review emergency plan and response.
- Aircraft and pilot.
 - Discuss the following concerning the aircraft:
 - Maintenance history.
 - Inspections and approval.
 - Mission loading.
 - Discuss contractor performance.
 - 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.
- Organizational structure and management relationships
 - 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.
 - Identify the agency person who was in operational command of the mission. Establish why and how this individual was selected.
 - 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. For example, dispatcher, district ranger, helicopter manager, forest aviation officer.
 - Discuss the relationships, as they are relevant to the investigation.
- Aircraft dispatching and aircraft management.
 - 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?
 - Discuss accident response.
 - Timeliness.
 - Availability of personnel and equipment.
- Discuss use of checklists (crash, rescue, risk analysis, pilot, aircraft, and so forth).
- Does the forest aviation plan address these issues? Is it adequate? Current? Used?
- Operational inspections and followup.
 - List the contract inspections performed of the pilot and aircraft since the award.
 - Document and discuss operations inspections performed on mission personnel.
- Physical environment.
 - Discuss the effects of altitude, temperature, terrain, weather, and turbulence on the accident mission.
 - 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 taken into consideration? By pilot, crew, or dispatching?
 - Was management involved in the decision process?
 - What has been the workload on the pilot and crew? Was this taken into consideration by managers and at what levels?
 - Was the departure and arrival base or site suitable for the mission undertaken?

Compliance With Directives

- Operational procedures.
 - Were standard procedures followed?
 - Proficiency and currency of the pilot.
 - Weight, balance, and manifests.
 - Load calculations/manifest.
 - Power trend checks.
 - Go/no-go checklists.
 - Personal protective equipment (worn and used).
 - Pilot and aircraft approvals.
 - Flight following.
 - Passenger controls (exposure to hazards).
 - Flight and duty limitations.
 - Contracting.
 - Airport guides.
 - Minimum altitudes.
 - Safety briefings.
 - Other.
 - Identify and discuss special mission procedures as they are related to the accident.

(Continued) ↗

EXHIBIT 9-1 (continued)

Aviation Report Formatting Guidelines

- Training and qualifications. The purpose of this section is to evaluate the training and qualifications of personnel and supervisors involved or directly associated with the accident.
 - Identify and discuss specific violations of established policy.
- Records management.
 - Identify and discuss whether directives, operational guides, contracts, manifest, and so forth, were readily available and properly used by personnel associated with the accident. Were they current?
 - 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.

Accident Prevention Opportunities

- Attitudes and performance.
 - Discuss attitudes of personnel involved in the accident and their peers concerning:
 - Use of personal protective equipment.
 - Records management.
 - Training guides and handbooks compliance.
 - Pilot and contractor performance.
 - Past operational practices.
 - Weather, terrain, and fire behavior predictions.
 - Safety practices and standard orders.
 - Management oversight.
- 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:
 - History of submission by the unit and individual. Determine whether any are related to the accident being investigated. If they are relevant, include a listing of reports and actions taken to correct at the field and forest level.
 - Who reviews these documents on the unit? What is done about problems identified? Determine the timeliness of the submission including review.
 - Were other unit incident reports reviewed and discussed by the individuals involved in the accident? Is a file available?
 - Are other unit reports or safety alerts available and used?

- Mission risk factors.
 - 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?
 - Determine whether risk determination is a consideration in mission planning. How frequently? Supervision and oversight?
 - Establish what part the risk analysis played in the accident mission.
- 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.
 - Who provides an emphasis on safety?
 - How is it provided? Is there accountability?
 - What is the frequency of briefings?
 - When was the last safety briefing held?
 - Do the district ranger, fire management officer, forest fire staff, forest aviation officer, and others participate?

Management Evaluation Report

Narrative

- How was the management evaluation conducted and organized?
- When and where was the team assembled? Identify the team composition including the support personnel.
- What were the members' task assignments/titles?
- How was the management evaluation coordinated?
- How was the technical investigation conducted? Include the NTSB and other agency personnel involvement.
- How was the information obtained? List the persons contacted, and companies and equipment used during the evaluation.
- Describe the closeout with the local units.
 - Release of wreckage.
 - Release of team members.
 - Forest and region closeout.
- Other.

(Continued) ↗

EXHIBIT 9-1 (continued)**Aviation Report Formatting Guidelines****Preliminary Actions**

- Describe the preliminary actions taken onscene at the forest or regional level prior to the arrival of the evaluation team concerning:
 - Notification of authorities (Forest Service and others).
 - Site security.
 - Witness identification and statement preparation.
 - Records and document acquisition.
 - Onscene photography.
 - Personnel injuries and treatment.
 - Law enforcement actions taken.
- Other.

Investigation Support

- Briefly describe forest and regional support provided to facilitate the accident investigation team.

