

United States  
Department of  
Agriculture

Forest Service

Technology &  
Development  
Program

5100 Fire  
March 2001  
0151-2823-MTDC



# *Investigating Wildland Fire Entrapments*

*2001 Edition*





*Those who cannot remember the past  
are condemned to repeat it.*

*George Santayana (1863-1952)*

# ***Investigating Wildland Fire Entrapments***

***2001 Edition***

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Missoula, MT**

**TE02E16—Technical Services**

**March 2001**

**This document replaces the 1995 edition of  
*Investigating Wildland Fire Entrapments*  
(9551-2845-MTDC).**

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## Introduction

**F**rom 1990 to 1998, burnovers killed 39 firefighters in the United States during 15 separate incidents. Burnovers were the leading cause of death for all wildland firefighting agencies except volunteer departments.

Many more firefighters were caught in life-threatening entrapments. Fire investigations revealed that 1,692 personnel were entrapped between 1976 and 1999. On average, 42 fire shelters were deployed each year.

Firefighters do not need to deploy shelters, suffer an injury, or even leave their engines to have been in situations defined as entrapments. The National Wildfire Coordinating Group (NWCG), a Federal organization sanctioned to improve suppression efforts, calls entrapment:

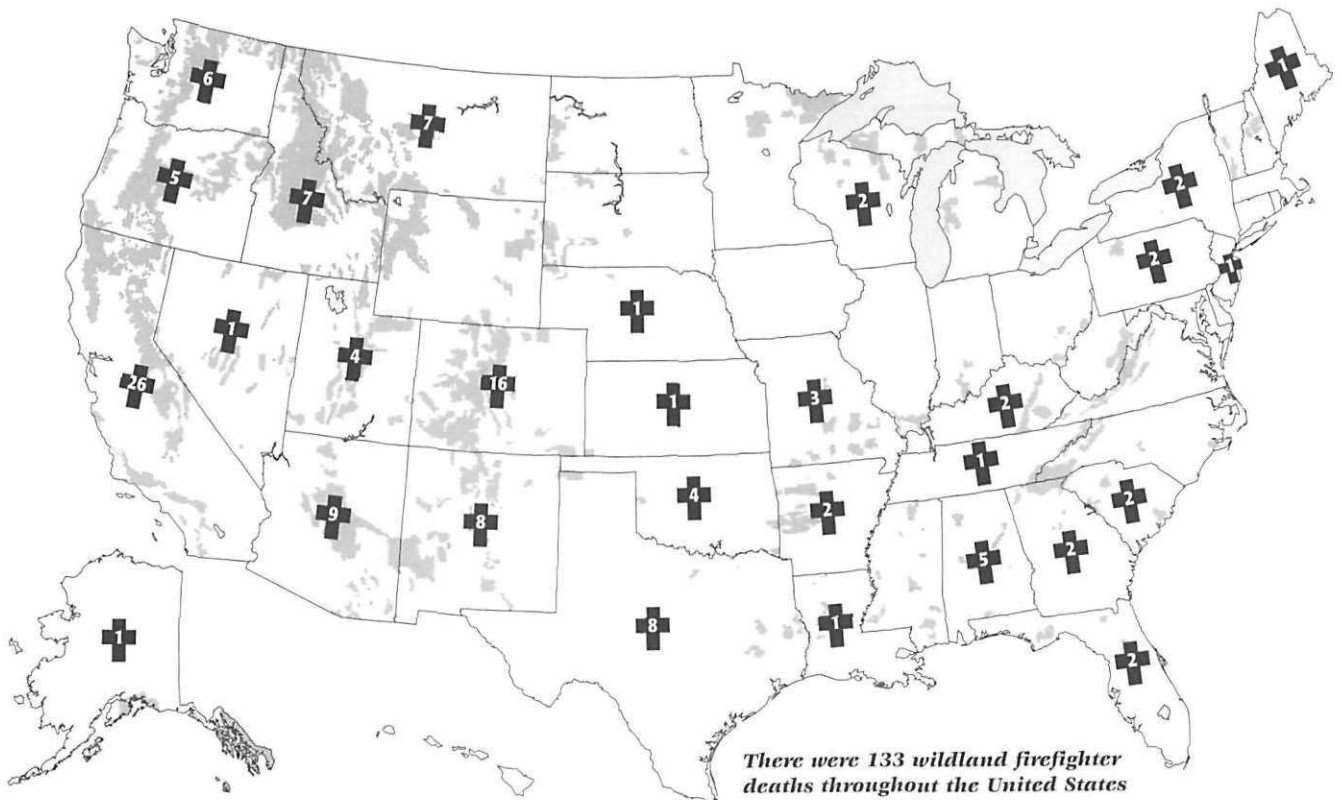
“A situation where personnel are unexpectedly caught in a fire behavior related life-threatening position where escape routes or safety zones are absent, inadequate or have been

compromised. An entrapment may or may not include deployment of a fire shelter for its intended purpose.”

A 1980 NWCG entrapment study revealed that, since the 1950's, investigators have repeatedly emphasized fire behavior, firefighter qualifications, and communications in their inquiries. Less quantifiable issues such as organizational, sociological, and psychological factors were not examined.

Entrapment investigations are among the most difficult and most important firefighting assignments. Investigators work under extremely stressful circumstances requiring the rapid release of findings concerning the actions of friends, colleagues, and superiors.

The objective is always to prevent the situation from recurring. Investigators accept an obligation to be unbiased, patient, professional, and committed to finding the truth.



## Objectives of an Entrapment Investigation

An entrapment investigation's findings can lead to changes in procedures, training, and equipment throughout the firefighting community worldwide. The primary objectives of an investigation should be to:

- 1. Determine the direct and indirect causes of the entrapment. Examples include inadequacies involving equipment, protective clothing, or standard operating procedures. It is also important to reveal previously unknown hazards.
- 2. Ensure that recommendations are publicized through fire organizations and professional publications to prevent similar occurrences.
- 3. Provide factual information to participants who are trying to understand events they experienced.
- 4. Document the incident and preserve evidence for further investigation or legal action.
- 5. Satisfy the requirements of beneficiary entitlements, such as the Public Safety Officer Benefits Program, which provides financial assistance to survivors of American firefighters killed or disabled in the line of duty.



“We feel a strong responsibility to wildland firefighters everywhere, particularly those who lost their lives in this incident, to help reduce the risk of a recurrence of the deep, personal loss experienced in the South Canyon Fire.”

—Preface, *Report of the South Canyon Fire Accident Investigation Team*, August 17, 1994

## Immediate Actions

**A**s soon as the emergency situation is over, the investigation begins. The first actions must be taken before the investigation team arrives.

Appendix A contains the fire entrapment/fatality first-response form that ensures essential tasks are performed. The entrapment investigation timeline (appendix C) helps ensure that actions are taken at appropriate times. The forms can be sent by fax machine anywhere an entrapment has occurred.

When a fire involves an entrapment, the entrapment becomes an incident within an incident. The incident commander (IC) should continue to supervise suppression efforts, while a second IC manages the entrapment scene. Assistance from other fire managers becomes essential as the entrapment IC:

- Accounts for injured or missing personnel by radioing fire managers, conducting roll calls, and checking manifests.

- Notifies dispatch of an entrapment, serious injury, or fatality. The names of involved personnel are not communicated over the radio.

