

# **Alaska Line of Duty Death Response Guide**

**October 2015**



**State of Alaska  
Division of Fire and Life Safety**

**Alaska Fire Chiefs Association**

**Alaska State Firefighters Association**



# Alaska Line of Duty Death Response Guide

## Table of Contents

### 1. LODD Notification

### 2. LODD Organization Chart

### 3. ICS Position Descriptions

### 4. LODD Action Checklist

### 5. AK Fire Service LODD Resources

### Appendix A Chaplains Manual

Introduction 1

Section 1 General Guidelines 3

Section 2 Pre-Incident Planning 5

Section 3 Funeral Types 9

Section 4 Funeral or Memorial Service Planning Considerations 11

Section 5 Key Assignments for Fire Department Funerals 17

Section 6 Other Considerations 19

Section 7 Ceremonies 21

C G Appendix 1 Employee Emergency Contact Information 27

C G Appendix 2 Suggestions on Preparing a Fire Service Eulogy 29

C G Appendix 3 Suggested Funeral Home Formations 33

C G Appendix 4 Suggested Church Formations 35

C G Appendix 5 Suggested Final Committal Service Formations 37

C G Appendix 6 Pallbearers' Locations When Marching 39

C G Appendix 7 Military Standards 41

C G Appendix 8 Traditional Method for Folding the Flag of the United States 43

C G Appendix 9 Suggested “Last Alarm” Ceremony 45

C G Appendix 10 Sample Order of Events 47

C G Appendix 11 Handling Dignitaries at Fire Department Funerals 51

Responsibility Sheets

Survivor Action Officer 55

Family Liaison Officer 59

Funeral Officer 63

Procession Officer 65

Service Officer 69

Final Committal Officer 71

## Appendix B USFA Firefighter Autopsy Protocol

Overview. vi

Acknowledgement. vii

I. BACKGROUND . 1

I.1 Scope of the Problem. 1

I.2 Rationale for the Protocol. 3

I.3 Description of the Protocol. 4

II. M Medico legal Autopsy Procedures in the United States. 9

II.1 When Is an Autopsy Required?. 10

II.2 Definition of Manner, Cause, and Mechanism of Death. 10

II.3 Chain of Custody and Documentation. 11

II.4 Retention of Autopsy Specimens and Paperwork. 12

III.. Occupational Aspects of Firefighting of Specific Concern to Autopsy. 13

III.1 F Firefighter Death Classification.	13
III.2 T Trends in Line-of-Duty Deaths.	14
III.3 I Investigation of Line-of-Duty Deaths.	18
III.4 Alcohol and Drugs .	19
III.5 F Fire Toxicology.	20
III.6 Burns.	24
III.7 Personal Protective Equipment.	26
III.8 N Non-Line-of-Duty Deaths.	28
III.9 F Firefighter Health.	29
IV. P PUBLIC SAFETY OFFICER BENE FITS (PS OB) PR OGR AM.	31
IV. IV.1 Summary of the PSOB Law.	31
IV. IV.2 Summary of the Heart/Stroke Amendment.	32
IV. IV.3U Useful	
Web sites .	33
Selected Bibliography.	34
Determination of Alcohol Levels During Autopsy.	34
Carbon Monoxide Determination During Autopsy.	44
USFA Appendix A:Death Investigation Systems In The United States And Territories.	55
USFA Appendix B: N NIOSH Firefighter Fatality Reports—Autopsy Information.	93
USFA Appendix C: E Examination of Personal Protective Equipment.	160
Protective Helmets.	163
Protective Hoods.	163
Protective Garments (Coat and Pants).	163
Protective Gloves.	164
Protective Footwear (Rubber).	165
Protective Footwear (Leather).	165

## Appendix C National Volunteer Fire Council Funeral Procedures

Introduction 3

Fire Department Funerals 4

Circumstances that Entitle a Fire Department Funeral

Types of Funeral Services 5

- Formal Funeral Service

- Semi-Formal Funeral Service

- Non-Formal Funeral Service

- Private Service

Preparations 6

- Personal Information Sheets

- Photographs

- Resumes

- Department Identification Cards

- Employee Benefits

- Uniform for Burial

- Inventory of Necessary Equipment for Funeral

- Funeral Director

- Florists

- National Fallen Firefighters Foundation's Local Assistance State Team

Job Responsibilities 8

- Chaplain

- Survivor Action Officer

- Family Liaison Officer

- Funeral Officer

Honor Guard

Honorary Pallbearers

Active Pallbearers

Funeral Detail

Procession Officer

Service Officer

Cemetery Officer

Transportation Officer

#### Initial Actions 15

Initial Roles of Personnel

Procedures for Notification

#### Description of Funeral Options 18

Honor Guards

Pallbearers

Transportation

Meals

Child Care

Procession

Flower Apparatus

Last Alarm Service

Musical Arrangements

Readings

Eulogy

Crossed Aerial Ladders

Static Equipment Display of Outside Equipment

Burial in Uniform

Closed Casket

Walk Through

Refreshments or Post Services Reception

Bunting

Half Staff Flag Protocol

Badge Shrouding

NVFC Appendix A 21

Sample Personal Information Sheet

NVFC Appendix B 22

Public Safety Officers' Benefits (PSOB) Program

NVFC Appendix C 23

Military Standards and Flag Folding Procedures

NVFC Appendix D 27

Sample Readings for Funeral Services

NVFC Appendix E 32

Preparing a Eulogy

NVFC Appendix F 33

Suggested Funeral Formations

NVFC Appendix G 37

Involving Your Fire Corps Team or Auxiliary

NVFC Appendix H 38

Additional Resources

Appendix D International Association of Fire Chiefs (IAFC) LODD Investigation Guide

Appendix E International Association of Fire Fighters (IAFF) Funeral Protocol

Appendix F Bell Ceremony, Prayers and Table Ceremony





## Alaska Line of Duty Death Notification List

Call Immediately:

Alaska State Fire Marshal (907) 269-5484

Department of Public Safety After Hours Contact (24 hours) AST  
Dispatch 911 or dispatch for local area;

A Detachment Ketchikan 907-225-5118 or 800-478-5113

B Detachment Palmer (Mat-Com) 907-745-2131 or 907-352-5401

C Detachment Anchorage 907-269-5511 Anchorage, Aniak, Bethel, Dillingham, Emmonak, Iliamna, King Salmon, Kodiak, Kotzebue, McGrath, Nome, Saint Mary's, Selawik, Unalakleet

D Detachment Fairbanks 907-451-5100 or 800-811-0911 Barrow, Cantwell, Delta Junction, Fairbanks, Galena, Healy, Nenana, Northway, Tok

E Detachment Soldotna 907-262-4453 “dial 0” Anchor Point, Cooper Landing, Girdwood, Ninilchik, Seward, Soldotna

Notify within 24 hours of incident:

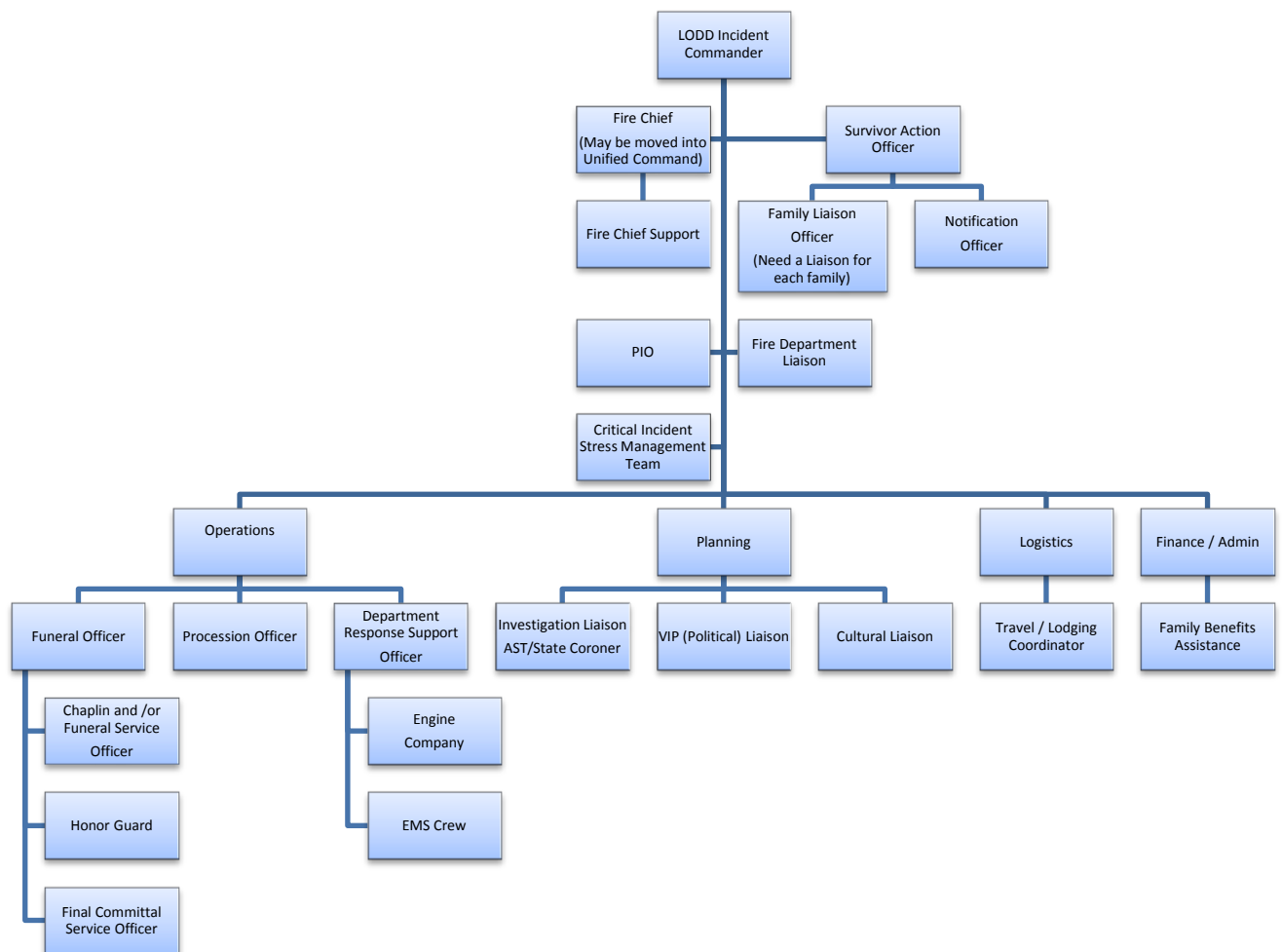
National Fallen Firefighters Foundation 24-hour line-of-duty death hotline at 866-736-5868

Bureau of Justice Assistance, Public Safety Officers Benefit Program  
1-888-744-6513 Email: [AskPSOB@usdoj.gov](mailto:AskPSOB@usdoj.gov)

For technical assistance with submitting your application online or help with technical difficulties, please submit a request for technical support at:

<https://www.psob.gov/TechSupportRequest.aspx>

You will receive a reply within 1 business day.



# ICS Position Descriptions for LODD – Alaska

(See attached org chart)

The LODD organization should not be construed as “taking over” the affected department. The LODD organization should be looked at as offering support to the affected Chief and his/her department as needed.

## LODD IC

This is the IC of the LODD and will be working for the Chief of the Affected Department unless I.C. designates a different working relationship (IE: Unified Command).

**Hospital Liaison/Notification** not identified on org chart (this activity/position may be fulfilled by the affected fire department prior to activation of LODD ICS Team)

Goes directly to the hospital and initiates contact with family members, the affected department and LODD IC. Assures no press releases are made until proper notifications are made (especially true of fatality). This position may become, or will need to work closely with, Extended Family Notification Officer for the notification of family members outside the local area.

## Chief of the Affected Department

While devastating, the LODD is an incident within organization (fire department). Everyone supporting the LODD events must remain cognizant that the Chief will still be running the department unless he/she designates otherwise. The LODD organization should try to limit the number of personnel directly contacting the Chief while keeping this same individual informed.

## Fire Chief Support Officer

Supports the affected Fire Chief, should be Chief Officer who has experienced an LODD or similar experience. Provides specific point of contact for LODD Team and offers support to affected Fire Chief.

## Survivor Action Officer

Reports to LODD IC. This position supports the next of kin. Provides continuity and familiarity for the surviving family(s) and sees to their welfare. Ensures local next of kin have been notified of LODD. Acts as point of contact for family between all agencies, organizations, unions and provides information as it becomes available from LODD investigations.

### SURVIVOR ACTION OFFICER RESPONSIBILITIES

1. As a direct representative of the Fire Chief, the Survivor Action Officer should receive the full cooperation of the entire fire department. The Survivor Action Officer will appoint assistants and delegate responsibilities as required to successfully complete all assigned duties.
2. The Survivor Action Officer is responsible for the management of several important activities. The principal concern is the ongoing welfare of the next of kin. The officer shall render all necessary assistance to help the family through the crisis.

3. The Survivor Action Officer coordinates and supervises the activities of a number of key personnel assigned to handle the specific aspects of the funeral arrangements and to assist the surviving family. These key personnel include:

- a. Family Liaison Officer - Remains on call to the surviving family 24 hours a day to assist and support as needed. Provides the Survivor Action Officer with regular updates on the family's status and needs. This officer probably needs a backup to provide on-going assistance over a multi-day period.
- b. Funeral Officer - Provides coordination and interaction with the Funeral Director and other personnel on funeral arrangements.
- c. Service Officer - Provides coordination and interaction with the church to arrange the funeral service.
- d. Final Committal Officer - Provides coordination with others involved in the funeral arrangements in order to arrange all details at the final committal site.
- e. Procession Officer - Arranges and directs the funeral procession.

4. Additional duties for the Survivor Action Officer include:

- a. Assuring that next-of-kin notification has been properly accomplished.
- b. Officially notifying all fire department stations of the death and passing on the order to have flags lowered to half-staff and making arrangements to notify off duty and vacationing personnel.
- c. Notifying the following personnel and agencies, as appropriate, of the death:
  - (1) Union president and/or Firefighters Association representative (national, state and local)
  - (2) Officials from other local government offices
  - (3) Other fire and police departments
- d. Making appropriate follow-up contacts when the funeral arrangements and schedules have been determined.
- e. Working with the Family Liaison Officer to determine the desired method of collecting the deceased firefighter's personal items from the fire station.
- f. Conducting a coordination meeting with the key personnel as soon as possible so that everyone understands the family's wishes regarding options chosen for the funeral ceremony. Once the funeral procedures are established, instructing all key personnel to make the appropriate contacts and setting a date and time for a final coordination meeting.
- g. Conducting a final coordination meeting with key personnel to:
  - (1) Establish schedule and timetables.
  - (2) Identify times and places for group gatherings as required by the ceremonies.
  - (3) Contact all appropriate individuals and agencies with the schedule, meeting places, and special instructions.
- h. Serving as a key contact person for outside agencies, news media, and other fire departments in relation to the death and subsequent ceremonies. This duty may be handled by a department Public Information Officer.
- i. After obtaining family approval through the Family Liaison Officer, making appropriate arrangements for a post-funeral reception and a facility to handle a large group of people.
- j. Arranging for a fire department member to be on hand at the residence to assist the family and provide for security during the funeral and funeral-related

activities. Additional meals for immediate family members will be provided as needed.

k. In career departments, coordinating with the appropriate local government office to arrange for a final paycheck and for the completion of any required paperwork.

l. Contacting neighboring fire departments and arranging for mutual aid stand-in fire companies during the funeral.

m. Ensuring accessibility to the family for the duration of the funeral process.

n. Coordinating meals for the family and assuring ongoing family contact by the Family Liaison Officer.

o. Assuring that all department functions continue as required.