Human Factors Analysis

- Refer to exhibit 9-3.

Investigation Findings

- Develop findings from supporting data. Opinions and observations can be used as a finding if confirmation from another source can be obtained. The location of the information that supports each finding must be identified. Identify the appropriate page number of supporting data after each finding. List all relevant findings.
- Divide the list of findings into sections by subject matter. For example:

• Personnel.	• Pilot.
• Aircraft.	• Management.
• Weather.	
- Sample findings:
 - The accident/incident was partially survivable due to the limited cabin structural damage and absence of fire following the accident.
 - The flight crewmembers were properly certified and inspected.

- The load calculation and passenger manifest were properly completed and accurately depicted conditions at the destination helispot.
- Dispatch had not received a position report or contact for over 30 minutes, and no attempt had been made during this period to contact the aircraft or firefighters.
- 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.
- Three 5700-14s, SAFECOM reports, had been prepared on the pilot in the 12 days prior to the accident.
- 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.

Causal and Contributing Factors**Causal Factor Definition**

- Any behavior, acts, or omissions that starts or sustains an accident or incident occurrence. These can occur individually or in combination. An event(s) that sustain the occurrence sequence, but were normal to the situation as it developed, are not causal factors.
 - 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.
 - A short statement should indicate which findings were used and explain the rationale for their selection.

Contributing Factor Definition

- Any behavior, act, or omission that contributes to, but does not directly cause an accident or incident occurrence.
 - 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 a contributing factor.
 - Base contributory cause factors on the findings discovered during the investigation. A short statement should indicate which findings were used and explain the rationale for the selection.

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EXHIBIT 9-1 (continued)

Aviation Report Formatting Guidelines

Preliminary Recommendations

- On completion of the report, preliminary recommendations will be developed. This last step concludes 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 develops quality recommendations for further review and action.
- Using findings and causal and contributing factors, prepare a listing of preliminary recommendations for use by the Accident Review Board. Prepare recommendations for both accidents and incidents, including recommendations for Accident Review Board consideration.

Recommendation 1:

Recommendation 2:

Recommendation 3:

Witness and Interview Statements

- The team is responsible for contacting and interviewing surviving crewmembers, passengers, and persons who may have seen or heard portions of the flight or who may have knowledge concerning the flight. Contact all personnel involved in the accident.
- Obtain witness statements from all persons named in the accident report who were involved in the accident. Statements should be taken as soon as possible and may be handwritten. They must be dated and a time of preparation recorded on the form. When timing, condition of survivors, or other circumstances prevent a statement from being signed, the investigator can prepare a statement. When this is done, it is recommended that the document be reviewed, if possible, before it is included in the report. Telephone interviews can be documented in the same manner.
- Expedite! If crew or passengers survive, obtain statements and interviews as soon possible for maximum recall of details.

Accident Records

- Attach applicable documents in this section. They should be clean and legible. Include only pertinent material and documents as follows:

Contract and Equipment Records

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

Aircraft Records

- Forest Service aircraft inspection records.
- Discrepancy sheets and FS data cards.
- Aircraft log sheets relevant to the accident.
- Power check forms.
- Load calculation forms.
- Load manifests and weight and balance forms.

Pilot Records

- Federal Aviation Administration certificates.
- Medical certificates.
- EKG.
- Forest Service application and check-ride forms.
- Pilot approval card and date.
- Medical injury report.
- Autopsy reports (relevant portions only).
- Death certificates.

(Continued) ↗

EXHIBIT 9-1 (continued)

Aviation Report Formatting Guidelines

- Previous 24-hour history.
- Pilot safety and contract briefing.

Personnel Records

- Aircraft crew members, helitack, and suppressions personnel.
 - Training and qualification records.
 - Medical records of injured personnel.
 - Other related records.
 - Pay records (as needed).

Weather and Terrain Descriptions

- Accident site.

- Flight service station, Forest Service fire weather, lookout reports, and so forth.

- Fire behavior, predicted and actual.

- Other.

Communications Records

- Radio and dispatch logs.
- Tapes and other communications records.

All Other Records

EXHIBIT 9-2

FORM APPROVED FOR USE THROUGH 7/31/96 BY OMB NO.3147-0001.