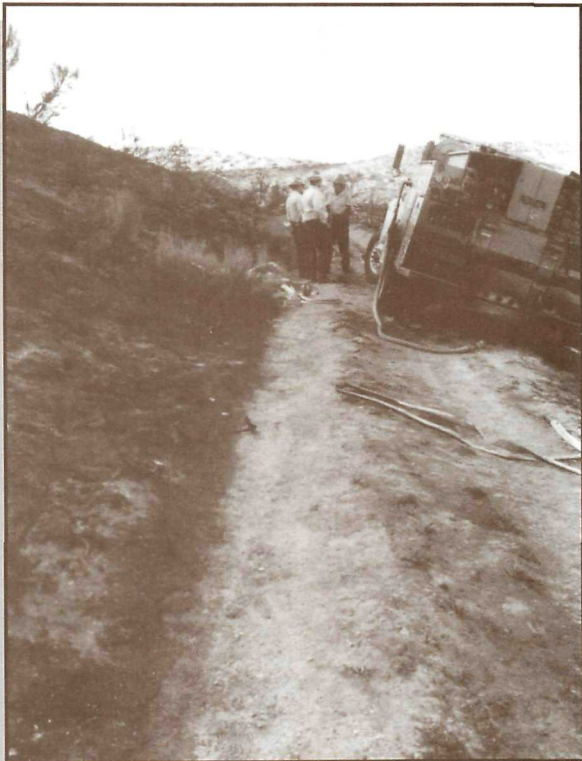
- Ensures firefighters receive medical treatment and that someone accompanies them to the hospital. This individual administers to firefighter needs, tracks where each person is transported, gathers personal protective equipment (PPE) for investigators, and protects the privacy of firefighters and their relatives.

- Requests additional personnel, such as a second IC, to ensure an investigation is begun, the entrapment scene is secure, and an agency presence is maintained.

- Orders law enforcement to control access to the scene. Flight restrictions over the entrapment site will keep propeller downwash from disturbing evidence and ensure safe airspace (FAA–TFR 91.91.) Flight restrictions may also be needed to limit media access over the hospital where victims are transported.

- Notifies the sheriff's department if fatalities have occurred. The IC should request that bodies be left in place for investigators, if possible.

- Relieves firefighters, managers, and dispatchers directly involved in the incident. The IC should also be prepared to turn the fire over to another IC as soon as practical.



*Equipment involved in a turnover should not be disturbed before investigators have inspected it.*

# Notifications

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**N**otification of relatives of firefighters who have been killed or seriously injured should follow agency protocol and be channeled through the chain of command. Swift delivery of accurate information to the victims' families and home units is the priority (before news media reports).

The process should be coordinated through the victims' home units. Those units will designate personnel to meet with families. For instance, the USDA Forest Service requires local line officers to notify families in person.

It is important to recognize a deceased firefighter's cultural background and to respect the family's religious wishes.

Native Americans may want to perform ceremonies at the entrapment site and refuse to authorize an autopsy. Fire managers must identify a fallen firefighter's tribal affiliation, remembering that a crew may include members from different tribes.

Federal agencies involved in an entrapment should also notify the National Interagency Coordination Center in Boise, ID; the Washington Office; and the Missoula Technology and Development Center.

The Occupational Safety and Health Administration (OSHA) investigates employers to determine whether occupational safety and health violations contributed to mishaps. All Federal fire units must notify OSHA if a fatal entrapment occurs. The National Institute for Occupational Safety and Health primarily develops research data to support OSHA, but also has excellent resources to assist local jurisdictions with investigations. Since 1998, the National Institute for Occupational Safety and Health has had a congressional mandate to investigate all firefighter fatalities.

Fire agencies in other countries should follow policies and procedures specified in their incident action plans or other directives.

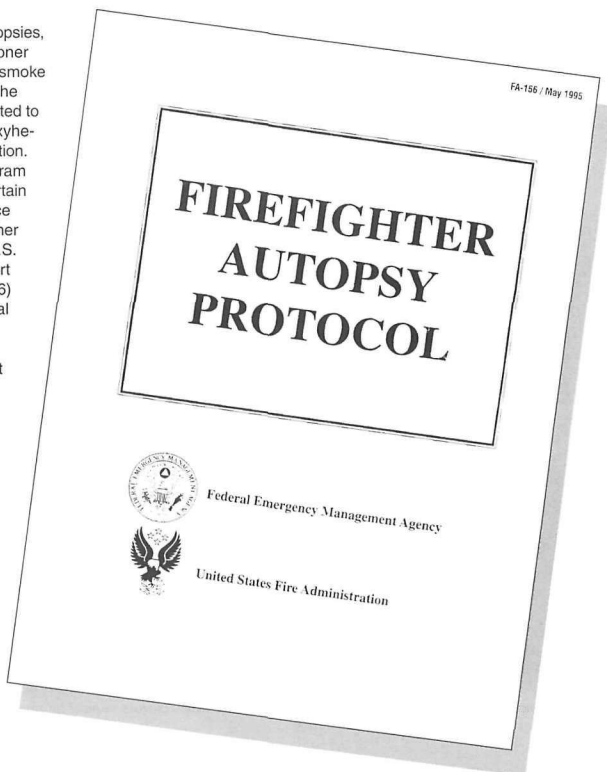
Other organizations or groups may be involved in wildland fire entrapment investigations. The International Association of Fire Chiefs locates technical experts to help its members conduct investigations. It also publicizes findings and recommendations throughout the fire service. The International Association of Fire Fighters also participates in investigations involving the death or serious injury of career firefighters. The National Fire Protection Association has participated as an advisor to wildland fire entrapment investigations.

## Medical Considerations

The local sheriff's office must be notified if fatalities have occurred. In most situations the sheriff retains authority over the victim's remains until the coroner releases authority. Incident commanders should request that bodies be left in place until investigators arrive or at least until photographs have been taken.

Forest Service officials cannot order autopsies, but most jurisdictions require that a coroner determine the cause of death (such as smoke inhalation or burns) in an entrapment. The medical examiner should also be requested to examine blood gases, especially carboxyhemoglobin, and other products of combustion. The Public Safety Officer Benefits Program requires an alcohol-level test to meet certain requirements. The Department of Justice should be contacted to obtain a list of other required tests and to file a claim. The U.S. Fire Administration has published a report on Firefighter Autopsy Protocols (FA-156) that specifies procedures for the medical examiner.

The coroner's report is a public document that should be handled with sensitivity. It does not need to be included in the investigation report in its entirety.



## *Personnel Involved in the Entrapment*

**P**ersonnel involved in an entrapment must be 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 cope with the experience and better relate the events to investigators.

The investigation team should not be overlooked when dealing with posttraumatic stress issues. Investigators may suppress their own emotions for days or weeks while constantly exposing

themselves to the reactions of everyone affected by the incident. However, investigators must not participate in group settings with incident personnel because their presence may inhibit incident personnel from exposing their feelings.

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



*The personnel involved in an entrapment and the investigators should be monitored to see whether they need critical-incident stress debriefing.*

## Organizing the Team

An investigation team should be organized and trained long before an entrapment occurs. It is essential to have administrative support, to have established dispatch notification procedures, memorandums of understanding with potential partners, and methods to obtain outside expertise.

An effective team requires administrative support and independence to perform a thorough and unbiased investigation. Administrators must give clear direction through an official letter of delegation or charter, a designated leader, and delineation of duties. They should also appoint a local fire manager to the team who can guarantee access to involved personnel, fire records, and agency policies.

Team members arriving at an incident should be issued PPE to be worn at the site and given a tour of the entrapment before being taken to an offsite facility, such as a motel conference room.

The facility must have areas for holding meetings, keeping evidence secure, and working independently. The team must be able to display wall charts and perform other tasks free from scrutiny by agency employees and the media.

Depending on the complexity of the incident, the team may establish a documentation unit that has access to copy machines, scanners, personal computers, fax machines, shredders, and file cabinets.

The incident command system can provide the structural framework for a large multiagency team. The system ensures that tasks are properly delegated and facilitates communication among members.

Other advantages of the incident command system during entrapment events are that it can be implemented swiftly for any incident and that the investigation team can activate, deactivate, or enhance sections of the system to meet specific objectives. Its unified command structure may help reduce turf battles because ranking officials from each agency have opportunities to make decisions in a team environment.