### **Family Liaison Officer**

This position reports to the Survivor Action Officer and is on call to the surviving family as needed for their logistical support. (A Family Liaison Officer must be identified for each fatality (in the case of multiple LODD incidents) and may need additional Family Liaison Officers in the case of “blended” families.) The Family Liaison Officer provides the Survivor Action Officer with regular updates on the family’s status and needs.

In every incident involving the death of a firefighter, or when the death of an injured firefighter appears imminent, the Fire Chief will assign a Family Liaison Officer.

### **FAMILY LIAISON OFFICER RESPONSIBILITIES**

1. Be readily available with a fire department vehicle, pager, and portable radio for the entire funeral process.
2. Immediately report to the deceased’s residence or that of the next of kin, or to the medical facility or morgue, and provide reassurance and support to the family. Ensure that the NEEDS OF THE FAMILY come before the wishes of the department or any other officials.
3. Be prepared to discuss all aspects of the funeral process and relay to the Fire Chief the family’s wishes on the level of the department’s involvement in the funeral process. These considerations include:
  - a. What the department can offer in the way of assistance based on the type of death
  - b. Churches with seating capacities large enough to accommodate projected attendance at the funeral. First, any alternate churches will need to agree that the family minister or fire department chaplain may officiate at the service.
  - c. Fire department funeral ceremonial options (i.e., gun salute, presenting of the flag, playing of Taps, Last Alarm, the ladder archway, etc.)
  - d. Proper recognition for the family and friends during the funeral and funeral procession
4. Ask the family to select six or eight primary pallbearers and the optional honorary pallbearers. Make suggestions only if the family asks for some.
5. Assist the family in determining:

- a. The type of final committal
  - b. The funeral home to use
  - c. The clergy to use
  - d. The place of final committal
  - e. Whether to bury the deceased in a fire department uniform and, if so, how to obtain one
  - f. Alternate clothes for burial and delivering them to the funeral director
  - g. A photograph of the deceased and delivering it to the funeral director
  - h. Length of the wake and a tentative schedule
  - i. The length of the funeral service to include:
    - (1) Readings and readers
    - (2) Music and musicians
    - (3) Deliverer of the funeral tribute and/or eulogy
    - (4) Inclusion of a "Last Alarm" bell service
  - j. Ceremonies at the place of final committal:
    - (1) Band or Piper
    - (2) Singing
    - (3) Honor Guard/Firing Party
    - (4) Readings
    - (5) Last Alarm Service
    - (6) Taps
    - (7) Use of an engine, a caisson or a hearse
    - (8) Use of an engine or ladder truck to carry flowers
    - (9) Personnel walking alongside the caisson or riding in the procession
  - k. Any other special considerations
6. Be available to the family on a 24-hour basis to assist in any way necessary.
7. Address the following items with the family:
- a. Autopsy report
  - b. Obtaining birth certificates, marriage certificates, death certificates, or VA or military records
  - c. Determine the benefits for which the survivors may be eligible, including:
    - (1) Fire department benefits due to surviving beneficiaries
    - (2) VA spouse and children's benefits and burial benefits
    - (3) Social Security benefits
    - (4) Federal Public Safety Officers' Benefits for spouse and other survivors
    - (5) State benefits for survivors of fallen firefighters
    - (6) Educational assistance and scholarship programs for spouses and children
    - (7) Life and health insurance plans (personal and city) including funeral benefits
    - (8) Final paycheck, including sick leave, vacation payoff, and W-2 forms
    - (9) Deferred compensation account
  - d. Offer to identify lawyers, accountants and/or financial advisors to assist with legal and financial issues. Ask the family if they already have advisors to help with the following:.



- (1) Transfer ownership of property and vehicles to survivors
- (2) Review all outstanding bills before payment by survivors for legality and accuracy. This should include last illness, previous debts, and funeral expenses. Some bills may be covered by insurance.
- (3) Change name on all bank accounts
- (4) Check on mortgage insurance
- (5) Explore damages resulting from the circumstances of the death

8. Be constantly alert for ways to help the family of a fallen firefighter cope with the tragedy. Immediately relay any special needs to the Fire Chief to obtain the resources to meet those needs.

### **Notification Officer**

Reports to the Survivor Action Officer, researches need and develops plan in the case that close survivor family members are in multiple or out of city/state locations. Ensures next of kin are notified promptly and with proper respect and decorum.

### **Fire Department Liaison**

Reports directly to the LODD IC, works closely with Fire Chief Support Officer. This person may fulfill the need for an additional point of contact between the LODD team and the Affected Fire Department beyond the Fire Chief Support and Response Support positions. IE: Fire Department Auxiliary, etc.

### **Public Information Officer**

Reports to the LODD IC. Develops, coordinates and disseminates information from the department and the LODD incident.

### **Critical Incident Stress Management Team**

Provide defusing and debriefings as needed to support the Affected Fire Department and LODD working team if the affected department does not have internal support mechanism in place. Team leader reports directly to the LODD IC.

## **Operations Section**

The Operations Section supports all the funeral wishes/activities as relayed from the Survivor Action Officer. Operations section will support, as needed, the response support needs of the affected fire department as identified by the Fire Chief Support Officer and Fire Department Liaison.

### **Funeral Officer**

The Funeral Officer's role is to serve as intermediary between the Funeral Director and other Fire Department personnel involved in funeral or memorial; service activities. This officer is not a funeral director and should not interfere in funeral management.

### **FUNERAL OFFICER RESPONSIBILITIES**

1. Coordinate with the Family Liaison Officer and the funeral director to insure that the funeral wishes of the deceased firefighter's family are carried out.

2. Attend all meetings called by the Survivor Action Officer to determine the following:
  - a. The schedule of events and the length of the funeral service
  - b. Whether fire department vehicles will serve as a caisson or flower carrier. If they are not used, make alternate arrangements with the funeral director.
3. If the firefighter's immediate family has not requested limousine service from the funeral home on the day of the funeral, ask the funeral director to provide the service and send an invoice for the service to the fire department.
4. Coordinate with Honor Guard members to establish an Honor Guard schedule at the funeral home and church.
5. Coordinate with the departments involved and with the funeral director a formal walk through of uniformed personnel. This includes seating arrangements.
6. Work with the fire department chaplain or clergy member designated by the family to coordinate any prayer services to be conducted at the funeral home and forward this information to the Survival Action Officer.
7. Develop a schedule for uniformed personnel to follow the day of the funeral at the funeral site. This includes:
  - a. Arrival time for uniformed personnel and specific instructions where to gather
  - b. Briefing and practice of formations that will be present when the casket is removed
  - c. Briefing on proper protocols for entering and leaving the funeral site
8. Coordinate vehicle staging with the Procession Officer, including arrangements for fire department vehicles. Ensure the availability of sufficient personnel to properly direct and stage incoming apparatus and vehicles.
9. Obtain from the Family Liaison Officer the uniform or other clothing that the deceased will wear during viewing and deliver it to the funeral director.
10. Coordinate with the Family Liaison Officer on special readings or eulogies.
11. Obtain white gloves for all fire department pallbearers.

### **Funeral Service Officer**

The Funeral Service Officer has the primary responsibility of coordinating all of the activities and ceremonies at the church or funeral site. If the family has decided to have a religious service, the Service Officer coordinates with clergy selected by the family.

### **FUNERAL SERVICE OFFICER RESPONSIBILITIES**

1. Attend coordination meetings and obtain the following information from the Survivor Action Officer and Family Liaison Officer:
  - a. Schedule of events
  - b. Location of the service

- c. Clergy involved, including the fire department chaplain
- d. Readings and readers
- e. Type and length of service
- f. Requested ceremonial items:
  - (1) Badge presentation
  - (2) Special readings
  - (3) Special eulogies
- g. Music and musicians
- h. Information on the deceased firefighter, both professional and personal.  
Give this information to the person delivering the tribute or eulogy.

2. Contact the Procession Officer and coordinate vehicle staging at the service location.

3. Make seating arrangements for those attending the service. In addition to family members, provide dedicated seating for:

- a. Pallbearers
- b. Honor Guard
- c. Uniformed personnel
- d. Dignitaries

4. Determine the formations to be used and coordinate them during the arrival and removal of the casket from the location of the service. Review military commands for the formations and issue them when appropriate.

5. Develop a program for the service and give it to the Family Liaison Officer to discuss with the family. Ask if they want any special prayer cards and, if so, provide a draft.

6. After approval by the family, print the program and prayer cards, if used.

### **Procession Officer**

This person will work with the LODD team and coordinate the wishes of the immediate family members and the department regarding any/all memorial and funeral arrangements. Selects team to accompany body during transport, develops procession plan and parking plan. Arranges and directs the funeral procession.

### **PROCESSION OFFICER RESPONSIBILITIES**

The Procession Officer is responsible for coordinating the procession from the funeral home to the church or other service area (if necessary) and from there, or other funeral site, to the place of final committal. Duties include:

- 1. Attend all coordination meetings to determine the following:
  - a. Name of the funeral home
  - b. Name of the church or other service location
  - c. Name of the place of final committal
  - d. Use of an engine as a caisson or a conventional hearse
  - e. Use of an engine as a flower carrier

- f. Schedule of events the day of the funeral
  - g. The logistics of the procession:
    - (1) Honor Guard
    - (2) Band or Pipers
    - (3) Pallbearers
2. Establish a system for staging and coordinating vehicles at all locations where funeral activities will occur. Coordinate the vehicle staging with appropriate key personnel (service officials, officials at the site of final committal). Ensure that sufficient personnel are available at all staging locations to efficiently direct and stage apparatus and vehicles.
3. Coordinate with the Family Liaison Officer to determine any special circumstances affecting the procession. These may include:
- a. Passing the firefighter's home, fire station, or other special location
  - b. Special static displays of equipment and personnel at locations on the procession route
  - c. The use of crossed aerial ladders at the entrance to the site of the final committal or other location. If used, contact the Survival Action Officer to obtain the necessary apparatus.
4. Contact the local law enforcement authorities for assistance in working with the funeral director to:
- a. Establish routes for the procession.
  - b. Determine traffic control needs.
    - (1) Traffic rerouting and street closings at the funeral home and funeral site. Contact the appropriate government agency or department to obtain barricades if needed.
    - (2) Traffic control at any special assembly points.
    - (3) If necessary, posting "No Parking" signs around the funeral home, funeral site, and any other assembly points.
    - (4) Directing of staged vehicles as they line up for procession(s).
  - c. Arrange for procession escorts.
5. Develop maps showing the procession route and other needed information. Maps will be handed out at the briefing at the funeral site prior to the beginning of the service and sent to attendees from out of town. Post them on the department's website along with times and required dress.
6. Align vehicles in the procession in coordination with the funeral director:
- a. Lead Escort
  - b. Fire department vehicle used as flower carrier
  - c. Hearse or engine used as caisson
  - d. Family vehicles
  - e. Pallbearers (if not riding on flower vehicle and caisson)
  - f. Honorary pallbearers
  - g. Honor Guard/Color Guard
  - h. Fire Chief's vehicle

- i. Other host fire department vehicles
- j. Local law enforcement vehicles
- k. Local officials' vehicles
- l. Vehicles from other fire departments
- m. Vehicles from other police department
- n. Vehicles of family friends and other private vehicles
- o. Rear Escort

7. If fire department apparatus serve as a caisson and/or flower vehicle, contact the Survivor Action Officer and determine which apparatus will be used. Ensure the following preparations have been made:

- a. Apparatus is thoroughly cleaned and hose beds stripped.
- b. Hose dividers are removed from the apparatus serving as a caisson.
- c. The hose bed on the caisson engine is adapted to easily facilitate casket placement and removal. This needs to be coordinated with the funeral director.
- d. Apparatus operators wear full dress uniforms while driving.
- e. Deceased firefighter's bunker gear is placed in a riding position on the caisson with the bunker boots turned backwards.
- f. If used, bunting and/or funeral flags are affixed to the apparatus.

### **Chaplin**

Provides emotional and spiritual support; ensures the wishes of the family come before those of the affected department. Assists as needed/supports memorial/funeral activities. May act as a liaison between differing faiths/cultures of family and/or department.

### **Honor Guard**

Obtains necessary items needed to support memorial/funeral services, IE: flags, bells, bunting, etc. Provides services relating to memorial/funeral decorum, works with funeral home, local law enforcement (establishing precession route). Assists as needed for detailing visiting dignitaries/departments.

### **Final Committal Service Officer**

Provides coordinates all the individuals for the final committal service.

### **FINAL COMMITTAL SERVICE OFFICER RESPONSIBILITIES**

The Final Committal Service Officer is responsible for the preparation and coordination of events at the site of the final committal. These duties start at the time the procession vehicles arrive and people exit the vehicles. The officer is also responsible for liaison with personnel who manage and operate the final committal site. Duties include:

- 1. Attending coordination meetings and obtaining the following information from the Survivor Action Officer and Family Liaison Officer:
  - a. Type of final committal:
    - (1) Burial
    - (2) Placement in a crypt
    - (3) Cremation
  - b. Family requests:
    - (1) Final Alarm Service

- (2) Taps
- (3) Firing Party
- (4) Readings and readers
- (5) Music and musicians

2. Schedule and coordinate the sequence of events that will take place at the final committal site. This includes coordinating any special requests received from the Survivor Action Officer or Family Liaison Officer.
3. Develop the type of formations for the uniformed personnel and their locations, issue appropriate orders consistent with military standards.
4. Ensure that the officials at the final committal site take care of all necessary items, such as:
  - a. Overhead protection for immediate family
  - b. Seating for the immediate family
  - c. A public address system if needed
5. Ensure that Honor Guard members are thoroughly familiar with folding and presenting the flag to the next of kin.
6. Coordinate with the Survivor Action Officer to see if any family members have medical conditions requiring emergency medical personnel and equipment at the site.
7. Upon dismissal of the formation, announce the location of the post-funeral reception, if any.

#### **Department Response Support Officer**

Works closely with Fire Chief Support Officer and Fire Department Liaison, obtains and coordinates resources to maintain operational capabilities of affected department.

#### **Engine Company Operations Officer**

Reports to Department Response Officer, established as needed to support fire response capabilities of affected department.