NATIONAL TRANSPORTATION SAFETY BOARD PILOT/OPERATOR AIRCRAFT ACCIDENT REPORT

**This Form is to be Used for Reporting Civil Aircraft Accidents
Involving Commercial and General Aviation Aircraft**

Location					
Nearest City/Place, State, Zip Code		Date of Accident	Local Time (24 HOUR CLOCK)	Zone	Elevation at Accident Site _____ Feet MSL _____ Feet MSL
If The Accident Occurred On Approach, Takeoff or Within 3 Miles of An Airport, Complete The Following Information					
Proximity To Airport					
1. On Approach		3. Within 1/2 Mile		5. Within 1 Mile	
2. Within 1/4 Mile		4. Within 3/4 Mile		6. Within 2 Miles	
				7. Within 3 Miles	
				8. Beyond 3 Miles	
Airport Name		Airport Ident	Runway/Landing Surface Conditions:		
			1. Direction: 3. Width: 5. Condition:		
			2. Length: 4. Surface:		
Phase Of Operation:					
1. Standing		3. Takeoff		5. Cruise	
2. Taxi		4. Climb		6. Descent	
				7. Approach	
				8. Landing	
				9. Hover/Maneuver	
				10. Altitude Of In-Flight Occurrence _____ Feet MSL	
Aircraft Information					
Registration Mark		Aircraft Manufacturer		Aircraft Type/Model	
				Serial Number	
				Cert Max Gross WT	
Type Of Aircraft			Type Of Airworthiness Certificate		Amateur Built
1. Airplane			1. Normal		1. Yes
2. Helicopter			2. Utility		2. No
3. Glider			3. Acrobatic		
4. Balloon			4. Transport		
5. Blimp/Dirigible			5. Restricted		
6. Ultralight			6. Limited		
7. Gyroplane			7. Experimental		
8. Specify _____			8. Specify _____		
Landing Gear					No. Of Seats
1. Tricycle - Fixed					Flight/Cabin
2. Tricycle - Retractable					Crew _____
3. Tailwheel - Fixed					Pax _____
4. Tailwheel - Retractable					
5. Tailwheel - Retractable Mains					
6. Amphibian					
7. Skid					
8. Limited					
9. Specify _____					
Stall Warning System Installed		IFR Equipped	Engine Type		
1. Yes		1. Yes	1. Reciprocating - Carburetor		
2. No		2. No	2. Reciprocating - Fuel Injected		
			3. Turbo Prop		
			4. Turbo Jet		
			5. Turbo Fan		
			6. Turbo Shaft		
Engine Manufacturer		Engine Model/Series	Engine Rated Power		Type Of Fire Extinguishing System Used
			1. _____ Horsepower		1. None
			2. _____ Lbs Thrust		2. Specify _____
Engine(s)	Date of Mfg.	Mfg. Serial No.	Total Time	Time Since Inspection	Time Since Overhaul
Engine No. 1			Hours	Hours	Hours
Engine No. 2			Hours	Hours	Hours
Engine No. 3			Hours	Hours	Hours
Engine No. 4			Hours	Hours	Hours
Type Of Maintenance Program		Type Of Last Inspection		Date Last Inspection Performed _____ (M/D/Y)	
1. Annual		1. Annual		Time Since Last Inspection _____ Hours	
2. Manufacturer's Inspection Program		2. 100 Hours		Airframe Total Time _____ Hours	
3. Other Approved Inspection Program (AAIP)		3. AAIP			
4. Continuous Airworthiness		4. Continuous Airworthiness			
5. Specify _____					
Emergency Locator Transmitter (ELT)	ELT Manufacturer	Model/Series		Serial Number	Battery Date (M/D/Y)
	Switch	Operated		Aided In Accident Location	
	1. On 2. Off 3. Armed	1. Yes 2. No		1. Yes 2. No	
Registered Aircraft Owner			Address _____		
Operator Of Aircraft			Address		
1. Same As Registered Owner			1. Same As Registered Owner		
2. Name _____			2. _____		
3. DBS: _____					

NTSB Form 6120.1/2 (11/87) This form replaces NTSB Forms 6120.1 (rev. 10/77) and 6120.2 (rev. 10/77)

Exhibit 9-2—National Transportation Safety Board form 6120.1/2.

Exhibit 9-2

EXHIBIT 9-2 (continued)