Team membership must be held to a minimum; technical specialists should be assigned for support as necessary. The core team has a **team leader**, **chief investigator**, and **safety manager**. Other members may include a fire operations expert, fire information officer, and union representative.

The team leader serves as the official team representative, keeps investigators working efficiently, assures good interchange of information, reminds everyone to avoid quick conclusions, and ensures that the investigation will be completed. This person also serves as the primary contact for the responsible official of the agency involved.

A team leader who is a line officer or agency administrator is normally more effective at gaining cooperation and coordinating team efforts, especially if the team leader is already respected for expertise, impartiality, and conscientious work. Examples would include a National Park superintendent or a Forest Service regional forester.

The team leader should be adept at handling administrative matters and management concerns, and will probably be appointed from outside the region or station involved in the entrapment. The team leader's duties and responsibilities include:

1. Providing briefings to officials.
2. Ensuring team members meet deadlines.
3. Facilitating meetings and coordinating information exchanges.
4. Maintaining a liaison with station, regional, and other Federal agency offices.
5. Approving requests for resources and their release from the investigation.
6. Issuing a preliminary briefing with recommended emergency actions within 24 hours of the team's arrival.
7. Delivering an expanded briefing within 72 hours of the team's arrival.
8. Authorizing and recording the expenditure of appropriated funds.
9. Requesting additional technical specialists and authorizing their release.
10. Maintaining the security of team facilities and any information gathered.
11. Coordinating with local law enforcement.
12. Ensuring that drug testing, autopsies, and other medical tests are performed.
13. Arranging for critical-incident stress debriefing for traumatized investigators.
14. Ensuring employing offices address the requirements of the Public Safety Officers' Benefit Program for survivors of firefighters killed in the line of duty.
15. Monitoring final report preparation and ensuring that the final report only contains relevant information.

## Organizing the Team

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- Updating the affected state forester, fire chief, or regional forester of any significant developments.
- Authorizing media releases about the investigation.
- Preparing, signing, and submitting the factual report to the official authorizing an investigation and to members of the board of review.

The chief investigator must be chosen from a list of qualified candidates who have completed formal investigative training and team assignments, equal or subordinate to the level of chief investigator. The chief investigator manages daily team activity and:

- Gives technical advice to the team leader.
- Provides investigative expertise and knowledge of operating practices.
- Ensures that the investigation addresses pertinent issues and concerns.
- Maintains security and control of the entrapment site.
- Ensures team members at the site wear the proper PPE and are given a safety briefing.
- Arranges for or takes initial statements from witnesses.
- Takes possession of all relevant documents.
- Recommends additional technical specialists be assigned when needed and releases them when their duties have been completed.
- Drafts the preliminary and expanded briefings for the team leader to release.
- Coordinates the development of the factual report with the team leader.
- Signs the report and attends the board of review where it is presented.

The safety manager is a safety and occupational health professional responsible for advising the team leader in accordance with OSHA. To qualify, an individual should have completed formal safety training courses and previously assisted a safety manager on a serious accident investigation. The safety manager is a core team member who:

- Advises the team leader and other investigators on safety and occupational health issues related to the entrapment.

- Assists in identifying management deficiencies in the safety and occupational health program that may have contributed to the incident.
- Advises the team leader on the conduct of the investigation to ensure compliance with OSHA and agency safety requirements.
- Coordinates the procurement of additional safety and health resources for the investigation.
- Develops a job hazard analysis for the team's operations.
- Ensures team members receive training in standards for survival when team members are officially designated by the team leader to operate in adverse geographic conditions.
- Signs the factual report.

In some cases, one or more technical specialists serve as core team members, depending on the circumstances of the entrapment. However, the team leader may assign additional specialists and release them when their duties are completed.

**Technical specialists** assigned to support the team may include a documentation unit leader, law enforcement officer, fire behavior analyst, fire weather meteorologist, fire equipment specialist, and social scientists (psychologists and sociologists).

These individuals typically must have current technical or academic qualifications and previous investigation experience to qualify for an assignment. Their duties will include:

- Reporting findings to the chief investigator.
- Applying skills to gather entrapment information.
- Documenting and signing information they help develop during the investigation.

All team members and technical specialists must maintain confidentiality and objectivity during the investigation. They should also agree to remain with the team until released by the team leader.

Each team member should assemble an investigation kit before the team is sent out to a fire. The kit will be based on the training and experience of investigators, but may include items listed in appendix D.

## Activities at the Entrapment Scene

**T**here is only one chance to preserve an entrapment scene. It is important that law enforcement personnel quickly safeguard the scene and cordon it with flagging.

If possible, firefighters should attempt to leave PPE, tools, fire shelters, and even bodies in place until investigators arrive. Photographs must be taken before disturbing the scene if bodies are removed before investigators arrive.

A qualified fire investigator should handle evidence collection in a manner similar to that used during an arson investigation. All items must be tagged, logged, and kept in a secure place. Never release evidence without proper authorization.

Plot the location of individuals and equipment on a scaled map or detailed diagram using a compass and measuring from a known point like a road intersection. Global positioning systems (GPS) may be useful on large entrapment sites.

The lack of PPE or failure to properly use it has been a causal factor in many burnover fatalities and injuries. The fire shelter is perhaps the most critical piece of PPE in burnovers. Fatally burned firefighters often did not have fire shelters or did not have them readily available. Investigators should examine PPE involved in an entrapment to determine:

- If the firefighter used full PPE, removed any of the PPE, or used it improperly.

**“Before you move any bodies or any equipment, you’ve got to thoroughly investigate this.”**

*—Colorado Governor Roy Romer,  
South Canyon Fire, July 1994*

- Where PPE was found and who owned it.

- How badly the items were damaged.

- Whether PPE met safety compliance requirements, such as the Canadian General Standards Board, American National Standards Institute, or the National Fire Protection Association’s 1977 standard for American wildland firefighters.

Complete analysis may require laboratory inspection by agencies such as the Missoula Technology and Development Center. It is important to maintain a chain of custody for evidence examined externally to ensure official reports are obtained and items are returned.

Items may be exposed to body fluids. Team members and technical specialists dealing with these items must follow their agency’s protocols against contracting bloodborne diseases such as hepatitis B or human immunodeficiency virus (HIV). Universal precautions should include wearing surgical gloves, goggles, and gowns.

Clothing recovered from burned firefighters cannot be laundered. It should be completely air-dried in sunlight before it is placed in red biohazard waste bags. Protective latex gloves should be worn when handling these items, even after they have dried.



*All members of the investigation team should participate in the onsite inspection.*

# Photographic Documentation

**P**hotographic documentation must be taken by a professional photographer on the first day, whenever possible. The photographer should be trained in investigative and aerial photography, as demonstrated by membership in the Evidence Photographers International Council. Ideally, the individual will have fire experience and be able to function in steep terrain. A police photographer should be requested if a qualified professional is unavailable.

Photographic equipment considerations include:

- Use of a medium-format camera (2¼ x 2¼ in). These cameras produce negatives with 4 times the detail of 35-mm cameras and 10 times the detail of most digital cameras.
- Use of 35-mm and video cameras by investigators. Professional photographers miss important shots, no matter how thoroughly they shoot.
- Use of color-negative film with a speed of ASA 200 to 400. Color-negative film records greater detail in shadows and highlights than slide film.
- Use of shutter speeds of at least 1/500 of a second when shooting from aircraft.
- Use of dictation equipment or notepads to record the time, direction, and location of photographs. This information will be critical for court exhibits.
- Use of a secure lab for developing sensitive photographs. All test prints must be shredded to prevent them from being released to unauthorized individuals. The local police or sheriff's office can help the team photographer identify a reliable photo processor.
- Use of proper mounting, identification, and logging for each photograph.