#### **EMS Crew**

Reports to Department Response Officer, established as needed to support EMS response needs of the affected department. May also be used to support EMS needs of LODD activities

### **Planning Section**

The Planning Section must work closely with the Logistics Section, ensuring contingencies are identified and LODD incident needs are met with dignity and decorum.

#### **Investigation Liaison**

Represents the affected department, ensures appropriate agency notifications are made and acts as point of contact for all investigating organizations IE: AST, AK-OSH,

Coroner, USFA, NIOSH, BATF, etc. Ensures compliance with all survivor benefit investigation and reporting requirements including autopsy protocols.

**VIP/Political Liaison**

Established as needed to support special needs of visiting dignitaries during LODD activities.

**Cultural Liaison**

Established as needed to ensure any/all family cultural requirements are honored.

**Logistics Section**

Establish as needed to support affected department and provide adequate services for incident/event needs.

**Travel/Lodging Coordinator**

Arranges travel for LODD Team. Ensures adequate housing and related facilities are available to next of kin, extended families, visiting dignitaries and LODD Team members.

**Finance/Administration**

Establish as needed to track incident related costs. May supplement affected department's procurement, contracting and administration functions.

**Family Benefits Assistance**

Works closely with Investigation Liaison and assists next of kin with identifying and establishing claims for survivor benefits.

# Line-of-Duty Death Action Checklist

## FIRST 24 HOURS

### Notification

\_\_\_\_\_ Assign a 2-person team to notify the firefighter's family, in person, before releasing any information

\_\_\_\_\_ Notify all on- and off-duty personnel, including chaplain.

\_\_\_\_\_ Notify elected officials and other key people in the community of the death.

\_\_\_\_\_ Notify all other fire chiefs in the jurisdiction.

\_\_\_\_\_ Notify the Public Safety Officers' Benefits Program office

### Family Support

\_\_\_\_\_ Designate a family support liaison (team) and offer to stay with the family around the clock.

\_\_\_\_\_ Designate a hospital liaison, if appropriate.

\_\_\_\_\_ Meet with the family to explain support the fire department can provide and any immediate support they can offer. Be prepared to explain why an autopsy may be required.

\_\_\_\_\_ Collect the deceased firefighter's department belongings to give to the family later. Inventory and document in the presence of a witness. If some belongings will be held during investigation, explain this to the family.

### Department Support

\_\_\_\_\_ Contact the National Fallen Firefighters Foundation's Chief-to-Chief Network as needed for assistance.

### Dealing with the Incident

\_\_\_\_\_ Determine the type of firefighter fatality investigation to conduct in addition to the NIOSH investigation (i.e., internal or external board of inquiry; arson-, accident- or homicide-related).

\_\_\_\_\_ Contact the departmental or jurisdictional attorney regarding possible legal issues.



## **Dealing with the Community and the Media**

\_\_\_\_\_ Prepare a summary of facts about the firefighter and the incident to use for public release of information.

\_\_\_\_\_ Prepare a written statement for the chief or spokesperson to release to the media

\_\_\_\_\_ Hold a briefing with the media.

## **DAY TWO THROUGH THE FUNERAL**

### **Funeral/Memorial Service**

\_\_\_\_\_ Assist the family in planning the funeral as they choose.

\_\_\_\_\_ Continue to inform department members of the details regarding the incident and the funeral/memorial service plans.

\_\_\_\_\_ Coordinate plans for fire department participation in funeral.

### **Family Support**

\_\_\_\_\_ Request that local law enforcement officials make routine checks of the family's residence during the funeral and for several weeks afterwards

\_\_\_\_\_ Assist the family with tasks related to home maintenance, transportation of out-of-town family and friends, childcare, etc.

### **Department Support**

\_\_\_\_\_ Monitor department members closest to the incident to see how they are dealing with the loss.

## **AFTER THE FUNERAL**

### **Family Support**

- \_\_\_\_\_ Continue to invite the family to department events and activities.
- \_\_\_\_\_ Provide assistance with routine tasks (home maintenance, running errands, etc.)
- \_\_\_\_\_ Assign someone to assist the family in accessing all benefits for which they are eligible.
- \_\_\_\_\_ Offer to "be there" at special times/events (children's activities, holidays, etc.)

### **Department Support**

- \_\_\_\_\_ Assist department members in accessing additional support, as needed.

### **Memorials and Tributes**

- \_\_\_\_\_ Inform and include families in local, state, and national tributes to the firefighter.
- \_\_\_\_\_ Make the family aware of the National Fallen Firefighters Foundation and its support programs for fire service survivors.
- \_\_\_\_\_ Plan to attend the National Fallen Firefighters Memorial Weekend and to send an escort and honor guard unit for the family.

### **Department Issues/Planning**

- \_\_\_\_\_ Update Emergency Contact Information for all department members.
- \_\_\_\_\_ Create or revise the department's Line-of-Duty Death plan.

## Alaska Fire Service Line of Duty Death Resources

Alaska Division of Fire and Life Safety, Life Safety Inspection Bureau (Fire Investigation) (907) 269-5637

Alaska Division of Fire and Life Safety, State Fire Marshal (907) 269-5491 or AST Dispatch

Alaska Fallen Fighter Memorial Committee 877-355-5472

Alaska Fire Chiefs Association <http://www.alaskafirechiefs.org/who-we-are/board.html>

Alaska Office of Rural Fire Protection 877-355-5472 or (907) 745-5472

Alaska Police and Fire Chaplains' Ministries (907) 272-3100

Alaska Professional Firefighters Association (IAFF) 907-748-6444

Alaska State Firefighters Association <http://www.alaskastatefirefighters.org/Members/Officers.aspx>

Alaska State Fire Marshal (907) 269-5491 or 24/7 AST Dispatch

Alaska State Medical Examiner's Office (907) 334-2200

Anchorage Fire Department Honor Guard

Firefighter Behavioral Health Alliance 847-209-8208

Nation Fallen Firefighters Foundation 24-hour line-of-duty death hotline at 866 -736-5868

Public Safety Officers Benefit 1-888-744-6513 Email: [AskPSOB@usdoj.gov](mailto:AskPSOB@usdoj.gov)

The following companies are part of the organization "With All Due Respect". A group of manufacturers who recognize the traumatic effect a LODD has on a department and family members. These manufacturers offer a rapid response to your needs in acquiring items necessary for a LODD funeral.

Lighthouse Uniform (Uniforms) 800.426.5225

Carrot Top Industries (Flags) 800-628-FLAG (3524)

FD Friendly (engine bunting) 610-584-4996

Smith and Warren (Badge and insignia) 914-948-4619

# **Chaplains Manual**

## **Fire Department Funerals**

**Federation of Fire Chaplains  
185 County Road 1602  
Clifton, Texas 76634-4508  
(254) 622-8514**

2/2004



## Acknowledgement

The Federation of Fire Chaplains would like to acknowledge its partnership with the National Fallen Firefighters Foundation. Through this partnership, both organizations are better able to meet the needs of the fire service family.

The Foundation offers extensive grief-related resources to the survivors of firefighters killed and seriously injured in the line of duty. Out of its work with the survivors, came the suggestion for development of *Taking Care of Our Own*, a training program to help senior fire officers better prepare for the loss of a firefighter in the line of duty. A key resource for the program is this Chaplains Manual.

The Federation provides this manual to assist fire departments through the worst of times. In addition, the Federation offers comprehensive training and resources for fire service chaplains who play such a vital role in helping departments and the survivors in local communities.

The Federation would also like to thank the National Fallen Firefighters Foundation for its assistance in the printing of this valuable resource.



## Table of Contents

Introduction		1
Section 1	General Guidelines	3
Section 2	Pre-Incident Planning	5
Section 3	Funeral Types	9
Section 4	Funeral or Memorial Service Planning Considerations	11
Section 5	Key Assignments for Fire Department Funerals	17
Section 6	Other Considerations	19
Section 7	Ceremonies	21
Appendix 1	Employee Emergency Contact Information	27
Appendix 2	Suggestions on Preparing a Fire Service Eulogy	29
Appendix 3	Suggested Funeral Home Formations	33
Appendix 4	Suggested Church Formations	35
Appendix 5	Suggested Final Committal Service Formations	37
Appendix 6	Pallbearers’ Locations When Marching	39
Appendix 7	Military Standards	41
Appendix 8	Traditional Method for Folding the Flag of the United States	43
Appendix 9	Suggested “Last Alarm” Ceremony	45
Appendix 10	Sample Order of Events	47
Appendix 11	Handling Dignitaries at Fire Department Funerals	51
Responsibility Sheets		
	Survivor Action Officer	55
	Family Liaison Officer	59
	Funeral Officer	63
	Procession Officer	65
	Service Officer	69
	Final Committal Officer	71





## **Introduction**

No one likes to consider the prospect of arranging and conducting a funeral or memorial service for someone who has touched our lives. As fire chaplains, however, we serve a group of brave and dedicated men and women who continually place themselves in harm's way. Far too often they make the ultimate sacrifice. They give their lives as they strive to protect the lives and property of the communities they serve.

When the unthinkable happens, it is up to the chaplain to do all he or she can to ensure that the fallen firefighter receives a tribute befitting the sacrifice. In this regard, no effort is too large, and no detail is too small. It is truly a time for "all things to be done decently and in order." The purpose of this manual is to provide basic information that a chaplain can use to help the department through a very trying time. It should also be part of a Standard Operating Procedure on how to handle all aspects of the death of a firefighter.

This manual is not intended to be all-inclusive in content or to present only one approach. Instead, it provides information covering a broad spectrum of subjects. This information comes from many sources and from what departments and families of fallen firefighters recommended. From this information, the chaplain may choose what best fits a particular situation and adapt it as necessary.

There are two keys to conducting a proper fire department funeral: showing honor to the fallen firefighter, and caring for those left behind. If the chaplain accomplishes these two things, the chaplain has done his or her job well.



**Section 1: GENERAL GUIDELINES**

- 1.1 When a member of the Fire, Emergency Medical or Rescue Services dies in the line of duty, several considerations are crucial for those dealing with the tragedy. These include:
  - a. Identifying and meeting the needs of the surviving family
  - b. Ensuring that the needs and wishes of the family always come before the needs and wishes of the department
  - c. Providing ongoing emotional and spiritual support for the next of kin
  - d. Using good organization, coordination and communication
  - e. Maintaining flexibility
  - f. Monitoring constantly not to overload any individuals
- 1.2 The primary goal of the fire department should be to work with the family, the funeral director and others involved to ensure that the fallen firefighter receives a fitting tribute. At all times the fire department must carry out the wishes and desires of the surviving family regarding the funeral ceremonies.
- 1.3 The fire department's responsibilities are not the same as those of the funeral director. Fire department personnel should work with the funeral director in the best interest of the firefighter's family.



**Section 2: PRE-INCIDENT PLANNING**

Pre-planning is essential to ensure the department meets the needs of the family and coworkers.

- 2.1 Fire Department Chaplain - The department should maintain an active chaplaincy program. The chaplain should be contacted immediately whenever the death of a fire department member is imminent or confirmed, regardless of the circumstances involved. The chaplain's services will be available to the surviving family before, during and after the funeral.
  - 2.2 Personnel Information – The department should maintain an Emergency Employee Contact Information Record on all department personnel. The department will use it to assist in the treatment of personnel following serious injury, and in the notification of next of kin following a serious injury or line-of-duty death. The form will contain the following information:
    - a. Complete name of the department member
    - b. Name and address of next of kin with specific directions to the address as needed
    - c. Names of parents and children/dependents, including those who may not live with the firefighter
    - d. The firefighter's religion and church affiliation and membership
- Appendix 1* contains a sample Emergency Employee Contact Information form created by the National Fallen Firefighters Foundation.
- 2.3 Photographs - The department should arrange for individual photographs of all department personnel and should maintain current photographs in department personnel files. The photos may be needed for immediate identification after an incident. After a line-of-duty death, there will be requests for photos from the media and other sources.
  - 2.4 Local Support Agencies - The department should periodically contact local public safety agencies to maintain a current resource list of:
    - a. Honor Guard and Color Guard
    - b. Bands, buglers, pipers
    - c. Firing parties
    - d. Bells for "Last Alarm" service

- e. Vocal and instrumental performers
- 2.5 Funeral Directors – The department should contact and provide the local funeral directors a copy of the department’s funeral procedures. This will allow them to understand local protocols before a line-of-duty death occurs.
- 2.6 Ceremonial Clothing and Equipment - The department should have the following available for use during fire department funerals:
- a. Badge and name tag presentation frame
  - b. An extra badge for each rank in the department as well as the name of a source for obtaining a duplicate name tag on an emergency basis
  - c. Presentation flags (U.S., state, municipality, fire department)
  - d. White gloves in sufficient numbers for the Honor Guard and eight pallbearers
- 2.7 Key Positions - The department should maintain and annually update a list of personnel selected to serve in the following key positions:
- a. Survivor Action Officer
  - b. Notification Officer
  - c. Family Liaison Officer
  - d. Hospital Liaison Officer
  - e. Funeral or Memorial Service Officer
  - f. Procession Officer
  - g. Service Officer
  - h. Final Committal Officer
- Personnel selected to serve should receive a manual and training on the responsibilities of key positions. The manual should contain copies of fire department procedures relating to funerals or memorial services.
- 2.8 Honor Guard and Color Guard - The department should encourage personnel to participate in a department Honor Guard and Color Guard that will function during fire department funerals and at other appropriate times. If possible, the

department should provide the following:

- a. Class A ("dress") uniforms with cap, white shirt, black tie, and white ascot, for all members
- b. White gloves for all members
- c. White shoulder braiding for all members
- d. Patent leather low-quarter shoes for all members
- e. Parade flags (U.S., state, municipality and fire department) with holders
- f. Two display axes with chrome or brass heads

Career departments should establish an official leave policy to allow members to provide these services.





**Section 3: FUNERAL TYPES**

The death of a firefighter may occur under a variety of circumstances. Based on the circumstances, the department should provide appropriate services from the planning of the funeral through the survivor follow-up process. To ensure all fallen firefighters are honored in a consistent manner, the department should adopt a policy on the types of services it will provide. The following policy is an example of what one state has adopted.

**3.1 Definitions**

- a. Line-of-duty: The death must be the result of a traumatic injury suffered in the line of duty.
- b. Job-related traumatic injury: A blow to the body by an outside force, e.g., crushing injuries suffered in a building collapse, apparatus accident or fall. Burns, smoke inhalation and such climactic injuries as heatstroke or frostbite are considered traumatic injuries.
- c. Job-related non-traumatic injury: A non-traumatic injury that is strongly believed or has been proven to be attributable to the job. Examples are stress, heart attacks, strokes, diseases and mental illness (suicide).
- d. Active member: A full-time or volunteer member of a fire or emergency medical service agency serving in an active capacity.
- e. Inactive member: A retired or former member of a fire or emergency medical service agency.
- f. Affiliate member: An individual who has served in some capacity with the department, such as a commissioner, trustee, dispatcher, etc.
- g. Non-job-related death: Deaths, natural and traumatic, that are not related to fire or emergency medical service duty.