Owner/ Operator Information (cont.)										
Operator (Certificate Number)			Operator Designator (4 Letter Designator)							
Purpose Of Flight And Type Of Operation										
Regulation Flight Conductor Under			Operator Authority			FAR 121, 125, 127, 129, 135 Revenue Operations				
1. FAR91 (only) 4. FAR 121 7. FAR 133			FAR 121 FAR 133			1. Scheduled				
2. FAR91D 5. FAR 125 8. FAR 135			1. Domestic 6. Rotorcraft			2. Non Scheduled				
3. FAR 103 6. FAR 129 9. FAR 137			2. Flag External Load			3. Domestic				
Purpose Of Flight			3. Supplemental			4. International				
1. Personal 6. Aerial Observation			FAR 125			5. Passenger				
2. Business 7. Other Work Use			FAR 135 7. Large Aircraft			6. Cargo				
3. Educational 8. Public Use			4. On Demand			7. Specify _____				
4. Executive/Corporate 9. Ferry			5. Commuter FAR 129							
5. Aerial Application 10. Positioning			8. Foreign							
Pilot Information										
Pilot Name			Pilot Certificate No.		Address _____			Nationality		
Certificate(s)										
1. Student		3. Commercial		5. Flight Instructor		7. Military		9. None		
2. Private		4. Airline Transport		6. Flight Engineer		8. Foreign		10. Specify _____		
Rating(s)			Instrument Rating(s)			Instructor Rating(s)				
1. None 6. Helicopter			1. None			1. None 6. Instrument Airplane				
2. Single Engine Land 7. Glider			2. Airplane			2. Airplane S.E. 7. Instrument Helicopter				
3. Single Engine Sea 8. Free Balloon			3. Helicopter			3. Airplane M.E. 8. Ground Instructor				
4. Multiengine Land 9. Airship						4. Helicopter 9. Specify _____				
5. Multiengine Sea 10. Gyroplane						5. Glider				
Type Ratings/Student Endorsements			Date Of Biennial Flight Review Or Equivalent (M/D/Y)			BFR Aircraft				
						1. Make _____				
						2. Model _____				
Medical Certificate			Date Of Last Medical (M/D/Y)		Limitations			Date Of Birth (M/D/Y)		
1. None 3. Class 2					Waivers					
2. Class 1 4. Class 3										
Degree Of Injury		Seat Occupied		Person At Controls At Time Of Accident				Seat Belt Available		
1. None		1. Left 4. Front		1. Pilot In Control 4. Non-Pilot				1. Yes		
2. Minor		2. Right 5. Rear		2. Second Pilot 5. No One				2. No		
3. Serious		3. Center		3. Both Pilots						
4. Fatal										
Seat Belt Used		Shoulder Harness Available		Shoulder Harness Used		Source Of Pilot Flight Time Information				
1. Yes		1. Yes		1. Yes		1. Pilot Logbook 4. Company				
2. No		2. No		2. No		2. Operators Estimate 5. Specify _____				
						3. FAA Records				
Flight Time		All A/C	This Make & Model	Airplane Single Engine	Airplane Multiengine	Night	Instrument Actual Simulated	Rotorcraft	Glider	Lighter Than Air
Total Time										
Pilot In Command (PIC)										
Instructor										
This Make & Model										
Last 90 Days										
Last 30 Days										
Last 24 Hours										
Second Pilot Information										
Second Pilot Responsibilities At The Time Of Accident										
1. Co-Pilot		2. Dual Student		3. Safety Pilot		4. Check Pilot		5. None (Pilot-Rated Passenger)		
Pilot Name			Pilot Certificate No.		Address _____			Nationality		
Certificate(s)										
1. Student		3. Commercial		5. Flight Instructor		7. Military		9. None		
2. Private		4. Airline Transport		6. Flight Engineer		8. Foreign		10. Specify _____		

Exhibit 9-2

EXHIBIT 9-2 (continued)

Second Pilot Information (cont.)										
Rating(s)			Instrument Rating(s)			Instructor Rating(s)				
1. None	6. Helicopter	1. None	1. None	6. Instrument Airplane	2. Single Engine Land	7. Glider	2. Airplane	7. Instrument Helicopter	3. Airplane S.E.	
3. Single Engine Sea	8. Free Balloon	3. Helicopter	3. Airplane M.E.	8. Ground Instructor	4. Multiengine Land	9. Airship	4. Helicopter	9. Specify _____	5. Glider	
5. Multiengine Sea	10. Gyroplane									
Type Ratings/Student Endorsements			Date Of Biennial Flight Review Or Equivalent (M/D/Y)			BFR Aircraft 1. Make _____ 2. Model _____				
Medical Certificate		Date Of Last Medical (M/D/Y)		Limitations			Date Of Birth (M/D/Y)			
1. None	3. Class 2			Waivers						
2. Class 1	4. Class 3									
Degree Of Injury		Seat Occupied			Seat Belt Available					
1. None	3. Serious	1. Left	3. Center	5. Rear	1. Yes					
2. Minor	4. Fatal	2. Right	4. Front		2. No					
Seat Belt Used		Shoulder Harness Available		Shoulder Harness Used		Source Of Pilot Flight Time Information				
1. Yes	2. No	1. Yes 2. No		1. Yes 2. No		1. Pilot Logbook		4. Company		
						2. Operators Estimate		5. Specify _____		
						3. FAA Records				
Flight Time		All A/C	This Make & Model	Airplane Single Engine	Airplane Multiengine	Night	Instrument	Rotorcraft	Glider	Lighter Than Air
							Actual Simulated			
Total Time										
Pilot In Command (PIC)										
Instructor										
This Make & Model										
Last 90 Days										
Last 30 Days										
Last 24 Hours										
Other Personnel										
Name		Seat	Address (City & State)		Crew	Non-Revenue	Revenue	Non-Occupant	FAA	Fatal Serious Minor None
1.										
2.										
3.										
4.										
5.										
6.										
Flight Itinerary Information										
Last Departure Point		Time Of Departure		Destination		Flight Plan Filed				
1. Airport ID _____		1. Time _____		1. Airport ID _____		1. None		4. VFR/IFR		
2. City/Place _____		2. Time Zone _____		2. City/Place _____		2. VFR		5. Company (VFR)		
3. State _____				3. State _____		3. IFR		6. Military (VFR)		
If Weather Was Involved, State If Weather Briefing Was Obtained Or If Weather Reports Were Checked And How It Was Accomplished										
Fuel On Board At Last Takeoff				Fuel Type						
_____ Gallons				1. 80/87		4. 115/145		7. Specify _____		
or _____ Pounds				2. 100 Low Lead		5. Jet A				
				3. 100/130		6. Automotive				
Other Services, If Any, Prior to Departure										
Weather Information At The Accident Site										
Source Of Weather Information (Pilot/Operator, Weather Observation)			Light Condition			Visibility		Temp (°F)		
			1. Dawn			3. Dusk		5. Dark Night		
			2. Daylight			4. Bright Night				
						_____ Miles				