An entrapment investigation should include aerial, ground, and closeup photographic perspectives. The following shots should be taken:

- Aerial photos from the four primary directions (N., E., S., and W.), providing an overview of the entrapment site. Important locations should be identified with flagging or other distinctive marking. Always use a safety harness when shooting from aircraft doors and ensure that propeller downwash does not disturb the site.
- The surrounding terrain, fuel type, and burn pattern from all eight cardinal directions (N., NE., E., SE., S., SW., W., and NW.). The shots should show the fire origin, containment lines, and personnel travel routes. If possible, obtain photographs depicting the entrapment site before, during, and after the incident.

- Shelter deployment sites and the final resting position of fatally injured firefighters. New Nomex clothing can be laid out to represent the positions where firefighters were found.



*New Nomex clothing can be laid out to represent the positions where firefighters were found.*

- All fire-resistant clothing, PPE, line gear, and tools. Take detailed shots of components, including closeups of identifying marks, name tags, labels, and so forth.
- Any other equipment (dozers, engines, and so forth) that responded to the incident.

Photos taken by the investigation team photographer should be printed (8- x 10-in or 11- x 14-in prints) as soon as possible, to use while interviewing potential witnesses.

Photographers and other investigators should also shoot video (Hi8 or digital video). Video is particularly valuable for showing slope and terrain features when filmed from aircraft. Narratives should be given while shooting all video.

Private citizens often are willing to provide copies of videos and photographs of the incident, particularly if fire agencies pay for reproductions. The media may also provide copies if they are assured the material will not be reprinted or broadcast without permission.



*Damaged clothing and equipment should be photographed.*

# The Paper Trail

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**T**eam members should be collecting written records pertinent to the incident while other investigators analyze the site and conduct interviews.

These documents will show a chronology of events, confirming whether operating standards were met, and proving whether critical information was available to both fire managers and firefighters. The information will also offer a general sense of a unit's fire management direction.

The list of documents to be collected is extensive and should include:

• Standard operating procedures, operating guides, and directives. These documents illustrate how the situation should have been handled, if the situation was handled correctly, and whether failure to follow standard operating procedures influenced the outcome. Other important documentation that must be obtained by the investigation team includes:

- Medical examiner's report.
- Police and ambulance reports.
- Dispatch logs and recordings of radio traffic.
- Incident action plans.
- Wildfire situation analyses that were reviewed by line officers.
- Official reports of weather and fuels conditions.
- Aircraft flight manifests.
- Training and qualifications forms.

- Resource orders.
- Maps and photographs of the area.
- Time, attendance, and overtime logs.
- Work/rest guidelines.
- Contracts.
- Newspaper and television reports.

The sources for many of these documents are:

- Dispatch offices of all units that assigned firefighters or equipment to the incident.
- National Weather Service offices.
- Law enforcement and ambulance agencies.
- Local emergency rooms.
- Regional burn and trauma centers.
- Helibases, airtanker facilities, and the Federal Aviation Administration.
- Local and regional offices holding the training and qualification records of involved personnel.

Under litigation discovery procedures, investigators may be forced to release any confidential document, even if the internal investigation proved the information to be inaccurate.

## Team Activity

The investigation team must follow every suspected causal factor back to a conclusion until the team's members are satisfied they understand what happened, why it happened, and what must be done to prevent similar occurrences.

Local unit officials and the team leader should brief the team when team members arrive at the agency's headquarters, describing the investigation to date. Investigators will take possession of records gathered, compile a list of involved personnel, determine the team's workplace, and identify transportation and clerical needs.

The team should assemble by itself. The team leader will define the role of core team members and technical specialists. Meetings will be held each morning to plan activities and every evening to review accomplishments.



*Protective clothing and equipment technical specialists should be part of the investigation team when PPE was used in a turnover or entrapment.*

The main focus of the investigation team, as determined by the team leader through the delegation of authority, will be:

- 1. Traveling to the entrapment site, photographing the area, obtaining evidence, and mapping the scene. Maintain site security until the team leader releases control of the site back to the responsible agency.
- 2. Preparing a preliminary briefing within 24 hours after arriving on the scene and an expanded briefing within 72 hours.
- 3. Identifying personnel involved in the incident, including those with some form of operational control.
- 4. Taking statements from firefighters and other involved personnel after they have completed critical-incident stress debriefing and scheduling followup interviews

where involved personnel will be asked a series of prepared questions.

- 5. Identifying violations of established standards and procedures.
- 6. Assembling documents such as personnel records, fire qualifications, agency policies, preattack plans, dispatch logs, fire management plans, aircraft manifests, resource orders, operating guides, medical reports, and agency memos.
- 7. Analyzing weather conditions before and during the entrapment. Discussions will include the availability of forecasts to firefighters.
- 8. Studying whether altitude, temperature, and terrain made the firefighting operation more difficult.
- 9. Constructing fire behavior and fire weather models.
- 10. Examining personnel work/rest schedules.
- 11. Inspecting firefighter equipment.
- 12. Preparing a chronology of events.
- 13. Identifying causal and contributing factors supported by factual data.
- 14. Developing recommendations based on team discussion.
- 15. Creating a final draft of the report. The team should try to complete the report before the team disbands to determine whether findings are supported by documented data or whether additional material is needed. The team leader may then make additional assignments and set deadlines, if necessary.
- 16. Planning to present the final report to the board of review. Depending on local guidelines, the report may be signed by all technical specialists or just by the core team with other investigators listed.

The investigation ends with a briefing with the local unit's management team. The investigation's team leader shares preliminary findings as appropriate.

The team will be working on a hectic schedule, attempting to issue a report that fire managers and the public are anxiously awaiting. In the United States, the Forest Service allows investigators 45 days to prepare the factual report, while the Department of the Interior gives investigators 30 days.

In complex investigations, additional time may be needed to do a thorough job. The team leader should meet with the local agency administrator when seeking an extension.

## Human Factors

Numerous reports have been published demonstrating the emphasis investigators have placed on tangible aspects of firefighting such as fuels, weather, and fire behavior. Conclusions from these investigations have brought substantial progress in equipment technology, fire prevention, and fire suppression tactics.

However, causal factors identified 50 years ago are still cited today in reports, while organizational and psychological factors often receive little attention. Investigators who fail to address these issues may miss important elements that need improvement. This failure affects the overall effectiveness of entrapment investigations and the way findings are communicated to the fire community.

Investigations must examine human factors such as the level of interagency cooperation among participating units, the compatibility of personnel who were on the scene, crew

cohesion, cultural differences, different levels of experience, and different risk-taking perceptions.

The manner in which units managed firefighters before their involvement in the entrapment should also be analyzed. Investigators need to know whether firefighters had training available, were properly trained, and took action consistent with their training. In addition, the way candidates were selected to become fire managers and the experience and qualifications required on assignment must be examined.

An investigation team should discuss the amount of time given firefighters for primary duties and maintaining skills, compared to the time needed for secondary duties. A unit's work/rest guidelines, fire management's compliance with work/rest guidelines, and the effect fatigue had on the operation need to be followed up.



*Identifying different perspectives of risk taking is an important component when considering the role that human factors play in an entrapment.*

# Interview Techniques

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Interviews are conducted during an entrapment investigation to gather accurate information through a logical process. An interview conducted in a friendly manner reduces inhibitions, encouraging cooperation and truthfulness.

It is important that the personnel being interviewed understand that the questioning is intended to uncover facts—not for discipline. The interview should be terminated if an investigator concludes the witness may be subject to disciplinary hearings. Such hearings are outside the investigation's scope.

Interviews with personnel directly and indirectly involved with the entrapment should begin as soon as possible after critical-incident stress debriefing. The priority should be to obtain essential information from individuals directly involved in the incident and to identify witnesses for later followup. Some individuals may have to be interviewed again.

The list of witnesses to interview will often grow as different leads are followed. The public, and anyone else having significant information, should be encouraged to contact the team. The team must interview such individuals.