**3.2 Types of Services**

- a. Level One: A line-of-duty or job-related death. This may include an inactive member whose death has stemmed from an injury sustained during active duty.
- b. Level Two: A non-job-related death of an active member.
- c. Level Three: A non-job-related death of an inactive or affiliate member.

### 3.3 SUGGESTED FUNERAL SERVICE OPTIONS

Level One	Level Two	Level Three
American Flag	American Flag	American Flag
Badge shrouds	Badge shrouds	Badge shrouds
Bagpipers		
Bell service	Bell service	Bell service
Bugler		
Color Guard		
Crossed ladders		
Eulogy	Eulogy	
Fire engine caisson	Hearse	Hearse
Fire service flag	Fire service flag	Fire service flag
Flower unit	Flower unit	
Honor Guard	Honor Guard	Honor Guard
Honor detail	Honor detail	
Pallbearers, active	Pallbearers, honorary	Pallbearers, honorary
Station bunting	Station bunting	Station bunting
Vehicle bunting	Vehicle bunting	
Walkthrough	Walkthrough	Walkthrough

**Section 4: FUNERAL OR MEMORIAL SERVICE PLANNING CONSIDERATIONS**

There are many ways for the department to offer help for the funeral or memorial service. Some families will welcome all offers of help, while others may choose to have no departmental involvement. The family must always be allowed to make that choice.

4.1 Honor Guard – If the family requests an Honor Guard, the Funeral Officer should coordinate with Honor Guard personnel to schedule Honor Guard activities according to the family's and funeral director's wishes. The following basic rules apply to these activities:

- a. Two Honor Guard members should be posted at the casket. During viewing hours, they should be posted at the head and at the foot.
- b. There should be a minimum of four Honor Guard members for each set of viewing hours.
- c. Honor Guard members should rotate at 15-minute intervals. Relief guards should march up together. Posted guards should come to attention and smartly make the transfer and then march off together.
- d. Posted Honor Guard should assume the position of parade rest.
- e. American and department flags (or a state flag, if there is no departmental flag) should be posted at the casket.
- f. Honor Guard members should wear Class A uniform, if available, with white gloves. They should use black mourning bands over uniform badges. If a department does not have Class A uniforms, dress uniforms are an acceptable option.

4.2 Pallbearers - Should the family choose to use department members as pallbearers, it is the Family Liaison Officer's responsibility to ask which firefighters the family would like to use. There should be between six and eight pallbearers. They should wear Class A uniforms with hats and white gloves.

- a. Due to their specific responsibilities, pallbearers are exempt from following the majority of orders given to the remainder of the formation.
- b. The Funeral Officer, assisted by the Funeral Director, should give instructions on removing, handling, and transporting the casket.

If a fire engine serves as a caisson, pallbearers should hold a practice session the day before the funeral. If this is not possible, pallbearers should report to the funeral home several hours before the beginning of the service for a protocol briefing and practice.

- c. If the casket is draped with a flag to present to the next of kin, three pallbearers will be instructed on the proper method of removing, folding, and presenting the flag. Two pallbearers will fold the flag and present it to the third pallbearer who, in turn, will present it to the next of kin. The Final Committal Officer will coordinate the flag folding. Flag folding instructions appear in *Appendix 8*.

If the casket is not draped with a flag, the department can present a pre-folded flag to the next of kin.

- d. If fire department engines serve as caisson and flower vehicle, pallbearers should ride on them. If engines are not used, the department will provide the pallbearers other department vehicles for the procession.

#### 4.3 Transportation

- a. The department should offer a fire department vehicle and driver to the immediate family during the viewing and funeral period. The Family Liaison Officer normally arranges for this service.
- b. The department should ensure that the next of kin have limousine service available on the day of the funeral.

#### 4.4 Meals – The department should plan to provide meals for the deceased firefighter's family at least until after the funeral. Friends of the family and members of the department and auxiliaries may help provide these meals. The Survivor Action Officer, in conjunction with the Family Liaison Officer, will determine the need and coordinate providing the meals.

#### 4.5 Family Liaison Officer - Regardless of the circumstances surrounding the death, or the deceased firefighter's status in the department, a Family Liaison Officer should be assigned to make contact with the family. The officer will determine the amount of involvement the family wants from the department. The officer will provide this information to the Survivor Action Officer. The Family Liaison Officer will assist the family throughout the process.

#### 4.6 Initial Family Support - The department will determine this based on the family requests as relayed by the Family Liaison Officer. The department should assign appropriate key personnel as the needs arise. **The department should not act on assumptions without contacting and getting the consent of the immediate family.**

#### 4.7 Fire Department Chaplain - The amount of involvement the chaplain has will be determined by the family. One option is a shared responsibility between the family's clergy and the department chaplain. Should the department chaplain be

requested, the following are areas of responsibility:

- a. Comfort and support for family members
- b. Prayer services at the funeral home
- c. Church services
- d. Final committal
- e. Follow-up support for the family
- f. Departmental or community memorial services

4.8 Procession - The family may request a procession from the funeral home or church to the place of final committal. The procession involves staging vehicles at the funeral home or church prior to the funeral, directing vehicles as they leave for the place of final committal, and staging of vehicles upon arrival there. Specific considerations include:

- a. Department vehicles used as caisson, flower car, and for transportation
- b. Coordination with the funeral director to determine the procession route, including a drive by the deceased firefighter's fire station or home. If the procession passes the fire station, apparatus should be parked on the apron. Firefighters on duty should assemble outside, come to attention as the procession passes, and toll a muffled bell as the caisson or hearse passes.
- c. Static displays of apparatus along the procession route
- d. Crossed ladders or aerial equipment at the funeral home, church, or place of final committal entrance

4.9 Caisson - A fire department engine may be appropriate as a caisson to carry the casket. If an engine is used, personnel must take it out of service for a period of time and prepare it as follows:

- a. Thoroughly wash and wax the engine.
- b. Remove hoses and dividers.
- c. Add available mourning flags or bunting.

The operator of the engine should be in dress uniform.

In the event of inclement weather, an enclosed hearse should carry the casket and the apparatus should serve as a flower car.

- 4.10 Flower Car - A fire department engine may also serve as a flower vehicle. If so, personnel must take it out of service and prepare it as indicated above for a caisson. Hoses and dividers need not be removed.
- 4.11 Formations - Special formations may be appropriate at the following points:
- a. Walkthrough of all attending firefighters at the funeral home or church
  - b. Honor Guard formations on either side of the casket's path from the funeral home to the hearse or caisson
  - c. Honor Guard formations on either side of the casket path during entry to and exit from the church
  - d. Honor Guard formations on either side of the casket path from the hearse or caisson to the place of final committal.
- 4.12 Taps - Taps may be sounded by one or more buglers at the place of final committal. The location of the bugler should be approximately 75 feet from the final committal site.
- 4.13 Firing Party - A military-type firing party may be used at the final committal. If so, the party will fire three volleys 75 feet from the final committal site.
- This type of salute may startle people at the service, especially in times of heightened national security. The family should be aware of this.
- 4.14 Musical Selections
- a. A band, a piper, an organist, a choir or soloists may play or sing during various funeral ceremonies.
  - b. The Family Liaison officer should discuss this option with the family and communicate its wishes to the Funeral Officer.
- 4.15 Last Alarm Service - A traditional bell-ringing ceremony at the end of the church service or committal service usually signifies the firefighter's last alarm. A short reading accompanies the ringing of the bell. (*See Appendix 9*)
- 4.16 Readings - Numerous scripture passages and fire-service-related readings are appropriate during the funeral services. The Family Liaison Officer will work with the family to determine if they would like any readings and who should read

them.

- 4.17 Eulogy - A eulogy may be appropriate at any point in the funeral ceremonies. The family should decide who will deliver the eulogy and when it is fitting. The Fire Chief, a clergy member, the department chaplain, or a close family friend from the fire department may be asked to perform this task. The Family Liaison Officer will make the necessary contacts and advise the Funeral Officer. ***(See Appendix 2 for information on how to prepare a fire service eulogy.)***
- 4.18 Crossed Aerial Ladders - If the family wishes to have the crossed aerial ladders at the entrance to the final committal site, the Family Liaison Officer will forward this request to the Survivor Action Officer for approval and coordination.
- 4.19 Static Equipment Display - During the processions, the family may choose to have a static display of department apparatus and crews at attention and saluting the passing casket and family vehicle. This final tribute may be set up at the funeral home or church, at key locations along the procession route, at a fire station on the procession route, or at the place of final committal entrance. The Family Liaison Officer will communicate this request to the Survivor Action Officer.
- 4.20 Burial In Uniform - If the family chooses to bury the deceased firefighter in the departmental uniform, the Family Liaison Officer will deliver the uniform to the Funeral Officer or funeral director. If the family selects non-departmental clothing, the Family Liaison Officer should deliver this.
- 4.21 Presentation of Fire Department Badge - As a part of the funeral service at the funeral home or church, the Fire Chief may present the badge and name tag worn by the deceased firefighter to the next of kin. The items should be in a framed display containing a department uniform patch. Administrative and support personnel will work with the Fire Chief to obtain the badge and name tag actually worn by the firefighter and to obtain duplicates to be placed on the burial uniform.
- 4.22 Closed Casket - If the family requests a closed casket, the family may wish to place a picture of the firefighter in uniform along with the firefighter's dress hat on top of or next to the casket.
- 4.23 Walkthrough - A walkthrough of firefighters at the funeral home may occur to pay tribute to the deceased firefighter. If so, the Funeral Officer will schedule the walkthrough and have firefighters form line by department. The formation will pass single file by the casket with each firefighter stopping briefly to pay tribute.
- 4.24 Post-services Reception - A reception may be held following the funeral. A church hall, school cafeteria, fire station, or other facility may serve for this purpose. The Survivor Action Officer will coordinate the event and ask department members, the firefighters association, or local service organizations to



assist in donating and/or preparing food.

- 4.25 Memorial Fund - Fire department members and local organizations may want to start a memorial fund for the deceased firefighter's family. The Survivor Action Officer should work with local financial organizations in establishing this fund. The family should be involved in deciding how this will occur. The officer will emphasize to the family the importance of working with a local bank to avoid legal complications.
- 4.26 Flags at Half-staff - Upon notification that a fire department member has died, the Fire Chief will direct that all station flags be lowered to half-staff. They will remain at half-staff until 1700 hours the day of the final committal. When the American flag is at half-staff, no other flags will fly on the same pole.

For line-of-duty deaths, the Fire Chief will request that the local officials ask other facilities to fly their flags at half-staff.

- 4.27 Badge Shrouding - The shroud should appear on badges at the time of notification of the death and should remain on the badge until after the funeral and final committal. For line-of-duty deaths, the badge shrouds will remain in place for a 30-day mourning period.

To shroud of a badge, place a 1/2" to 3/4" piece of black material horizontally around the badge at its midpoint.

If the chaplain's badge contains a cross, a crescent, tablets, or the Star of David, the chaplain's badge remains uncovered.

- 4.28 Flag Presentation - When the casket is draped with a flag, an appropriate flag presentation ceremony should take place immediately before the conclusion of the committal service.

## **Section 5: KEY ASSIGNMENTS FOR FIRE DEPARTMENT FUNERALS**

- 5.1 When a firefighter dies, the department must focus on the family's needs and wishes and give them the highest priority. The support offered by the department will vary depending on the type of death, as described previously in Section 4.

To support the family, a department must be prepared to manage a series of inter-related responsibilities. These duties extend from initial notification of next of kin through continuing support after the final committal service.

A department should have a funeral plan that will enable it to staff the needed assignments should a death occur. The department should identify and train personnel to handle these assignments.

Depending on the size of the department, it may need to combine many of the following major assignments.

### **5.2 Survivor Action Officer**

The Fire Chief may assume the position of Survivor Action Officer but will probably assign another senior officer this function. As a direct representative of the Fire Chief, the Survivor Action Officer should receive the full cooperation of the entire fire department.

The officer is responsible for managing several important activities, the principal concern being the ongoing welfare of the next of kin. The officer will give whatever assistance is necessary to assist the family.

The Survivor Action Officer may appoint the following positions as needed and delegate responsibilities as required to successfully complete all assigned duties.

The detailed Responsibility Sheets for all officers are in the section following the appendices.

### **5.3 Notification Officer**

The Federation of Fire Chaplains provides comprehensive information on how to make notifications as part of its Chaplaincy training resources.

### **5.4 Family Liaison Officer**

The Family Liaison Officer provides the Survivor Action Officer with regular updates on the family's status and needs.

Because of the critical nature of the liaison's role and the around-the-clock

coverage required, a department should appoint a back-up liaison to provide relief as needed.

**All officers must work closely with the Family Liaison Officer to ensure that the family understands their options and that their wishes are honored.**

5.5 Funeral Officer

The Funeral Officer's role is to serve as intermediary between the funeral director and the other fire department personnel involved in funeral or memorial service activities.

**This officer is not a funeral director and should not interfere in funeral management.**

5.6 Procession Officer

The Procession Officer arranges and directs the funeral procession from the funeral home to the church, if there is a church service, and to the final committal site.

5.7 Service Officer

If the family has decided to have a religious service, the Service Officer coordinates with clergy selected by the family.

5.8 Final Committal Service Officer

The Final Committal Service Officer provides coordinates all the individuals responsible for the final committal service.

**Section 6: OTHER CONSIDERATIONS**

- 6.1 Inclement weather may impact upon funeral services. If severe weather conditions are anticipated, personnel involved in coordinating the funeral services should work with the Survivor Action Officer and Family Liaison Officer to implement alternative plans.
- 6.2 If services will occur outside the local area, the department should coordinate all planning steps with officials and agencies in that location. If possible, representatives from fire and police departments in all the communities involved should participate in the planning.
- 6.3 For a line-of-duty death, a large contingent of out-of-town fire service personnel will want to attend the funeral. If there will be a procession from the funeral home to the church, ask these firefighters to report directly to the church for staging prior to the start of the procession from the funeral home.
- 6.4 All firefighters and apparatus may take part in the procession from the funeral or memorial site to the place of final committal. If there will be a procession of firefighters marching to the church, only members from the fallen firefighter's department should participate.