Exhibit 9-2

EXHIBIT 9-2 (continued)

Weather Information At The Accident Site (cont.)			
Dew Point (°F)	Altimeter Setting "HG	Sky/Lowest Cloud Condition 1. Clear 2. Scattered _____ Feet AGL 3. Broken _____ Feet AGL 4. Overcast _____ Feet AGL 5. Partial Obscuration 6. Obscured	
Wind Information 1. Direction _____ 2. Velocity _____ Kts 3. Gusts _____ Kts		Restriction To Visibility	Intensity Of Precipitation 1. Light 2. Moderate 3. Heavy 4. Specify _____
Turbulence (Multiple Entry) 1. None 2. Light 3. Moderate 4. Severe 5. Extreme 6. Clean Air 7. In Clouds			
Damage To Aircraft And Other Property			
Degree Of Aircraft Damage 1. None 2. Minor 3. Substantial 4. Destroyed			Fire 1. Yes 3. In-Flight 2. No 4. On Ground
Description Of Damage To Aircraft And Other Property			
Mechanical Malfunction Failure			
1. <input type="checkbox"/> No		Total Time	
2. <input type="checkbox"/> Yes List The Name Of The Part, Manufacturer, Part No., Serial No., And Describe The Failure		On Part _____ Hours	At Overhaul _____ Hours
Collision Accident			
If Collision Accident Occurred, Complete The Information For Other Aircraft			
Registration Mark	Aircraft Manufacturer	Aircraft Type/Model	Degree Of Aircraft Damage 1. Destroyed 3. Minor 2. Substantial 4. None
Registered Aircraft Owner		Address	
Pilot Name	Address		Pilot Certificate No.
Evacuation Of Aircraft			
Assistance Received 1. Outside Person(s) 3. Slide 5. Ladder 2. Auxiliary Lighting 4. Rope 6. Specify _____			
Method Of Exit (State Approximate Number Of Persons Using Each Of The Following 1. Main Door _____ 2. Auxiliary Door _____ 3. Emergency Exit _____			
Recommendation (How Could This Accident Have Been Prevented)			
Operator/Owner Safety Recommendation (Optional Entry)			

Exhibit 9-2

EXHIBIT 9-2 (continued)

Additional Flight Crew Members			
For Each Additional Flight Crew Member, Exclusive Of Cabin Attendants Complete The Following Information			
Name	FAA Certificate No.	Address _____ _____	Title
Certificate(s) 1. Student 3. Commercial 5. Flight Instructor 7. Foreign 2. Private 4. Airline Transport 6. Flight Engineer 8. Specify _____			
Ratings/Endorsements		Total Flight Time	Flight Time This Accident
Name	FAA Certificate No.	Address _____ _____	Title
Certificate(s) 1. Student 3. Commercial 5. Flight Instructor 7. Foreign 2. Private 4. Airline Transport 6. Flight Engineer 8. Specify _____			
Ratings/Endorsements		Total Flight Time	Flight Time This Accident
Name	FAA Certificate No.	Address _____ _____	Title
Certificate(s) 1. Student 3. Commercial 5. Flight Instructor 7. Foreign 2. Private 4. Airline Transport 6. Flight Engineer 8. Specify _____			
Ratings/Endorsements		Total Flight Time	Flight Time This Accident
Name	FAA Certificate No.	Address _____ _____	Title
Certificate(s) 1. Student 3. Commercial 5. Flight Instructor 7. Foreign 2. Private 4. Airline Transport 6. Flight Engineer 8. Specify _____			
Ratings/Endorsements		Total Flight Time	Flight Time This Accident