Besides the firefighters involved in the entrapment, other persons who may be interviewed include incident managers, support personnel, landowners, dispatchers, aircraft pilots, and aerial observers. Anyone else who observed the weather or fire behavior before or during the incident should be interviewed.

Anyone making statements to the media should be interviewed, because these comments often confuse investigation issues. It is essential to determine the accuracy of such comments. The team should also obtain and review copies of broadcasts and articles involving the incident.

Interview reporters if their reports are not consistent with information the team found. They should be approached like other witnesses, with a request for their assistance in determining what happened.

Effective interviewing is a specialized skill that must be learned through training and experience. Investigators can obtain essential information by demonstrating integrity and stressing that they seek only the truth. Interviewers need to quickly develop a rapport with witnesses, respecting their emotional state while maintaining self-control. Interviews are not normally conducted in uniform, because the uniform may create a barrier between the interviewer and the witness.

Other important interview considerations include:

- Refusing to prejudge a witness.
- Believing all statements. Do not introduce contradictory information from other sources.
- Being receptive to all information regardless of its nature.
- Avoiding impatient, contemptuous, or antagonizing attitudes.
- Attempting not to belittle the person being interviewed or the information they provide.
- Being serious, prepared, focused, and persistent.
- Avoiding personality conflicts, politics, or controversial matters.
- Being aware of cultural or regional differences.
- Being aware of gender differences.
- Displaying confidence.

The interview setting is important. Find a location with an unofficial atmosphere that is quiet, well lit, adequately ventilated, and comfortably furnished.

Interviews can be documented in several ways. The interviewer can prepare a record of the session, the witness can write a statement, or the entire interview can be tape-recorded and transcribed.

All statements must be reviewed and signed by the witness and the interviewer. A note should be made if a witness refuses to sign a statement they made.

Never conduct an interview in a group setting. All witnesses must be encouraged to tell their story without being influenced by others. Interviews are most effective with one investigator asking questions and another taking notes.

When conducting the interview, it is also important to remember to:

- Interview—do not interrogate.
- Explain the value of the witness' statement.
- Inform the witness that you cannot promise confidentiality.
- Explain that you will record the conversation unless there is an objection.
- Do not embarrass a witness by reacting to obvious errors.
- Do not lecture the witness on correct procedures.
- Use two tape recorders for critical statements.
- Use photographic documentation, if photographs are available, to help the witness tell the story.
- Avoid questions that elicit *yes* or *no* responses.
- Permit witnesses to tell their own stories without interrupting them.
- Keep witnesses talking by staying quiet during periods of silence.
- Avoid leading questions that suggest the desired answer.
- Avoid assisting the witness by answering questions.
- Avoid revealing items discovered during the investigation.
- Be unobtrusive while taking notes.

A person making a statement should first be asked to give a narrative of the incident. Team members should then ask followup questions. Interviewers may wish to develop a set of standard questions specific to the incident and several general questions to determine if the individual has previously unknown information.

A sampling of questions includes:

- Full name, home address, and age.
- Duty station and position.
- Technical background, skills, and knowledge.
- Connection to those involved.
- Confirmation of times and how the witness made the observation.
- Weather at the time of the entrapment.
- Fire behavior at the incident.
- Actions taken at the site.
- Other witnesses seen in the area.

# The Report

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The efforts of an investigation team culminate with a report based on factual information. All findings and recommendations will be supported by statements, photographs, diagrams, and documents in the report. Additional supporting information should be maintained in investigation files.

A report can follow several formats. However, most include a narrative, chronology, findings, causal factors, recommendations, and appendixes.

The narrative gives the reader a brief overview of the incident. It includes dates, times, location, and a list of individuals involved.

The chronology is a detailed account of the times, places, and personnel on the incident shown in a timeline. For long fires, the early stages need only show major events such as time of ignition, initial attack, and resources deployed. The chronology becomes more detailed as it leads up to the entrapment.

The findings list facts that can be supported by documentation. Findings should be listed without regard to their relationship to direct or contributory causes of the entrapment. That relationship will be detailed in the causal factors section.

The NWCG Fire Entrapment Investigation and Review Guidelines (appendix E) recommend that findings be classified as: *Did not contribute*, *Influenced*, or *Significantly contributed*. Findings listed as *Did not contribute* are dropped from further investigation. Findings that *Influenced* or *Significantly contributed* to the incident are analyzed to identify the causal factors of the entrapment.

The determination of causal factors is perhaps the most critical part of a report. This section synthesizes all the information, identifying the factors that led directly or indirectly to the entrapment. The causal factors will lead investigators to recommendations that will prevent similar occurrences.

Causal factors can be direct or contributory. Direct causes may include extreme fire behavior, inadequate briefings, and lack of communication. Contributory factors set the stage for the

event. Examples of contributory factors are failure to follow procedures, conflicting resource priorities, and delay in taking appropriate action.

The recommendations section of a report focuses firefighters' attention on changes needed in policies, actions, and attitudes. Whenever possible, the *Ten Standard Fire Orders* and *18 Watchout Situations* should be the basis for recommendations.

Recommendations must relate to the incident. However, improvements having regional, National, and international significance also need to be spelled out. Requesting specific changes to agency policies, dispatch procedures, protection priorities, equipment availability, or training techniques should drive the recommendations home to fire managers and agency administrators.

The appendix section should include detailed information such as copies of agency policies, weather reports, witness statements, and investigation team charters.

A report that has been approved by the appropriate agency administrator becomes a public document, accessible to the news media and other interested organizations.

The lessons learned from the investigation must be disseminated throughout the wildland firefighting community. Copies of the report should be sent to the U.S. Fire Administration, National Fire Protection Association, International Association of Fire Chiefs, and International Association of Fire Fighters—and be made available on the Internet, if appropriate.

Timely distribution of the report is essential because fire season is in effect throughout the year in different North American regions. Fire training courses that can incorporate the lessons and recommendations from entrapment reports are conducted throughout the year. In addition, wildland fire agencies throughout the world review entrapment reports.

The NWCG training working team should be notified so course development committees can make appropriate changes to firefighter training.