**Section 7: CEREMONIES**

- 7.1 If the family requests, the following personnel may take part in the ceremonial portion of the funeral:
- a. A Chief
  - b. Six or eight pallbearers
  - c. A Color Guard of four firefighters and one officer
  - d. A bugler and piper, pipe band, or drummer
- 7.2 Due to the important role of pallbearers and Color Guard, a practice session should occur the day before the funeral. If not possible, these personnel must report to the funeral home several hours before the service for a protocol briefing and practice. The funeral director will instruct the pallbearers on how to handle the casket.
- 7.3 If the procession will include firefighters marching from one point to another, the Procession Officer must coordinate with the Funeral Officer, Service Officer, or Final Committal Officer to establish an assembly point, order of alignment, and route for the march. If marching will occur, a drummer should be part of the parade contingent to provide a steady cadence. Cadence should **not** be called verbally. Determine an appropriate assembly point for department personnel participating in the march. Visiting fire personnel will assemble at the end point of the march.
- a. Basic alignment for the elements of a march is:
    1. Color Guard
    2. Pipe band/drummer
    3. Host fire department members
    4. Apparatus caisson or hearse
      - (a) The Officer-in-Charge (OIC) will walk immediately in front of the caisson or hearse.
      - (b) Three pallbearers will march on either side of the caisson or hearse.
      - (c) Two pallbearers will ride on the tailboard of the caisson or walk immediately behind the hearse. If there are only six

pallbearers, two Honor Guard members will assume this position.

*Note: Check to see if this practice is allowed in your jurisdiction.*

5. Family's cars

6. Friends' cars

Note: If the immediate family of the deceased firefighter desires to join in the march, they will fall in immediately behind the caisson or hearse and will receive an Honor Guard escort.

b. If the casket will be driven from the funeral home to the church, the following should occur:

1. Determine an assembly point several blocks from the church for department personnel and the pipe band/drummer.

2. Assign an assembly point for visiting fire department members at the church on the church side of the street.

3. Immediately after loading the casket at the funeral home, transport the Color Guard to the fire department meeting location.

4. Have the pallbearers board the apparatus, with two of them remaining on the rear step.

*Note: Check to see if this practice is allowed in your jurisdiction.*

5. With a police escort, have the apparatus proceed slowly to the meeting point with the fire department contingent.

6. Line up the procession in the same order as listed above.

7. Direct the pallbearers to dismount and march as follows:

(a) The OIC in front of the apparatus

(b) Two or three pallbearers on each side of the apparatus

(c) Two pallbearers on the rear step

*Note: Check to see if this practice is allowed in your jurisdiction.*

c. When the procession arrives, the following should occur:

1. As the procession nears the location of the service, move the Color Guard to the side and allow the pipe band/drummer and fire department members to pass.
2. Near the entrance to the service area, assemble the pipe band.
3. Line up the national, state and local dignitaries near the entrance, leaving room for the Color Guard.
4. When marching fire department members arrive at the location of the service, move them to the other side of the street. When they are in place, give the command "**Right face.**"
5. When personnel line the street on both sides and face the center, begin the Color Guard march toward the service site followed by the apparatus or hearse. Leave a space between the Color Guard and hearse. The service assembly OIC commands "**Present arms**" (hand salute).
6. As the Color Guard arrives, assemble it near the front of the church.
7. Move the apparatus to the front of the service site and shut off the engine.
8. Have the service assembly OIC command "**Order arms.**"
9. Assemble pallbearers at the rear of the apparatus, with two in the hose bed, and prepare to remove the casket.
10. Have the Honor Guard OIC command "**Present arms.**"
11. Have the pipe band play as the pallbearers carry the casket to the entrance. If the chaplain or cleric performs a blessing at the rear of the apparatus, the pipe band should delay playing until the pallbearers begin to move.
12. Have the pallbearers escort the casket to the front of the service area.
13. Have the assembled fire department personnel file into the area and take positions in the designated seating areas.

7.4 At the close of the service, the following should take place:



- a. Fire personnel file out and assemble in specified areas in the following order:
    1. Visiting fire service personnel
    2. Department personnel
    3. National, state and local dignitaries
    4. Color Guard
  - b. At the funeral director's signal, the pallbearers move to the front of the location of the service and escort the coffin to the rear.
  - c. The service assembly OIC commands "**Detail, attention.**"
  - d. When the casket arrives at the rear, the OIC commands "**Present arms.**"
  - e. If used, the piper/pipe band plays.
  - f. The pallbearers move slowly to the rear of the hearse or apparatus to load the casket.
  - g. After loading, the pallbearers face each other and the OIC commands "**Detail, present arms.**" The pallbearers give a hand salute.
  - h. The OIC commands "**Order arms**" for all personnel.
  - i. The Color Guard officer commands "**Color Guard, dismissed.**"
  - j. The OIC commands "**Detail, dismissed**" to the pallbearers.
  - k. The Color Guard, bugler/piper, and OIC enter the waiting fire department vehicles for transportation to the place of final committal. The pallbearers will ride on the caisson or other apparatus directly behind the caisson.
  - l. Fire personnel and national, state and local dignitaries prepare to leave for the place of final committal.
  - m. The Procession Officer and assistants direct vehicles taking part in the procession to the place of final committal.
- 7.5 Upon arrival at the place of final committal, the following will take place:
- a. The fire department personnel and Color Guard take up positions in formations as determined by the Final Committal Officer.

- b. If space permits, the Color Guard assembles near the place of final committal.
- c. The bugler is 75 feet away from the grave and will await the command from the OIC.
- d. When the caisson or hearse is in position, the pallbearers take up positions at the rear and remove the casket.
- e. The pallbearers carry the casket and place it on the grave stand. The family and other guests follow.
- f. As the pallbearers begin to move the casket, the OIC commands "**Detail, attention**" and all fire department personnel come to attention. When the pallbearers place the casket on the gravestand, the OIC commands "**Parade rest.**"
- g. If the family wants the casket draped, two pallbearers will drape it with an American flag. If the casket is not draped, an already folded flag will be placed on the casket for presentation.
- h. The chaplain and/or cleric will conduct the committal service and lead in the final prayer.

Note: If not part of the funeral or religious service, the "Last Alarm" ceremony may occur at this point. The OIC orders "**Present arms**" prior to the ringing of the bell. The hand salute should occur during the playing of Taps.

- i. The OIC next commands "**Detail, attention**" and "**Present arms.**" A hand salute follows; the Color Guard presents arms and dips the departmental flag. The hand salute occurs during the playing of Taps.
- j. The bugler plays Taps.
- k. The OIC commands "**Order arms.**"
- l. At the conclusion of Taps, the Honor Guard removes the American flag from the casket and folds it. The Honor Guard Officer presents the folded flag to the fire chief who, in turn, presents it to the family.
- m. The funeral director gives words of thanks on behalf of the family and indicates the conclusion of the services.
- n. The OIC commands "**Detail, dismissed.**"



## APPENDIX 1

### EMPLOYEE EMERGENCY CONTACT INFORMATION

The information that you provide will be used **ONLY** in the event of your serious injury or death in the line of duty. Please take the time to fill it out fully and accurately because the data will help the department take care of your family and friends.

#### PERSONAL INFORMATION

Last Name	First Name	Middle Name
<b>Home Address</b>		
<b>City</b>	<b>State</b>	<b>Zip</b>
<b>Phone Number</b>		
(    )		

#### CONTACT INFORMATION

Family or friends you would like the department to contact. Please list in the order you want them contacted. If needed, provide additional names on the back of this sheet.

**NOTE: If the contact is a minor child, please indicate the name of the adult to contact.**

<b>Name</b>
<b>Relationship</b>
<b>Home Contact Information</b>
Address:
Phone:
<b>Work Contact Information</b>
Name of Employer:
Address:
Phone:
Pager/Cell phone:
<b>Special Circumstances – such as health conditions or need for an interpreter</b>

<b>Name</b>
<b>Relationship</b>
<b>Home Contact Information</b>
Address:
Phone:

<b>Work Contact Information</b>
Name of Employer:
Address:
Phone:
Pager/Cell phone:
<b>Special Circumstances – such as health conditions or need for an interpreter</b>

<b>List names and dates of birth of all of your children.</b>	
Name:	DOB:
Name:	DOB:
Name:	DOB:

<b>List the department member(s) you would like to accompany a chief fire officer to make the notification.</b>
Name:
Name:

<b>List anyone else you want to help make the notification. (for example, your minister)</b>
Name:
Relationship:
Home Contact Information
Address:
Phone:
Work Contact Information
Name of Employer:
Address:
Phone:
Pager/Cellphone:

## **OPTIONAL INFORMATION**

Make sure someone close to you knows this information.

Religious Preferences		
Religion:		
Place of Worship:		
Address:		
Funeral Preferences		
Are you a veteran of the U. S. Armed Services?	yes	no
If you are entitled to a military funeral, do you wish to have one?	yes	no
Do you wish to have a fire service funeral?	yes	no
Please list your membership in fire service, religious, or community organizations that may provide assistance to your family:		

Do you have a will? <span style="float: right;">yes                      no</span>		
<i>If yes, where is it located or who should be contacted about it?</i> _____		
List all life insurance policies you have:		
<u>Company</u>	<u>Policy Number</u>	<u>Location of Policy</u>
Is all information current? (beneficiary names, contact info, etc. This information may determine who gets Federal benefits.)		
<b>Special Requests</b>		
If you are an organ donor, coordination with the medical officials will be necessary. List any requests in this section.		

1/03

*Form last updated on* \_\_\_\_\_

Reprinted from the National Fallen Firefighters Foundation's *Taking Care of Our Own®* materials.



## **APPENDIX 2**

### **SUGGESTIONS ON PREPARING A FIRE SERVICE EULOGY**

For years, members of the fire service have told the National Fallen Firefighters Foundation that preparing a eulogy was one of the most difficult things they had ever done. They wanted their remarks to be both comforting and respectful.

A eulogy is for the living, most importantly for family and close friends. So we have turned to survivors and friends of fallen firefighters to share what meant the most to them. We also have asked senior fire officers what worked best in their preparation and delivery.

If you asked to deliver a eulogy for a fallen firefighter from your department, here are a few guidelines that may help you gather your thoughts and prepare a fitting tribute.

#### **Research**

- Get the key facts—age, nickname, names of family members and closest friends, timeline of key events in the person’s life, personal and professional accomplishments, honors and awards received
- Ask friends and family members for stories that illustrate how they want to remember their loved one. If you use one of these stories, remember to acknowledge the source. For example, “Jim’s daughters told me...” or “Ann’s father reminded me that ...”
- Include information about the firefighter’s character and personality. What was the firefighter proudest of in his or her life? For what would he or she want to be remembered?
- If you knew the firefighter, include personal anecdotes and memories.
- If you did not know the firefighter personally, say that! Speak with people who did, especially those who shared years of friendship and memories.

#### **Organize**

- You may want to use a theme to tie your presentation together. For example, “Jack loved adventure,” or, “In everything he did, Don reached out to help other people.”
- It may help to put your ideas on note cards and then arrange them in a logical order for your presentation

#### **Draft**

- Begin by expressing your condolences and the department’s sense of loss.
- Acknowledge family members, including spouse or significant other, children, parents, siblings, and close friends.
- Focus on the person’s life, not the circumstances that lead to the death.
- Include funny stories. Even in the midst of deep grief, it is important to smile. And remember to mention the source of the story, if appropriate.
- Include a statement of support from the department. Acknowledge the department member who is acting as the liaison for the family. The department must follow through on any promised support, so only promise what you can ensure will be delivered.



- Have a printed copy of the final eulogy ready for the family and others who may want a copy.

### **Practice**

- Review your remarks carefully before the service. If you are nervous about speaking in front of other people, practice speaking in front of someone you trust to give you honest, supportive feedback.
- It is okay to show emotion!
- Have a back-up plan so someone else can take over if you cannot finish speaking.
- Be prepared to adjust your planned remarks. Before you speak, another person may use some of the same stories or information. Acknowledge this or have other stories ready.
- Above all, remember not everyone is a great orator. However, families will remember the sincerity of your words and your kindness forever.

### **Reference Materials**

These resources may also help you in writing and delivering a eulogy.

**Funerals with Love** [link to: [www.funeralswithlove.com/eulogy.htm](http://www.funeralswithlove.com/eulogy.htm)]

Suggestions for structuring, writing, and delivering a eulogy; a downloadable book is available for a fee

**Grief Loss & Recovery** [link to: [www.grieflossrecovery.com/grief-articles/martin01.html](http://www.grieflossrecovery.com/grief-articles/martin01.html)]

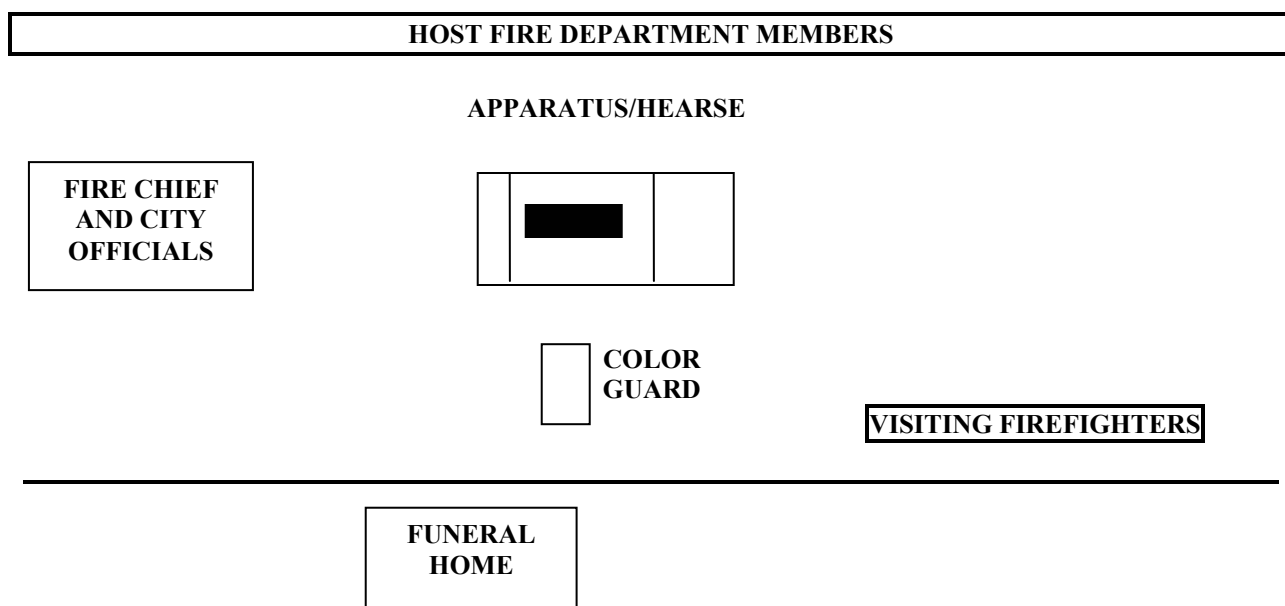
Brief step-by-step guideline to writing a eulogy