Exhibit 9-2

EXHIBIT 9-2 (continued)

Exhibit 9-2

Narrative History Of Flight Describe What Occurred In Chronological Order, The Circumstances Leading To The Accident And The Nature Of The Accident. Describe The Terrain And Include A Sketch Of Wreckage Distribution If Pertinent. Attach Extra Sheets If Needed. State Point Of Departure, Time Of Departure, Intended Destination And Services Obtained.			
I Hereby Certify That The Above Information Is Complete And Accurate To The Best Of My Knowledge			
Date Of This Report	Signature Of Pilot/Operator		
Signature Of Person Filling Report Other Than Pilot/Operator			
1. Signature _____			
2. Type Or Print Name _____			
3. Title _____			
For NTSB Use Only			
NTSB Accident No.	Reviewed By NTSB Office Located At	Name Of Investigator	Date Report Received

EXHIBIT 9-2 (continued)

NATIONAL TRANSPORTATION SAFETY BOARD NTSB Form 6120.1/2 PILOT/OPERATOR AIRCRAFT ACCIDENT REPORT

Forms may be obtained from the National Transportation Safety Board Field Offices and the Federal Aviation Administration, Flight Standards District Offices.

Rules pertaining to aircraft accident, accidents, overdue aircraft, and safety investigation are contained in Part 830 of the National Transportation Safety Board's Regulations, 49CFR. These rules state the authority of the Board's Regulations, 49CFR. These rules state the authority of the Board, define accidents, injuries, and other terms, and provide procedures for initial and immediate notification by aircraft pilots/operators.

A. APPLICABILITY

The pilot/operator of an aircraft shall file a report with the Field Office of the National Transportation Safety Board nearest the accident or incident. The report shall be filed within ten (10) days after an accident for which notification is required by Section 830.5 or when after seven (7) days an overdue aircraft is still missing.

The Pilot/Operator Aircraft Accident Report Form is used in determining the facts, conditions, and circumstances for aircraft accident prevention activities and for statistical purposes. It is necessary that ALL questions be answered completely and accurately to serve the above purposes.

B. DEFINITIONS

1. "Aircraft Accident" means an occurrence with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, and in which any person suffers death, or serious

injury as a result of being in or upon the aircraft or by direct contact with the aircraft or anything attached thereto, or in which the aircraft receives substantial damage.

2. "Substantial Damage" means damage or structural failure which adversely affects the structural strength, performance or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component. NOTE: Engine failure (damage limited to an engine), bent fairing or cowling, dented skin, small punctured holes in the skin or fabric, ground damage to rotor or propeller blades, damage to landing gear, wheels, tires, flaps engine accessories, brakes, or wing tips are not considered "substantial damage" for purposes of this report.

3. "Demolished" includes destruction by fire.

4. "Operator" means any person who causes or authorizes the operation of an aircraft, such as the owner, lessee, or bailee of an aircraft.

5. "Fatal Injury" means any injury which results in death within thirty (30) days of the accident.

6. "Serious Injury" means any injury which (1) requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received; (2) results in a fracture of any bone (except simple fracture of finger, toes, or nose); (3) involves lacerations which cause severe hemorrhages, nerve, muscle, or tendon damage; (4) involves injury to any internal organ; or (5) involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface.

INSTRUCTIONS TO PILOTS/OPERATORS FOR COMPLETING THIS FORM

It is necessary that ALL questions on this report be answered completely and accurately.

Item 1. Location: Use the name of the nearest community that has a Post Office in the state where the accident occurred. **Date & Time:** Indicate if daylight saving or standard time. **Elevation:** Provide elevation of the accident site. **Airport Identification:** Provide 3 or 4 character identifier. **Runway:** Direction—heading being used; Surface—composition, i.e., concrete asphalt, grass, etc.; Condition—wet, slick, soft, etc. **Phase of Operation:** During what Phase of Operation did the accident occur. Note: If the accident occurred in flight, state the altitude of the occurrence.

Item 2. Aircraft Data: Make and Model—enter as shown on aircraft registration certificate; Engine—enter make and model as shown on engine nameplate. **Certificated Max Gross Weight:** Indicate the certificated max gross weight for the aircraft involved in the occurrence. **Type of Fire Extinguishing system:** Include hand type extinguishers, if fire was involved, and extinguisher was used.

Item 3. Purpose of Flight and Type of Operation: More than one selection may be made to indicate the type of operation that was being conducted at the time of the occurrence.