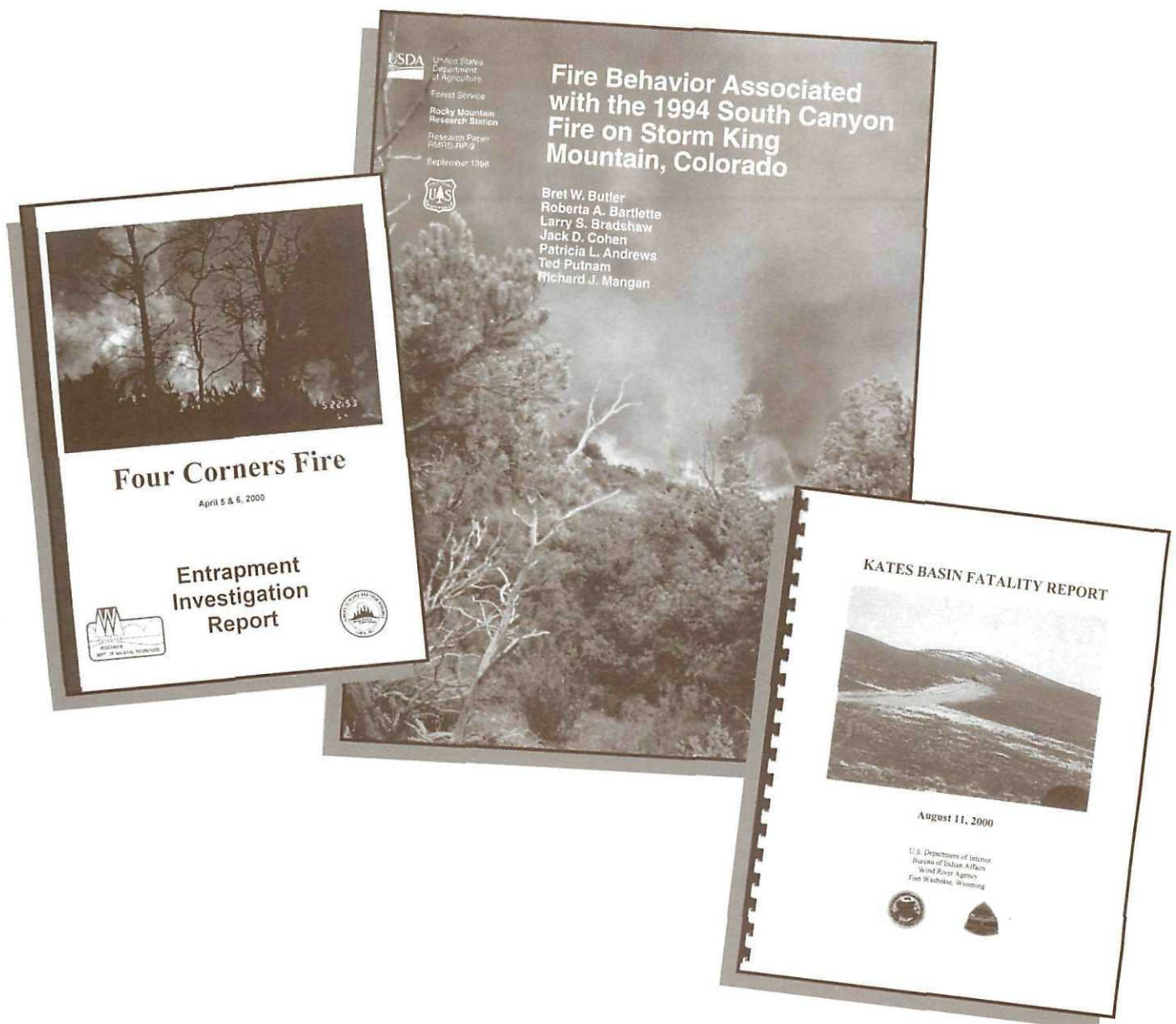
## Collateral Investigations

Law enforcement, firefighter unions, and State and Federal agencies may have a responsibility to conduct their own investigations. Team members should continue their inquiries and establish a cooperative relationship with other agencies. Incidents involving arson require investigators to carefully control evidence and the release of information until obtaining law enforcement authorization.

In the United States, collateral investigations may include OSHA, which determines whether an employer violated occupational safety and health laws leading to a death or the hospitalization

of three or more employees. OSHA investigations can take months. The OSHA investigations may take place during an agency investigation, but they are always independent of the agency investigation.

Another Federal agency that investigates all occupational firefighter fatalities is the Firefighter Investigation Team of the National Institute for Occupational Safety and Health. This team develops succinct descriptive reports of events surrounding firefighter deaths. These reports are distributed throughout the American fire community.



## Legal Implications of Investigations

**E**very aspect of an entrapment investigation may have legal implications. Investigators should not allow these issues to restrict their efforts, but an attorney should review a report before it is released.

The legal issues may include criminal negligence, wrongful death or injury, product liability, and occupational health and safety violations. In addition, personnel actions may be based on a report.

A report's credibility depends on proper management of evidence. Investigators need to maintain a chain of evidence. Items must be tagged, kept in a secure place, and logged into a record with the signature and date when anyone takes the item into possession. Photographs must be properly mounted, identified, and entered into another log. Documents such as witness statements and reports on tests made by specialists should all have signatures.

All relevant information should be placed under the control of a designated agency representative. Destroy material that is not included in the official investigation, including early drafts of the report.

Any material found in an investigation can be requested during the discovery phase of a trial, even if investigators found it to be totally irrelevant.

Fire managers should never refrain from taking steps to prevent incidents from recurring because they fear such action is an admission of responsibility for a previous entrapment. The courts have generally ruled that these actions do not prove an agency was previously negligent. Corrective action that is recommended, but is not implemented, may be construed as evidence of negligence or even gross negligence if another similar incident occurs.



*Isolate the scene of a burnover with ribbon to prevent the area from being disturbed.*

## Information and Media Relations

**W**e live in an age of instant communication. The media may attempt to reach an entrapment scene while the entrapment is occurring or immediately afterward. Failure to provide timely information is unacceptable. If timely information is not provided, a fire organization's credibility will be destroyed.

However, you should provide information only on the progress of the investigation. Do not release findings until a full report is completed and reviewed. The completed report should be released at a press conference with the team leader available for interviews.

Media relations will be smoother if:

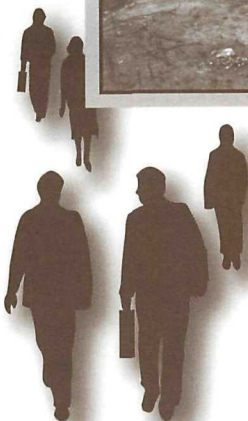
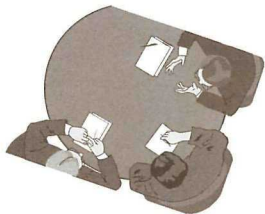
- A fire information officer is assigned to the team. This person should have fire experience and be involved in all team meetings.

- Packages containing basic information and photographs are provided to the media early in the investigation.

- Press releases are issued once or twice a day.

- Reporters and photographers are pooled to minimize impact at the entrapment scene. In some instances, safety and efficiency dictate that one reporter and one photographer be designated to represent the news pool.

- Survivors and the team headquarters are isolated from the media.



*Helicopters may be needed for media access to remote sites.*

## Other Considerations

A professionally conducted fire investigation offers an opportunity to identify where our policies, procedures, equipment, and actions need improvement. Thorough reports of entrapments will help reduce risks to firefighters throughout the world.

The NWCG's Safety and Health working team prepares a *SafetyGram* documenting wildland fire fatalities across the United States in all jurisdictions. It also updates classes such

as the *Firefighter Survival* series (S-Courses) and annual refresher training based on findings from entrapment reports.

Public interest in entrapments remains high long after investigations have been completed. *Young Men and Fire*, a book about the Mann Gulch Fire of 1949, was published more than 40 years after the incident. Books and films have also been produced on the South Canyon Fire, including the 1999 publication of *Fire on the Mountain*, which looks extensively at the investigation process on that incident.