*Prepared by the National Fallen Firefighters Foundation*

*5/03*

## APPENDIX 3

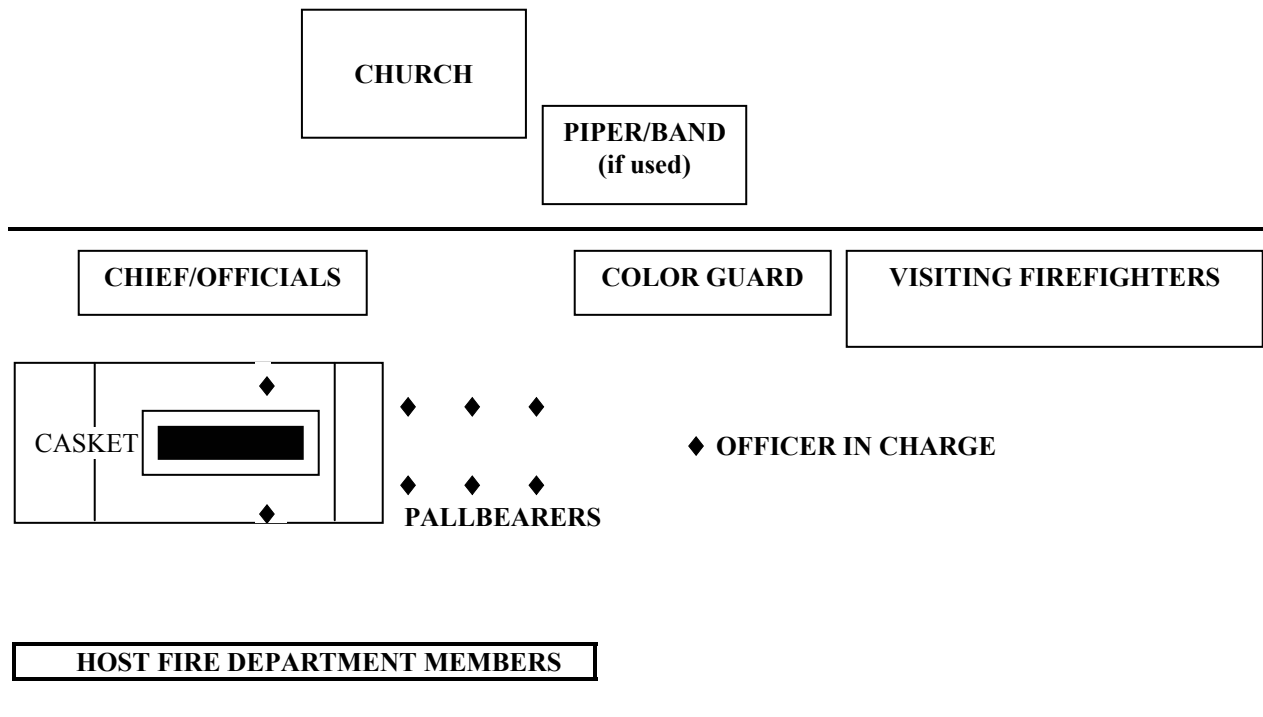
### SUGGESTED FUNERAL HOME FORMATIONS





## APPENDIX 4

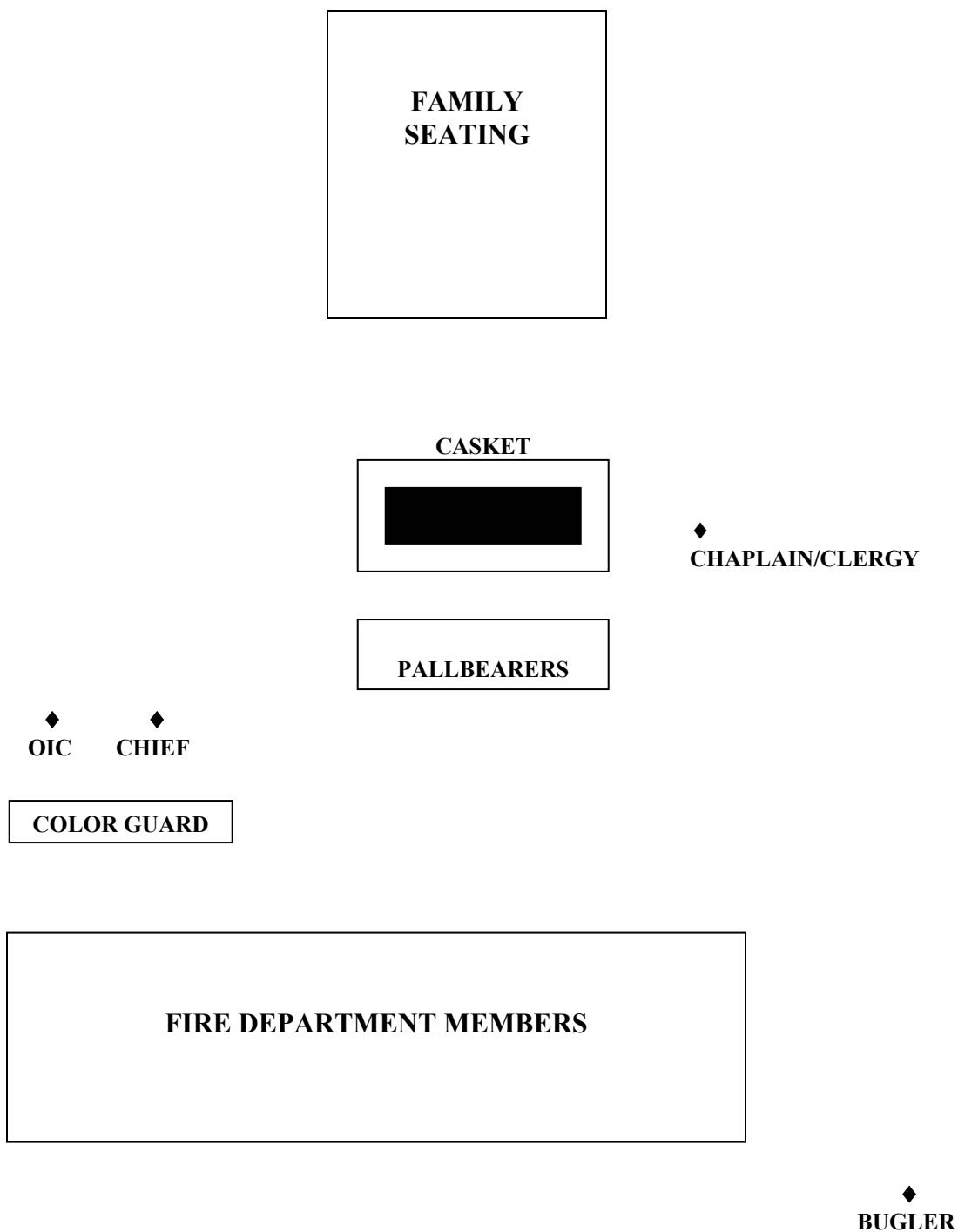
### SUGGESTED CHURCH FORMATIONS





## APPENDIX 5

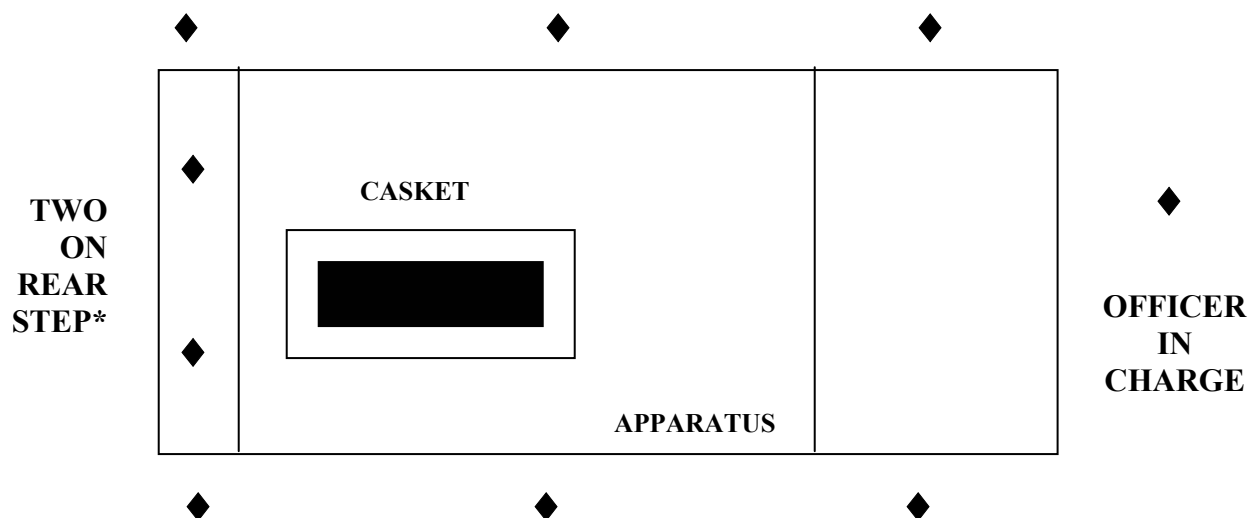
### SUGGESTED FINAL COMMITTAL SERVICE FORMATIONS





## APPENDIX 6

### PALLBEARERS' LOCATION WHEN MARCHING



*\*Note: Check to see if this practice is allowed in your jurisdiction.*





## APPENDIX 7

### MILITARY STANDARDS

#### POSITION OF ATTENTION

Assume the position of “Attention” on the command of “**Attention.**”

To assume this position, bring the heels together smartly so that the heels are on the same line with the toes pointing out equally, forming an angle of 45 degrees. Keep the legs straight without locking the knees. Hold the body erect with the hips level, chest lifted and arched, and the shoulders square and even.

Let the arms hang straight, without stiffness, along the sides with the back of the hands outward. Curl the fingers so that the tips of the thumb are alongside and touching the first joint of the forefingers. Keep the thumbs straight and along the seams of the trousers with all fingertips touching the trouser leg.

Keep the head erect and hold it squarely to the front with the chin drawn slightly in so that the axis of the head and neck is vertical. Look straight to the front.

Rest the weight of the body equally on the heels and balls of the feet. Remain silent except when replying to a question or when directed otherwise.

#### POSITION OF PARADE REST

Parade rest is commanded from the position of “Attention” only. The command for this movement is “**Parade, Rest.**”

On the command of execution “**Rest,**” move the left foot ten inches to the left of the right foot. Keep the legs straight, resting the weight of the body equally on the heels and balls of both feet. Simultaneously place the hands at the small of the back, centered on the belt line. Keep the fingers of both hands extended and joined, interlocking the thumbs so that the palm of the right hand is outward.

Hold the head and eyes as at the position of “**Attention.**” Remain silent and do not move.

“**Stand at, Ease,**” “**At Ease,**” or “**Rest**” may be commanded from this position.

#### STAND AT EASE

The command for this movement is “**Stand At, Ease.**” On the command of execution “**Ease,**” execute “**Parade, Rest**” but turn the head and eyes directly toward the officer in charge. “**At Ease**” or “**Rest**” may be commanded from this position.

### **AT EASE**

The command for this movement is “**At Ease.**” On the command “**At Ease,**” movement is allowed but personnel must remain standing and silent with the right foot in place. “**Rest**” may be commanded from this position.

### **REST**

The command for this movement is “**Rest.**” On the command “**Rest,**” **NO** talking, smoking, or drinking are allowed unless otherwise specified. Personnel must remain standing with the right foot in place. “**At Ease**” may be commanded from this position.

### **HAND SALUTE**

The hand salute is a one-count movement. The command is “**Present, Arms.**” On the command of execution (“**Arms**”), raise the right hand to the head dress. With the tip of the forefinger touch the rim of the visor slightly to the right of the right eye. The fingers and thumb are extended and joined, palm down. The outer edge of the hand is barely canted downward so that neither the palm nor the back of the hand is visible from the front. The upper arm is horizontal with the elbow inclined slightly forward and the hand and wrist straight.

Order arms from this salute in a one-count movement. The command is “**Order, Arms.**” On the command of execution “**Arms,**” return the hand smartly to the side, resuming the position of attention.

When uncovered or when wearing a head dress without a visor, the hand salute is executed in the same manner as previously described, except the tip of the forefinger touches the forehead near the eyebrow and slightly to the right of the right eye.

**APPENDIX 8****TRADITIONAL METHOD FOR FOLDING  
THE FLAG OF THE UNITED STATES**

Hold the flag flat with one person holding each end of the flag.

- (A) Fold the flag lengthwise once.

Fold the lower striped section  
of the flag over the blue field.



A)

- (B) Fold the folded edge over  
to meet the open edge.



B)

- (C) Start a triangular fold by bringing  
the striped corner of the folded  
edge to the open edge.



C)

- (D) Fold the outer point inward parallel  
with the open edge to form a second  
triangle.



D)

Continue folding until the entire  
length of the flag is folded  
into a triangle with only the  
blue field and margin showing.

Tuck the remaining margin into the  
pocket formed by the folds at the  
blue field edge of the flag.



E)

- (E) When properly folded, the flag should  
resemble a three cornered (cocked) hat.





## APPENDIX 9

### SUGGESTED “LAST ALARM” CEREMONY

The chaplain or a department member reads the following:

Throughout most of history, the lives of firefighters have been closely associated with the ringing of a bell. As they began their hours of duty, it was the bell that started it off. Through the day and night, each alarm was sounded by a bell, that called them to fight fire and to place their lives in jeopardy for the good of their fellow man. And when the fire was out, and the alarm had come to an end, the bell rang three times to signal the end.

And now our Brother (Sister) \_\_\_\_\_ has completed his (her) task, his (her) duties well done, and the bell rings three times in memory of, and, in tribute to, his (her) life and service.

The Officer-in-Charge calls everyone to Attention.

The Color Guard is called to Present Arms.

The bell is struck three times.

The Color Guard is called to Order Arms.

The firefighters are seated (if in church or funeral home).

The chaplain offers a closing prayer.



## APPENDIX 10

### SAMPLE ORDER OF EVENTS

Funeral Service for Firefighter John Doe  
Sample Fire Department

October 1, 2003

1:00 p.m.	Arrival of hearse at church  Honor Guard Posted Color Guard Posted
1:30-2:00 p.m.	Arrival of guests, fire personnel, and fire apparatus  Fire personnel placed in formations Explanation of commands to be given Attention Present Arms Order Arms
2:00-2:15 p.m.	Arrival of family and processional  Pallbearers remove the casket Procession enters the church Minister Color Guard Pallbearers and casket Honorary pallbearers Family and friends Department members Members of other fire departments
2:15-3:00p.m.	Funeral service (options)  Music Remembrances Readings Eulogy Sermon Presentation of badge Walk-by of fire personnel Benediction



3:00-3:15 p.m.	Funeral recession  Minister Color Guard Pallbearers and casket Honorary pallbearers Family and friends Department members Members of other fire departments
3:15-4:00 p.m.	Procession to place of final committal (Order of vehicles)  Lead escort Host department engine Hearse (It may be the same if an apparatus serves as caisson) Family limousines Pallbearers' vehicle Honorary pallbearers' vehicle Honor Guard vehicle Host department Chief's vehicle Other host department vehicles Police vehicles Local officials' vehicles Vehicles from other fire departments Vehicles from other emergency service departments Vehicles of friends or other private Vehicles Rear escort
4:00-4:15 p.m.	Graveside processional*  Color Guard Members of host department Members of other fire departments Honorary pallbearers Minister Pallbearers and casket Family Friends
4:15-4:45 p.m.	Graveside service options*  Opening prayer Words to the family Final prayer Last Alarm ceremony

Taps  
Presentation of the flag  
Benediction  
Dismissal

4:45 p.m. Graveside recessional\*

Color Guard  
Members of host department  
Members of other fire departments  
Honorary pallbearers  
Minister  
Pallbearers and casket  
Family  
Friends

\*The family may choose to have the body or ashes placed in a crypt. In this case, the same protocols apply. However, the Final Committal Service Officer should modify them appropriately to fit the specific circumstances.