Item 4. Pilot Information — Pilot-in-Command (PIC) Includes solo flight time. Instructor—indicate all dual flight instructor given.

Item 5. Second Pilot Information—Indicate the capacity in which the second pilot was acting at the time of the accident.

Item 6. Self-Explanatory.

Item 7. Self-Explanatory.

Item 8. Weather Information at the Accident Site. Indicate the weather conditions at the accident site at the time of occurrence.

Sky/Lowest Cloud Condition: If cloud condition was scattered, broken or overcast, include height of clouds above ground level.

Restriction to Visibility: Haze, dust, smoke, fog, etc.

Type Precipitation: Rain, snow, hail, etc.

Item 9. Collision Accident. This includes collision with parked aircraft. **Item 10-14.** Are self-explanatory.

Item 15. Additional Flight Crew Members. This page should be completed if there are more than two required flight crew members on the aircraft. This also includes a check airman performing official duties. For aircraft requiring two flight crew members or less, and there were not other required flight crew members involved, separate this page.

EXHIBIT 9-3**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).

(Continued) ↗

EXHIBIT 9-3 (continued)

Aviation Human Factors Analysis

- 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.
- Negative learning transfer (such as during transition to new aircraft).
- 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).

- 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).

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.

Knowledge and Skill

- Inadequate knowledge of systems, procedures, and so forth (knowledge-based errors). Types:
 - Knowledge-based.
 - Inadequate knowledge of systems, procedures.
 - Used improper procedure.
 - Illstructured 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:

(Continued) 

EXHIBIT 9-3 (continued)**Aviation Human Factors Analysis**

- 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.
 - Demonstration of performance below required proficiency standards or currency standards.
 - Demonstration of 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).
 - 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 on 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 or current proficiency standards.
- Demonstration of 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.
 - Diverted to new incidents.
 - Excessive communication demands.
 - Past mission success was based on high-risk behavior.

(Continued) ↗

EXHIBIT 9-3 (continued)

Aviation Human Factors Analysis

Personality and Safety Attitude

- Demonstration of overconfidence in flying ability.
- Demonstration of excessive motivation to achieve mission.
- Reckless operation.
- Demonstration of anger or frustration on the job.
- Demonstration of 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 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.
 - Violated agency policy or contract.

- Failed to comply with departmental manuals.
- Conducted night training or special mission with PAX.
- Filed VFR in marginal weather conditions.
- Failed to use radar advisories from ATC.
- PIC knowingly accepted noncurrent crew.
- Performed unauthorized acrobatic maneuver.
- Scud running (avoiding a weather pattern).
- Failed to obtain valid weather brief.
- Accepted 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.

(Continued) 

EXHIBIT 9-3 (continued)**Aviation Human Factors Analysis**

- 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.
 - 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 (conducive to negative habit transfer).
 - 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.

(Continued) ↗

EXHIBIT 9-3 (continued)

Aviation Human Factors Analysis

- 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:
 - Hazards go unseen or unrecognized.
 - 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).
 - Inadequate work standards or low-performance expectations.
 - Inadequate or poor example set by supervisors.
 - Inadequate safety commitment or emphasis by supervisors.
 - Organization lacked an adequate system for monitoring and correcting hazardous conditions.
 - Supervisors did not promote and reward safe behavior or quickly correct unsafe behaviors.
 - Organization did not have adequate policies and procedures to ensure high quality work performance.
 - Organization had inadequate job qualification standards or training program.
 - Organization had inadequate internal communication.

- Organization had no system or an inadequate system for management of high-risk pilots.
- Organization had inadequate process or procedures for operational risk management.
- Organization did not provide adequate aeromedical or human factors training.
- Organization did not ensure sufficient involvement of medical and occupational health specialists.
- Organization did not establish or enforce 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.
 - Were 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.
 - Not properly licensed.
 - Insufficient (staffing).
 - Improper or insufficient oversight.
 - Insufficiently rested.

(Continued) 

EXHIBIT 9-3 (continued)***Aviation Human Factors Analysis***

- Management.
 - Nonexistent.
 - Ineffective.
 - Understaffed.
 - Ineffective organization chart.
 - Insufficiently trained.
- Quality Assurance.
 - Nonexistent.
 - Insufficiently trained.
 - Ineffective.
 - Not used when available.
- Inspection Guides.
 - Not available.
 - 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.
 - Not complete.
 - 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 9-3

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 reached the ground.

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 report is completed.

Briefing, Preliminary (24-hour)—This document contains the first details of the accident. It is prepared by the chief investigator and transmitted within 24 hours of the team's arrival by the team leader 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 report is completed.