*Learning from past mistakes makes for a safer workplace on wildland fires.*



## References

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- Anderson, Leslie. 2001. Your fire shelter: 2001 edition. PMS 409-2. NFES 1570. Boise, ID: National Wildfire Coordinating Group and National Interagency Fire Center. 30 p.
- Aurnhammer, Thomas W. 1994. The Incident Command System and its application to fire investigations. Firehouse. June: 92-94.
- Butler, Bret W.; Bartlette, Roberta A.; Bradshaw, Larry S.; Cohen, Jack D.; Andrews, Patricia L.; Putnam, Ted; Mangan, Richard J. 1998. Fire behavior associated with the 1994 South Canyon Fire on Storm King Mountain, CO. Res. Pap. RMRS-RP-9. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 82 p.
- International Association of Fire Chiefs. [Date unknown]. Guide for investigation of a line-of-duty death. Fairfax, VA: International Association of Fire Chiefs. 39 p.
- King, Stephen J.; Hayden, Peter. 1999. Conducting the fatal fire investigation. [Speech]. Fire Department Instructors Conference: 1999 February 13-21. Indianapolis, IN.
- Macleane, John N. 1999. Fire on the mountain: the true story of the South Canyon Fire. New York, NY: William Morrow. 275 p.
- Mangan, Richard J. 1994. Handling bio-hazard material. Tech Tip 9451-2353-MTDC. Missoula, MT: U.S. Department of Agriculture, Forest Service, Missoula Technology and Development Center. 4 p.
- Mangan, Richard J. 1994. Lessons learned: the use of personal protective equipment on wildland fire entrapments in 1993. Tech Tip 9451-2335-MTDC. Missoula, MT: U.S. Department of Agriculture, Forest Service, Missoula Technology and Development Center. 4 p.
- Mangan, Richard J. 1995. Investigating wildland fire entrapments. Tech. Rep. 9551-2845-MTDC. Missoula, MT: U.S. Department of Agriculture, Forest Service, Missoula Technology and Development Center. 14 p. plus appendixes.
- Mangan, Richard J. 1999. Wildland fire fatalities in the United States: 1990 to 1998. Tech. Rep. 9951-2808-MTDC. Missoula, MT: U.S. Department of Agriculture, Forest Service, Missoula Technology and Development Center. 14 p.
- Munson, Steven A. 2000. Assessment of accident investigation methods for wildland firefighting incidents by case study method. Missoula, MT: University of Montana. Thesis.
- Munson, Steven A.; Mangan, Richard J. 2000. Wildland firefighter entrapments. Tech. Rep. 0051-2853-MTDC. Missoula, MT: U.S. Department of Agriculture, Forest Service, Missoula Technology and Development Center. 10 p.
- National Fire Protection Association. 1995. NFPA 1051 standard on wildland firefighter professional qualifications: 1995 edition. Quincy, MA: National Fire Protection Association. 22 p.
- National Fire Protection Association. 1998. NFPA 1977 standard on protective clothing and equipment for wildland firefighting. 1998 edition. Quincy, MA: National Fire Protection Association. 70 p.
- National Fire Protection Association. 1998. NFPA 921 guide for fire and explosion investigations: 1998 edition. Quincy, MA: National Fire Protection Association. 167 p.
- National Wildfire Coordinating Group. Fireline handbook. 1998. PMS 410-1. Boise, ID: National Wildfire Coordinating Group. 158 p. plus appendixes.
- U.S. Departments of the Interior and Agriculture. 1994. Report of the South Canyon Fire Accident Investigation Team, Aug. 17, 1994. Boise, ID: National Interagency Fire Center. 39 p. plus appendixes.
- U.S. Departments of the Interior and Agriculture. 1995. Final report of the interagency management review team: South Canyon Fire, June 26, 1995. Boise, ID: National Interagency Fire Center.
- U.S. Departments of the Interior and Agriculture. 2000. Wildland and prescribed fire qualification system guide. ICS 310-1. Boise, ID: National Interagency Fire Center. 72 p. plus appendixes.
- U.S. Departments of the Interior and Agriculture. 2000. National mobilization guide. Boise, ID: National Interagency Fire Center. 315 p.
- U.S. Fire Administration. 1995. Firefighter autopsy protocol. FA-156. Emmitsburg, MD: U.S. Fire Administration.

# Appendix A—Fire Entrapment/Fatality First-Response Form

## Fire Entrapment/Fatality First-Response Form

### AT THE SCENE

1. **Have law enforcement isolate the scene.** Night or day, get your law enforcement officers involved 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 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. Propeller 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.


# Appendix B—Wildland Fire Entrapment/Fatality Initial Report

Page 1 of 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 \_\_\_\_\_
- Number of personnel involved \_\_\_\_\_
- Fire name, location, agency, etc. \_\_\_\_\_
- 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.**

(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 turnovers 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

## ***Appendix C—Entrapment Investigation Timeline***

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### **From time of event, 0 to 2 hours:**

- Evacuate injured firefighters.
- Notify onsite incident commander.
- Notify higher headquarters.
- Isolate scene.
- Initiate airspace restrictions.
- Assign interim-event incident commander.
- Assign liaison to accompany injured firefighters to the hospital.

### **From 2 to 6 hours:**

- Assign investigation team.
- Order replacement resources.
- Order a critical-incident stress debriefing team.
- Remove or isolate uninjured firefighters from the scene.
- Assign interim media contact.

- Identify involved personnel.
- Notify next of kin.
- Secure dispatch records and radio logs.

### **From 6 to 24 hours:**

- Brief investigation team members when they arrive.
- Complete aerial photography.
- Provide critical-incident stress debriefing for involved personnel.

### **From 24 to 72 hours:**

- Complete onsite photography.
- Begin interviews.
- Complete PPE and evidence documentation and inspection.
- Take the complete investigation team to the scene.

## ***Appendix D—Entrapment Investigation Kit***

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The investigation kit includes:

- Cellular telephones and pagers.
- Cameras, 35-mm, ASA 400 color-negative film, flash attachments, and extra batteries.
- Video cameras and blank tapes.
- Tape recorder with extra cassettes and batteries.
- Magnetic compasses.
- Inclinator.
- Measuring tapes (10- and 100-ft).
- Rulers.
- Notebooks, pencils, pens, and highlighters.
- Graph paper.
- Plotters.
- Clipboards.
- Wooden survey stakes.
- Permanent markers.
- Evidence tags.
- Evidence bags.
- Bloodborne pathogens kits, including boots and full-body covering.
- Red biohazard bags.
- Flashlights with extra batteries and bulbs.
- Gloves.
- Fuel and oil sample bottles.
- First-aid kits.
- Insect repellent.
- Knives.
- Tools.
- Flagging.
- Common nails.
- Duct tape.
- Scales.
- Yellow rope or tape to cordon off areas.
- Two colors of fluorescent spray paint.
- Tire-tread gauges.
- Hand-held radios.
- Magnifying glasses.
- Regional and Washington Office directories.

# Appendix E—National Wildfire Coordinating Group Guidelines



## NATIONAL WILDFIRE COORDINATING GROUP

Memorandum

July 27, 1993

To: NWCG Members

From: Chair, NWCG

Subject: Fire Entrapment Investigation and Review Guidelines

At the January, 1993 meeting, NWCG approved the Fire Entrapment Investigation and Review Guidelines prepared by the Safety and Health Working Team, subject to some editorial changes. Those changes have been completed as attached. The intent of the Guidelines is to obtain standardized data to assist in identifying trends and determining preventative measures for the benefit of all. They are not intended to replace agency protocol or to compromise any agency prerogatives.

NWCG recommends that each member review existing direction regarding investigation procedures and subsequent sharing of information resulting from investigation of fire entrapments, then incorporate the guidelines below to the extent possible.

These Guidelines recommend:

- A standard interagency investigation process, procedures and composition.
- Interagency participation on investigation teams.
- Identified channels to communicate findings and mitigation measures.

These guidelines recommend the establishment of Entrapment Investigation Teams. Because of the short time frames to organize such Teams, potential members should be pre-determined by the various Geographic Coordination Groups and reflect interagency composition so far as practicable.

The guidelines also indicate that the Safety and Health Working Team will review each entrapment report and distribute a "sanitized" summary of applicable findings and recommendations to NWCG and the National Fire Protection Association within thirty days of receipt of the investigation report from the appropriate agency administrator, via the "SafetyGram".

Portions of these guidelines, specifically the "Management and Command Responsibilities" and the "Entrapment Investigation Element Matrix", will be added to Chapter 4 (Firefighter Safety) of the NWCG 410-1 "Fireline Handbook" upon its next revision.

NWCG feels that these guidelines will be a viable and useful tool for all participating members.

Elmer Hurd

Enc.

FIRE ENTRAPMENT INVESTIGATION AND REVIEW GUIDELINES

**PROBLEM STATEMENT:**

Since 1976, over 300 shelter deployments and 30 entrapment fatalities have been documented in wildfire suppression operations. In reviewing available injury and fatality investigation reports, it is clear that there are common circumstances that are causal factors throughout the entire wildland fire management community chain of command.

NWCG recognizes that some agencies do an outstanding job of investigating entrapments, implementing corrective recommendations, and distributing findings. However, in some cases, improvements could be made by implementing and following clear investigation criteria, using consistent entrapment review elements, and by wide distribution of findings and recommendations.