## APPENDIX 11

### HANDLING DIGNITARIES AT FIRE DEPARTMENT FUNERALS

When a firefighter dies in the line of duty, many elected officials and fire service leaders show their respect by attending the funeral or memorial service. While the family of the fallen hero should always command the most attention, departments should also be prepared to handle dignitaries who plan to attend.

Most departments understand that their local elected officials will attend the ceremony honoring a local firefighter. Senior elected officials may even have a role in the fire department funeral. Since the World Trade Center disaster, more state, national, and international officials have attended fire service funerals, especially those that involved multiple fatalities or received special attention.

Departments should be prepared to handle attendance by the following dignitaries:

#### **Federal Officials**

- President or Vice President
- Cabinet Members, including Secretary of Homeland Security
- Members of Congress
- FEMA Director
- United States Fire Administrator
- Other Federal agency officials, including U.S. Forest Service and Department of Interior officials, may attend a wildland firefighter's ceremony

#### **State and Local Government Officials**

- Governor or Lieutenant Governor
- State Legislators
- State Fire Marshal or Agency Officer with Fire Program Oversight
- Local Elected Officials, including city and county

#### **National and State Fire Service Officials**

- IAFC President, Officers, or Division/District Representatives
- IAFF General President, Officers, or Division/District Representatives
- National Volunteer Fire Council President or Officers
- State Fire Chief Organization Officers
- State IAFF Officers
- State Volunteer Fire Council Officers
- National Fallen Firefighters Foundation Representative

A department should include a section or branch to handle dignitaries in its official line-of-duty death funeral plan. Many departments establish an Incident Management System to run the funeral or memorial service.

Here are some actions to consider:

- Immediately assign a dignitary coordinator, and publicize this person's contact information. If necessary, assign others to assist.
- Prepare a fact sheet with pertinent information on the department, the fallen firefighter, and the ceremony.
- As soon as possible, make contact with the dignitaries' coordinators. Senior level government officials may have both a security detail and a staff point of contact. Be prepared to handle different requests for the same senior official's appearance.
- Establish a plan for meeting and transporting dignitaries to the service.
- Set up a seating plan, and designate a holding area for dignitaries.
- Determine in advance if any of the dignitaries will be introduced or acknowledged during the service. If so, by whom?
- Determine if dignitaries will speak during the service. This decision must be made in consultation with the family. Decide on the length of the remarks and in which part of the service.
- Decide the order in which dignitaries will ride in the procession and stand at the graveside service. Remember that the family members should always be in the first cars before any dignitaries.
- Determine if dignitaries will have direct contact with the survivors. This is best done in a private setting with no media coverage. Make sure the family wants this to happen.
- Provide information to dignitaries before their arrival. If possible, provide dignitaries with a background sheet and a summary of events, even if they are not speaking at the service.
- Be aware that agendas, schedules and even the people coming may change several times up to the actual event. Stay flexible!

## Sample

### BACKGROUND SHEET

#### Funeral/Memorial Service Information

Date:

Time:

Location:

Type of service: (funeral or memorial service):

Estimated length of service:

Dignitary Coordinator:

Coordinator's contact information: (phone/cellphone/pager/email)

#### Fallen Firefighter/Department Information

Name of Fallen Firefighter:

Age:

Name of Department:

Status: (career/volunteer/contract)

Length of service:

Date of Death:

Brief Description of the Incident:

Name, relationship and age of each immediate survivor:

Name of Chief:

Contact information:

Special circumstances, if any:

Note: the Dignitary Coordinator should complete a sheet for each dignitary who will attend the service.

**Dignitary Information Form**

Name:

Title:

Name of dignitary's chief of staff or designated point of contact:

Contact information:

Names and titles of people who will accompany dignitary:

Estimated Time of Arrival in area:

- mode of transportation?

Estimated Time of Departure:

- mode of transportation?

Will dignitary require local transportation to/from ceremony?

Are there security considerations?

If so, contact information for security detail coordinator:

Special requests:

Connections to fire service or member of the fire service:



## **SURVIVOR ACTION OFFICER RESPONSIBILITIES**

1. As a direct representative of the Fire Chief, the Survivor Action Officer should receive the full cooperation of the entire fire department. The Survivor Action Officer will appoint assistants and delegate responsibilities as required to successfully complete all assigned duties.
2. The Survivor Action Officer is responsible for the management of several important activities. The principal concern is the ongoing welfare of the next of kin. The officer shall render all necessary assistance to help the family through the crisis.
3. The Survivor Action Officer coordinates and supervises the activities of a number of key personnel assigned to handle the specific aspects of the funeral arrangements and to assist the surviving family. These key personnel include:
  - a. Family Liaison Officer - Remains on call to the surviving family 24 hours a day to assist and support as needed. Provides the Survivor Action Officer with regular updates on the family's status and needs. This officer probably needs a backup to provide on-going assistance over a multi-day period.
  - b. Funeral Officer - Provides coordination and interaction with the Funeral Director and other personnel on funeral arrangements.
  - c. Service Officer - Provides coordination and interaction with the church to arrange the funeral service.
  - d. Final Committal Officer - Provides coordination with others involved in the funeral arrangements in order to arrange all details at the final committal site.
  - e. Procession Officer - Arranges and directs the funeral procession.
4. Additional duties for the Survivor Action Officer include:
  - a. Assuring that next-of-kin notification has been properly accomplished.
  - b. Officially notifying all fire department stations of the death and passing on the order to have flags lowered to half-staff and making arrangements to notify off-duty and vacationing personnel.
  - c. Notifying the following personnel and agencies, as appropriate, of the death:
    - (1) Union president and/or Firefighters Association representative (national, state and local)
    - (2) Officials from other local government offices



- (3) Other fire and police departments
- d. Making appropriate follow-up contacts when the funeral arrangements and schedules have been determined.
- e. Working with the Family Liaison Officer to determine the desired method of collecting the deceased firefighter's personal items from the fire station.
- f. Conducting a coordination meeting with the key personnel as soon as possible so that everyone understands the family's wishes regarding options chosen for the funeral ceremony. Once the funeral procedures are established, instructing all key personnel to make the appropriate contacts and setting a date and time for a final coordination meeting.
- g. Conducting a final coordination meeting with key personnel to:
  - (1) Establish schedule and timetables.
  - (2) Identify times and places for group gatherings as required by the ceremonies.
  - (3) Contact all appropriate individuals and agencies with the schedule, meeting places, and special instructions.
- h. Serving as a key contact person for outside agencies, news media, and other fire departments in relation to the death and subsequent ceremonies. This duty may be handled by a department Public Information Officer.
- i. After obtaining family approval through the Family Liaison Officer, making appropriate arrangements for a post-funeral reception and a facility to handle a large group of people.
- j. Arranging for a fire department member to be on hand at the residence to assist the family and provide for security during the funeral and funeral-related activities. Additional meals for immediate family members will be provided as needed.
- k. In career departments, coordinating with the appropriate local government office to arrange for a final paycheck and for the completion of any required paperwork.
- l. Contacting neighboring fire departments and arranging for mutual aid stand-in fire companies during the funeral.
- m. Ensuring accessibility to the family for the duration of the funeral process.

- n. Coordinating meals for the family and assuring ongoing family contact by the Family Liaison Officer.
- o. Assuring that all department functions continue as required.



## FAMILY LIAISON OFFICER

In every incident involving the death of a firefighter, or when the death of an injured firefighter appears imminent, the Fire Chief will assign a Family Liaison Officer. This individual will perform the following duties:

1. Be readily available with a fire department vehicle, pager, and portable radio for the entire funeral process.
2. Immediately report to the deceased's residence or that of the next of kin, or to the medical facility or morgue, and provide reassurance and support to the family. Ensure that the **NEEDS OF THE FAMILY** come before the wishes of the department or any other officials.
3. Be prepared to discuss all aspects of the funeral process and relay to the Fire Chief the family's wishes on the level of the department's involvement in the funeral process. These considerations include:
  - a. What the department can offer in the way of assistance based on the type of death
  - b. Churches with seating capacities large enough to accommodate projected attendance at the funeral. First, any alternate churches will need to agree that the family minister or fire department chaplain may officiate at the service.
  - c. Fire department funeral ceremonial options (i.e., gun salute, presenting of the flag, playing of Taps, Last Alarm, the ladder archway, etc.)
  - d. Proper recognition for the family and friends during the funeral and funeral procession
4. Ask the family to select six or eight primary pallbearers and the optional honorary pallbearers. Make suggestions only if the family asks for some.
5. Assist the family in determining:
  - a. The type of final committal
  - b. The funeral home to use
  - c. The clergy to use
  - d. The place of final committal
  - e. Whether to bury the deceased in a fire department uniform and, if so, how to obtain one

- f. Alternate clothes for burial and delivering them to the funeral director
  - g. A photograph of the deceased and delivering it to the funeral director
  - h. Length of the wake and a tentative schedule
  - i. The length of the funeral service to include:
    - (1) Readings and readers
    - (2) Music and musicians
    - (3) Deliverer of the funeral tribute and/or eulogy
    - (4) Inclusion of a "Last Alarm" bell service
  - j. Ceremonies at the place of final committal:
    - (1) Band or Piper
    - (2) Singing
    - (3) Honor Guard/Firing Party
    - (4) Readings
    - (5) Last Alarm Service
    - (6) Taps
    - (7) Use of an engine, a caisson or a hearse
    - (8) Use of an engine or ladder truck to carry flowers
    - (9) Personnel walking alongside the caisson or riding in the procession
  - k. Any other special considerations
6. Be available to the family on a 24-hour basis to assist in any way necessary.
7. Address the following items with the family:
- a. Autopsy report
  - b. Obtaining birth certificates, marriage certificates, death certificates, or VA or military records

- c. Determine the benefits for which the survivors may be eligible, including:
    - (1) Fire department benefits due to surviving beneficiaries
    - (2) VA spouse and children's benefits and burial benefits
    - (3) Social Security benefits
    - (4) Federal Public Safety Officers' Benefits for spouse and other survivors
    - (5) State benefits for survivors of fallen firefighters
    - (6) Educational assistance and scholarship programs for spouses and children
    - (7) Life and health insurance plans (personal and city) including funeral benefits
    - (8) Final paycheck, including sick leave, vacation payoff, and W-2 forms
    - (9) Deferred compensation account
  - d. Offer to identify lawyers, accountants and/or financial advisors to assist with legal and financial issues. Ask the family if they already have advisors to help with the following:
    - (1) Transfer ownership of property and vehicles to survivors
    - (2) Review all outstanding bills before payment by survivors for legality and accuracy. This should include last illness, previous debts, and funeral expenses. Some bills may be covered by insurance.
    - (3) Change name on all bank accounts
    - (4) Check on mortgage insurance
    - (5) Explore damages resulting from the circumstances of the death
8. Be constantly alert for ways to help the family of a fallen firefighter cope with the tragedy. Immediately relay any special needs to the Fire Chief to obtain the resources to meet those needs.



## **FUNERAL OFFICER RESPONSIBILITIES**

1. Coordinate with the Family Liaison Officer and the funeral director to insure that the funeral wishes of the deceased firefighter's family are carried out.
2. Attend all meetings called by the Survivor Action Officer to determine the following:
  - a. The schedule of events and the length of the funeral service
  - b. Whether fire department vehicles will serve as a caisson or flower carrier. If they are not used, make alternate arrangements with the funeral director.
3. If the firefighter's immediate family has not requested limousine service from the funeral home on the day of the funeral, ask the funeral director to provide the service and send an invoice for the service to the fire department.
4. Coordinate with Honor Guard members to establish an Honor Guard schedule at the funeral home and church.
5. Coordinate with the departments involved and with the funeral director a formal walkthrough of uniformed personnel. This includes seating arrangements.
6. Work with the fire department chaplain or clergy member designated by the family to coordinate any prayer services to be conducted at the funeral home and forward this information to the Survival Action Officer.
7. Develop a schedule for uniformed personnel to follow the day of the funeral at the funeral site. This includes:
  - a. Arrival time for uniformed personnel and specific instructions where to gather
  - b. Briefing and practice of formations that will be present when the casket is removed
  - c. Briefing on proper protocols for entering and leaving the funeral site
8. Coordinate vehicle staging with the Procession Officer, including arrangements for fire department vehicles. Ensure the availability of sufficient personnel to properly direct and stage incoming apparatus and vehicles.
9. Obtain from the Family Liaison Officer the uniform or other clothing that the deceased will wear during viewing and deliver it to the funeral director.
10. Coordinate with the Family Liaison Officer on special readings or eulogies.
11. Obtain white gloves for all fire department pallbearers.





## **PROCESSION OFFICER RESPONSIBILITIES**

The Procession Officer is responsible for coordinating the procession from the funeral home to the church or other service area (if necessary) and from there, or other funeral site, to the place of final committal. Duties include:

1. Attend all coordination meetings to determine the following:
  - a. Name of the funeral home
  - b. Name of the church or other service location
  - c. Name of the place of final committal
  - d. Use of an engine as a caisson or a conventional hearse
  - e. Use of an engine as a flower carrier
  - f. Schedule of events the day of the funeral
  - g. The logistics of the procession:
    - (1) Honor Guard
    - (2) Band or Pipers
    - (3) Pallbearers
2. Establish a system for staging and coordinating vehicles at all locations where funeral activities will occur. Coordinate the vehicle staging with appropriate key personnel (service officials, officials at the site of final committal). Ensure that sufficient personnel are available at all staging locations to efficiently direct and stage apparatus and vehicles.
3. Coordinate with the Family Liaison Officer to determine any special circumstances affecting the procession. These may include:
  - a. Passing the firefighter's home, fire station, or other special location
  - b. Special static displays of equipment and personnel at locations on the procession route
  - c. The use of crossed aerial ladders at the entrance to the site of the final committal or other location. If used, contact the Survival Action Officer to obtain the necessary apparatus.
4. Contact the local law enforcement authorities for assistance in working with the funeral director to:

- a. Establish routes for the procession.
  - b. Determine traffic control needs.
    - (1) Traffic rerouting and street closings at the funeral home and funeral site. Contact the appropriate government agency or department to obtain barricades if needed.
    - (2) Traffic control at any special assembly points.
    - (3) If necessary, posting "No Parking" signs around the funeral home, funeral site, and any other assembly points.
    - (4) Directing of staged vehicles as they line up for procession(s).
  - c. Arrange for procession escorts.
5. Develop maps showing the procession route and other needed information. Maps will be handed out at the briefing at the funeral site prior to the beginning of the service and sent to attendees from out of town. Post them on the department's website along with times and required dress.
6. Align vehicles in the procession in coordination with the funeral director:
- a. Lead Escort
  - b. Fire department vehicle used as flower carrier
  - c. Hearse or engine used as caisson
  - d. Family vehicles
  - e. Pallbearers (if not riding on flower vehicle and caisson)
  - f. Honorary pallbearers
  - g. Honor Guard/Color Guard
  - h. Fire Chief's vehicle
  - i. Other host fire department vehicles
  - j. Local law enforcement vehicles
  - k. Local officials' vehicles

- l. Vehicles from other fire departments
  - m. Vehicles from other police department
  - n. Vehicles of family friends and other private vehicles
  - o. Rear Escort
- 7. If fire department apparatus serve as a caisson and/or flower vehicle, contact the Survivor Action Officer and determine which apparatus will be used. Ensure the following preparations have been made:
  - a. Apparatus is thoroughly cleaned and hose beds stripped.
  - b. Hose dividers are removed from the apparatus serving as a caisson.
  - c. The hose bed on the caisson engine is adapted to easily facilitate casket placement and removal. This needs to be coordinated with the funeral director.
  - d. Apparatus operators wear full dress uniforms while driving.
  - e. Deceased firefighter's bunker gear is placed in a riding position on the caisson with the bunker boots turned backwards.
  - f. If used, bunting and/or funeral flags are affixed to the apparatus.