Causal Factor—A causal factor, developed from the findings, is an act, omission, condition, or circumstance that either starts or sustains an accident sequence. A causal factor may be related to persons, equipment or environmental conditions. A given act, omission, condition, or circumstance is a causal

factor if correcting, eliminating, or avoiding it would prevent the accident or mitigate damage or injury.

Cause—A cause is an act, omission, condition, or circumstance that starts or sustains an accident sequence. A cause may be related to persons or machines. A given act, omission, or circumstance is a cause if correcting, eliminating, or avoiding it would prevent the accident or mitigate damage or serious injury. An environmental condition may be a cause if it was not reasonably avoidable.

Collateral 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.

Contributing Factor—Factors that set the stage for an accident or incident, or increase the severity of injuries or extent of property damage. Some examples of contributing factors are: failure to follow procedures, conflicting resource priorities, and delay in taking appropriate action.

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—An actual happening in time or space that is verified, preferably by two or more sources of evidence or proof.

Factual Report—A document is developed by the accident investigation team that contains the facts and findings of the investigation. The draft factual report is submitted to the Accident Review Board.

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

Findings—Findings are the conclusions of the accident

investigation team. Each finding should be based on two or more facts from the investigation. Based on the facts, they are statements of significant events or conditions prior to, during, and after the incident.

Fire Operations Accident—An accident occurring as a result of actions taken to confine, contain, or control wildfire, or to ignite, monitor, or otherwise manage a prescribed burn that results in serious injury, hospitalization, or a fatality.

Fire Operations Incident—An incident that occurs as a result of actions taken to confine, contain, or control a wildfire, or to ignite, monitor, or otherwise manage a prescribed burn.

First Aid—Any medical treatment provided that does not involve a medical bill. If a physician prescribes medical treatment 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 (not involving fire)—Any situation that narrowly misses being an accident in which the circumstances indicate serious potential for substantial damage, injury, or death.

Incident With Potential (fire)—An incident that narrowly misses being an accident and in which the circumstances

indicate serious potential for substantial damage or injury. The USDA Forest Service, National Aviation Safety and Training Manager, determines classification of an incident with potential.

Management Evaluation Report—A draft document prepared by the accident investigation team that identifies the causal factors of, and contributing factors to, an accident, and includes recommendations to prevent or reduce the risk of similar accidents. The draft document is submitted to the Accident Review Board who finalizes the document.

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—Reasonable, feasible solutions, based on the causal factors of an accident, to prevent or reduce the risk of similar accidents.

Serious Nonaviation 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
COR	Contracting officer's representative
DASHO ...	Designated agency safety and health official
DOI	U.S. Department of the Interior
DOT	U.S. Department of Transportation
FAA	Federal Aviation Administration
FMO	Fire management officer
FOIA	Freedom of Information Act
FS	Forest Service
FSM	Forest Service Manual
GPS	Global positioning system
ICP	Incident command post
IIC	Investigator in charge
JHA	Job hazard analysis
LEI.....	Law enforcement and investigations
MER	Management evaluation report
NFES	National fire equipment system
NFFE	National Federation of Federal Employees
NFPA	National Fire Protection Association
NICC	National Interagency Coordination Center
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
SOP	Standard operating procedure
TL	Team leader
USDA	United States Department of Agriculture
WO	Washington Office

About the Project Leader

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 a zone fire

management officer on the Wallowa-Whitman National Forest. Chuck has also worked on the Cleveland, Plumas, and Fremont National Forests before coming to the Center.

Library Card

Whitlock, Chuck. 2003. Accident investigation guide: 2003 edition. Tech. Rep. 0367–2808–MTDC. Missoula, MT: U.S. Department of Agriculture, Forest Service, Missoula Technology and Development Center. 96 p.

Describes the procedures used by the Washington Office chief's investigation team for serious accidents, aviation accidents, and incidents with potential. Serious accidents involve either: a death, three or more persons hospitalized for longer than mere observation, wildland fire shelter deployments or entrapments, or property damage that exceeds \$250,000. Smoke-jumping, helicopter rappelling, and aviation short-haul accidents are considered Forest Service aviation accidents if they occur before the employee or equipment is safely on the ground. An incident that narrowly misses being an accident and in which the circumstances indicate serious potential for substantial

damage or injury. The process also applies, either entirely or in part, 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. Forest Service and the Department of the Interior wildland firefighting resources involved in a "serious fire-related accident" are investigated in accordance with the memorandum of understanding between the United States Departments of the Interior and Agriculture. Aviation accidents are investigated in accordance with Forest Service Manual 5720.

Keywords: aviation, fatalities, fire fighting, firefighting, guide-books, incidents, safety at work

Additional single copies of this document may be ordered from:

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Electronic copies of MTDC's documents are available on the Internet:

<http://fsweb.mtdc.wo.fs.fed.us/cgi-bin/enter.pl?link=pubs>