These key improvements would noticeably further the prevention of these tragedies and near-miss incidents; without correction of these deficiencies, fire behavior-related injuries and fatalities will continue to occur.

**STATEMENT OF PURPOSE:**

NWCG hereby recommends guidelines for investigation and review of fire entrapment situations. These guidelines are not intended to replace agency-specific investigation protocol.

The intended purpose for developing these guidelines is to provide standardized data to assist in identifying and analyzing trends. From those trend analyses, preventative recommendations may be made.

These investigation and review guidelines will:

- a. Outline investigation elements, and
- b. Clarify management and command responsibilities.

Through the NWCG Safety and Health Working Team, the review process will:

- c. Provide an effective distribution mechanism of findings, and

- d. Develop a framework for implementation of recommendations.

**DEFINITIONS:**

**Agency Administrator:**

That lead employee having responsibility for management of land and/or resources on an organizational unit, and having accountability for overall results of management actions.

**Entrapment:**

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. These situations may or may not result in injury. They include "near misses".

**ENTRAPMENT INVESTIGATION ELEMENTS:**

The following elements most commonly contribute to entrapment situations. As a minimum, each of these elements should be addressed in an entrapment investigation and subsequent report, even if the investigation indicates that the element did not contribute to the entrapment. Exhibit I, "Entrapment Investigation Element Matrix", may be utilized to expedite the process.

**I. FIRE BEHAVIOR**

Fuels  
Weather  
Topography  
Predicted vs. Observed

**II. ENVIRONMENTAL FACTORS**

Smoke  
Temperature  
Visibility  
Slope  
Other

**III. INCIDENT MANAGEMENT**

Incident Objectives  
Strategy  
Tactics  
Safety Briefings/Major Concerns Addressed  
Instructions Given

- IV. CONTROL MECHANISMS
  - Span of Control
  - Communications
  - Ongoing Evaluations
  - "10 Standard Fire Orders/18 Watchout Situations"
- V. INVOLVED PERSONNEL PROFILES
  - Training/Qualifications
  - Operational Period Length/Fatigue
  - Attitudes
  - Leadership
  - Experience Levels
- VI. EQUIPMENT
  - Availability
  - Performance/Non-performance
  - Clothing and Equipment
  - Used for Intended Purpose?
  - Etc.

**MANAGEMENT AND COMMAND RESPONSIBILITIES:**

**Incident Commander Responsibilities (in addition to those identified in ICS 410-1, "Fireline Handbook"):**

Upon notification of an entrapment the Incident Commander should consider:

1. Removing involved personnel from the fireline, ensuring appropriate medical attention as necessary. When hospitalization or fatalities occur, relevant facilities and organizations should be advised to preserve all involved personnel's protective clothing and equipment.
2. Ensuring that the entrapment or deployment scene is secured and that all pertinent evidentiary items are secured (in place if possible), particularly fire shelters and personal protective equipment as required by the Occupational Safety and Health Act.
3. Immediately notifying the Agency Administrator and providing details on the incident status summary (ICS-209).
4. Initiating a preliminary investigation of the entrapment or deployment to determine the facts of the entrapment, insofar as possible. The initial investigation will be completed within 24 hours of the entrapment.

5. Relieving involved supervisors from fireline duty until the preliminary investigation has been completed.
6. Ensuring that personnel and supervisors are readily available for interviews by the Entrapment Investigation Team (EIT, below defined). "Available" means present at the incident base or nearby R&R center.
7. As soon as possible, providing the results of the Incident Commander's preliminary investigation to the Entrapment Investigation Team. Ensure preparation of a roster of individuals involved in the entrapment. The roster must minimally contain their names, employing agency, genders, ages, addresses, incident position titles, and appropriate employee identification numbers.

**Agency Administrator Responsibilities:**

Upon notification of an entrapment or deployment, the Agency Administrator should assure that the following activities take place within 24 hours of notification:

1. Convene an Entrapment Investigation Team (EIT) to investigate the entrapment. It is recommended that the EIT be interagency in nature and should include personnel with the following skill areas:
  - a. Incident Commander or Operations Section Chief (Type I).
  - b. Fire behavior analysis, qualified in the specific fuel type.
  - c. Safety officer, with investigative expertise.
  - d. Wildfire operations, with expertise at the peer level of the person(s) directly involved.
  - e. Agency representative of involved person(s).
  - f. Employee representation (union, peer at operations level)
  - g. Fire weather meteorology.
  - h. Personal protective equipment specialist, from a lab such as the USDA-Forest Service's Missoula Technology and Development Center.
2. Instruct the EIT to arrive on scene within 24 hours.

3. Advise the Incident Management Team of the EIT's time of arrival and team composition.
4. As required by the Occupational Safety and Health Act of 1970, advise the nearest office of the Occupational Safety and Health Administration (federal or state as applicable) if the entrapment involves a fatality or the hospitalization of 5 or more personnel. Advise OSHA office that a formal investigation is being conducted by a designated Entrapment Investigation Team.
5. Arrange for a critical incident stress debriefing team for the personnel involved in the entrapment.
6. Notify the home unit agency administrator of all individuals involved in the entrapment/deployment.
7. Submit a copy of the EIT's final report to the NWCG Safety and Health Working Team within 60 days of receipt from the EIT.

**Entrapment Investigation Team Responsibilities:**

1. The EIT will conduct the investigation, identify causal factors and list findings for the entrapment situation. Recommendations for corrective actions should be included in the letter of transmittal.
2. The EIT will brief the Agency Administrator and the Incident Commander of their preliminary findings prior to leaving the incident.
3. Within 30 days of the EIT's dispatch, the EIT's final report and recommendations for corrective actions will be submitted to the Agency Administrator.

**NWCG Safety and Health Working Team (SHWT) Responsibilities:**

1. Within 30 days of receipt of each entrapment report, the SHWT will distribute a summary of the applicable findings to NWCG agencies and the National Fire Protection Association, per the NWCG "Safety Gram". This summary will not include any incriminating agency references or information identified as sensitive by the agency.
2. The SHWT will periodically review all entrapment reports, determine trends, and incorporate findings to develop specific prevention recommendations for implementation by NWCG agencies.

## ***Entrapment Investigation Elements***

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

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## *Notes*

## ***About the Author***

**Dick Mangan** (retired) was program leader for Fire, Aviation, and Residues at MTDC from 1989 to 2000. Before coming to the Center, he spent more than 20 years working on ranger districts and national forests in Oregon and Washington, participating in the full range of wildland fire activities. He served

on the National Wildfire Coordinating Group's fire equipment and safety and health working teams and was chairperson of the National Fire Protection Association's 1977 Technical Committee for Wildland Fire Personal Protective Clothing and Equipment.

## ***Library Card***

Mangan, Richard J. 2001. Investigating wildland fire entrapments: 2001 edition. Tech. Rep. 0151-2823-MTDC. Missoula, MT: U.S. Department of Agriculture, Forest Service, Missoula Technology and Development Center. 34 p.

Describes the process used when investigating wildland fire entrapments. Entrapments are situations where firefighters are unexpectedly caught in life-threatening situations related to fire behavior when escape routes or safety zones are absent, inadequate, or have been compromised. Although firefighters may be injured or killed during entrapments, firefighters do not need to have deployed their fire shelters or suffered an

injury to have been in an entrapment. From 1990 to 1998, 39 wildland firefighters were killed in the United States when fires burned over them. Fire investigations reveal that 1,589 personnel were entrapped by wildland fires from 1976 to 1998. Appendixes include a fire entrapment/fatality first-response form, a wildland fire entrapment/fatality initial report, an entrapment investigation timeline, an entrapment investigation kit, and the National Wildfire Coordinating Group's fire entrapment investigation and review guidelines.

Keywords: burnovers, fatalities, firefighters, fire fighters, investigations, safety at work

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**Additional single copies of this document may be ordered from:**

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