## **FUNERAL SERVICE OFFICER RESPONSIBILITIES**

The Funeral Service Officer has the primary responsibility of coordinating all of the activities and ceremonies at the church or funeral site. Duties include:

1. Attend coordination meetings and obtain the following information from the Survivor Action Officer and Family Liaison Officer:
  - a. Schedule of events
  - b. Location of the service
  - c. Clergy involved, including the fire department chaplain
  - d. Readings and readers
  - e. Type and length of service
  - f. Requested ceremonial items:
    - (1) Badge presentation
    - (2) Special readings
    - (3) Special eulogies
  - g. Music and musicians
  - h. Information on the deceased firefighter, both professional and personal. Give this information to the person delivering the tribute or eulogy.
2. Contact the Procession Officer and coordinate vehicle staging at the service location.
3. Make seating arrangements for those attending the service. In addition to family members, provide dedicated seating for:
  - a. Pallbearers
  - b. Honor Guard
  - c. Uniformed personnel
  - d. Dignitaries
4. Determine the formations to be used and coordinate them during the arrival and removal of the casket from the location of the service. Review military commands for the

formations and issue them when appropriate.

5. Develop a program for the service and give it to the Family Liaison Officer to discuss with the family. Ask if they want any special prayer cards and, if so, provide a draft.
6. After approval by the family, print the program and prayer cards, if used.

## **FINAL COMMITTAL SERVICE OFFICER RESPONSIBILITIES**

The Final Committal Service Officer is responsible for the preparation and coordination of events at the site of the final committal. These duties start at the time the procession vehicles arrive and people exit the vehicles. The officer is also responsible for liaison with personnel who manage and operate the final committal site. Duties include:

1. Attending coordination meetings and obtaining the following information from the Survivor Action Officer and Family Liaison Officer:
  - a. Type of final committal:
    - (1) Burial
    - (2) Placement in a crypt
    - (3) Cremation
  - b. Family requests:
    - (1) Final Alarm Service
    - (2) Taps
    - (3) Firing Party
    - (4) Readings and readers
    - (5) Music and musicians
2. Schedule and coordinate the sequence of events that will take place at the final committal site. This includes coordinating any special requests received from the Survivor Action Officer or Family Liaison Officer.
3. Develop the type of formations for the uniformed personnel and their locations. Issue appropriate orders consistent with military standards.
4. Ensure that the officials at the final committal site take care of all necessary items, such as:
  - a. Overhead protection for immediate family
  - b. Seating for the immediate family
  - c. A public address system if needed



5. Ensure that Honor Guard members are thoroughly familiar with folding and presenting the flag to the next of kin.
6. Coordinate with the Survivor Action Officer to see if any family members have medical conditions requiring emergency medical personnel and equipment at the site.
7. Upon dismissal of the formation, announce the location of the post-funeral reception, if any.

U.S. Fire Administration

# Firefighter Autopsy Protocol

March 2008



FEMA



## **U.S. Fire Administration**

### **Mission Statement**

*As an entity of the Federal Emergency Management Agency (FEMA), the mission of the U.S. Fire Administration (USFA) is to reduce life and economic losses due to fire and related emergencies, through leadership, advocacy, coordination, and support. We serve the Nation independently, in coordination with other Federal agencies, and in partnership with fire protection and emergency service communities. With a commitment to excellence, we provide public education, training, technology, and data initiatives.*



# Firefighter Autopsy Protocol



Jeffrey O. Stull  
*International Personnel Protection, Inc.*  
*Austin, Texas*



March 2008

*Any opinions, findings, conclusions, or recommendations expressed in this publication do not necessarily reflect the views of the Department of Homeland Security or the U.S. Fire Administration.*

# ■ Table of Contents

<b>OVERVIEW</b>	VI
<b>ACKNOWLEDGEMENT</b>	VII
<b>I. BACKGROUND</b>	1
I.1 Scope of the Problem	1
I.2 Rationale for the Protocol	3
I.3 Description of the Protocol	4
<b>II. MEDICOLEGAL AUTOPSY PROCEDURES IN THE UNITED STATES</b>	9
II.1 When Is an Autopsy Required?	10
II.2 Definition of Manner, Cause, and Mechanism of Death	10
II.3 Chain of Custody and Documentation	11
II.4 Retention of Autopsy Specimens and Paperwork	12
<b>III. OCCUPATIONAL ASPECTS OF FIREFIGHTING OF SPECIFIC CONCERN TO AUTOPSY</b>	13
III.1 Firefighter Death Classification	13
III.2 Trends in Line-of-Duty Deaths	14
III.3 Investigation of Line-of-Duty Deaths	18
III.4 Alcohol and Drugs	19
III.5 Fire Toxicology	20
III.6 Burns	24
III.7 Personal Protective Equipment	26
III.8 Non-Line-of-Duty Deaths	28
III.9 Firefighter Health	29
<b>IV. PUBLIC SAFETY OFFICER BENEFITS (PSOB) PROGRAM</b>	31
IV.1 Summary of the PSOB Law	31
IV.2 Summary of the Heart/Stroke Amendment	32
IV.3 Useful Web sites	33
<b>SELECTED BIBLIOGRAPHY</b>	34
Determination of Alcohol Levels During Autopsy	34
Carbon Monoxide Determination During Autopsy	44

<b>APPENDIX A: DEATH INVESTIGATION SYSTEMS IN THE UNITED STATES AND TERRITORIES . . .</b>	<b>55</b>
<b>APPENDIX B: NIOSH FIREFIGHTER FATALITY REPORTS—AUTOPSY INFORMATION . . . . .</b>	<b>93</b>
<b>APPENDIX C: EXAMINATION OF PERSONAL PROTECTIVE EQUIPMENT . . . . .</b>	<b>160</b>
Protective Helmets . . . . .	163
Protective Hoods. . . . .	163
Protective Garments (Coat and Pants) . . . . .	163
Protective Gloves. . . . .	164
Protective Footwear (Rubber) . . . . .	165
Protective Footwear (Leather) . . . . .	165

## ■ Overview

**T**he Firefighter Autopsy Protocol has been extensively revised since its original 1994 edition. In this new protocol, a number of additional areas of information have been provided to take into account emerging issues and new technologies as applied to the conduct of autopsies. As stated in the report, it is recommended that autopsies be performed for all firefighter fatalities where a line-of-duty death has occurred. It is further recommended that an autopsy be performed when a non-line-of-duty death may be linked to a line-of-duty exposure.

Specific sections have been provided in this report as background and areas of information as related to the conducting of autopsies. General autopsy procedures must be supplemented with additional analyses and reviews in order to ascertain specific causes and mechanisms of death and to add to the body of knowledge for understanding firefighter fatalities which, in turn, helps to prevent future firefighter fatalities. The protocol gives specific attention to several areas, where current autopsy practice may be supplemented with additional evaluations and considerations. Examples of these supplemental factors include

- evaluation of victim work history with specific attention to prior exposures;
- examination of personal protective equipment (PPE) for relating effects of clothing and equipment on individual parts of the body, particularly in cases of trauma and burn injury;
- details in the physical examination for identifying signs of smoke asphyxiation and burn injury as contributing causes of firefighter fatality;
- implementation of appropriate carbon monoxide and cyanide evaluation protocols as part of the toxicological evaluation; and
- detailed toxicological evaluations where hazardous atmospheres have been encountered.

The utility of this specific firefighter autopsy protocol is intended to advance the analysis of the causes of firefighter deaths to aid in the development of improved firefighter health and safety equipment, procedures, and standards. It also is critical in helping to determine eligibility for death benefits under the Federal government's Public Safety Officer Benefits (PSOB) Program, as well as State and local programs. Lastly, implementation of this protocol will increase interest in the study of deaths as related to occupational illnesses among firefighters, both active and retired.

# Acknowledgement

This project could not have been undertaken without the expertise of the following people who provided invaluable guidance and input throughout this project:

Professor Vincent Brannigan, JD  
Dept. of Fire Protection Engineering  
University of Maryland  
College Park, MD 20742-3031

Dr. Merritt Birky  
National Transportation Safety Board  
2419 Childs Lane  
Alexandria, VA 22308

Richard Duffy  
Int'l Association of Fire Fighters  
1750 New York Avenue, NW  
Washington, DC 20006

Ms. Rita Fahy  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169-7471

Captain Tom Hales, MD  
Center for Disease Control  
4676 Columbia Parkway  
Cincinnati, OH 45226

Dr. James Melius  
NY State Laborers  
18 Corporate Woods Blvd.  
Albany, NY 12211

Ms. Valerie C. Neal\*  
PSOB (Senior Benefits Manager)  
810 7th Street, NW  
Washington, DC 20531

Dr. Fredric Rieders  
National Medical Services  
2300 Stratford Avenue  
Willow Grove, PA 19090

Kevin Roche  
Phoenix Fire Department  
2625 South 19th Street  
Phoenix, AZ 85009

Mary Ellis\*\*  
National Fallen Firefighters Foundation  
16825 South Seton Avenue, Building O  
P. O. Drawer 498  
Emmitsburg, MD 21727

Jim Monahan  
Beebe Medical Center  
424 Savannah Road  
Lewes, DE 19958

\*No longer with PSOB at the time of publication.

\*\*No longer with the NFFF at the time of publication.



# I. BACKGROUND

**T**he U.S. Fire Administration (USFA) is committed to improving the health and safety of firefighters. This mission has created an accompanying interest in learning about the causes of firefighter deaths and injuries. In the process of researching firefighter deaths, it was determined that forensic medicine had no standard protocol that would assist a coroner or medical examiner specifically in determining the cause of a firefighter death. Many purposes for firefighter autopsy are related to ensuring benefits in addition to providing an improved understanding of fireground hazards and the effectiveness of firefighting equipment.

In 1993, the USFA initiated a project to develop a standard firefighter autopsy protocol. Experts in forensic pathology, toxicology, epidemiology, and medicolegal aspects of autopsy, as well as representatives of several national fire service organizations, were selected to serve as a Technical Advisory Committee, to provide expertise and guidance for development of the new autopsy protocol. The first firefighter autopsy protocol was finalized in 1994 and disseminated in 1995. This protocol effectively served the forensic professional and provided a basis for examining firefighter deaths more consistently.

In 2004, a revision of the firefighter autopsy protocol was undertaken to further refine and update autopsy procedures to account for new types of analyses and concerns that have arisen with respect to the conducting of firefighter autopsies. A second Technical Advisory Committee, with membership similar to the first, was formed to help guide and review the modifications. The new changes and improvements in the autopsy protocol are represented in this publication.

The consensus of the Technical Advisory Committee is reflected in the new protocol. This protocol is intended to provide guidance to medical examiners, coroners, and pathologists on uniform recommended procedures for investigating the causes and contributing factors related to firefighter deaths. The protocol recognizes and addresses those attributes of firefighter casualties which distinguish them from casualties in the general population, as well as from civilian fire casualties. These differences include the use of protective clothing and equipment, prolonged exposures to the hazardous environment, and specialized training and duties.

The accompanying documentation is intended to describe the need for a revised autopsy protocol, the situations that led to its development, and the major issues that are related to it.

## **I.1 Scope of the Problem**

Firefighting has been described as one of the Nation's most hazardous occupations. The USFA estimated that the number of firefighters in 2005 was 1,136,650, comprising 313,300 career and 823,350

volunteer firefighters. This figure included only those career firefighters working for public municipalities rather than for private fire brigades or for State or Federal government.

The NFPA defines on-duty fatalities as follows (Fahy, 2007):

On-duty fatalities include any injury sustained in the line of duty that proves fatal, any illness that was incurred as a result of actions while on duty that proves fatal, and fatal mishaps involving non-emergency occupational hazards that occur while on duty. The types of injuries included in the first category are mainly those that occur at a fire or other emergency incident scene, in training, or in crashes while responding to or returning from alarms. Illnesses (including heart attacks) are included when the exposure or onset of symptoms occurred during a specific incident or on-duty activity.

According to reports by the NFPA<sup>2</sup>, 3,723 firefighters have lost their lives while on duty in the United States over the past 30 years (1977 through 2006); this includes the 343\* firefighters who died at the World Trade Center in 2001. Excluding the World Trade Center firefighter deaths, the average number of firefighter fatalities approaches 113 per year. However, from a yearly average of 151 firefighter line-of-duty deaths in the 1970s, the average death rate has declined to 99 deaths per year since 2000. While the primary cause of line-of-duty fatalities remains sudden cardiac death, the number of such deaths per year has declined by about one-third; however, since the early 1990s the number of cardiac-related deaths has remained between 40 and 50 per year. Vehicular crashes remain the second-highest cause of line-of-duty fatalities.

Improvements in firefighter health and safety standards and practices, particularly in the areas of PPE, physical fitness, and training, are widely believed to be responsible for a significant downward trend in line-of-duty deaths during the past 30 years. Between 1977 and 2006, the Nation experienced a 43-percent drop in the annual number of firefighter line-of-duty deaths (see Figure 1). Notwithstanding the significant drop in firefighter deaths, too many firefighters die needlessly each year.

The statistical analysis of firefighter fatalities accounts for how many firefighters have died and, to some extent, explains how they died, but the available data do not explain why firefighters die. Interpreting data is made more complex by factors such as the declining number of structural fires and the year-to-year variation in number and severity of wildland fires. Moreover, a dramatic downward shift in the total number of firefighter deaths in certain years, such as 1992, 1993, and 2005, begs still more questions about what is being done correctly to prevent line-of-duty deaths.

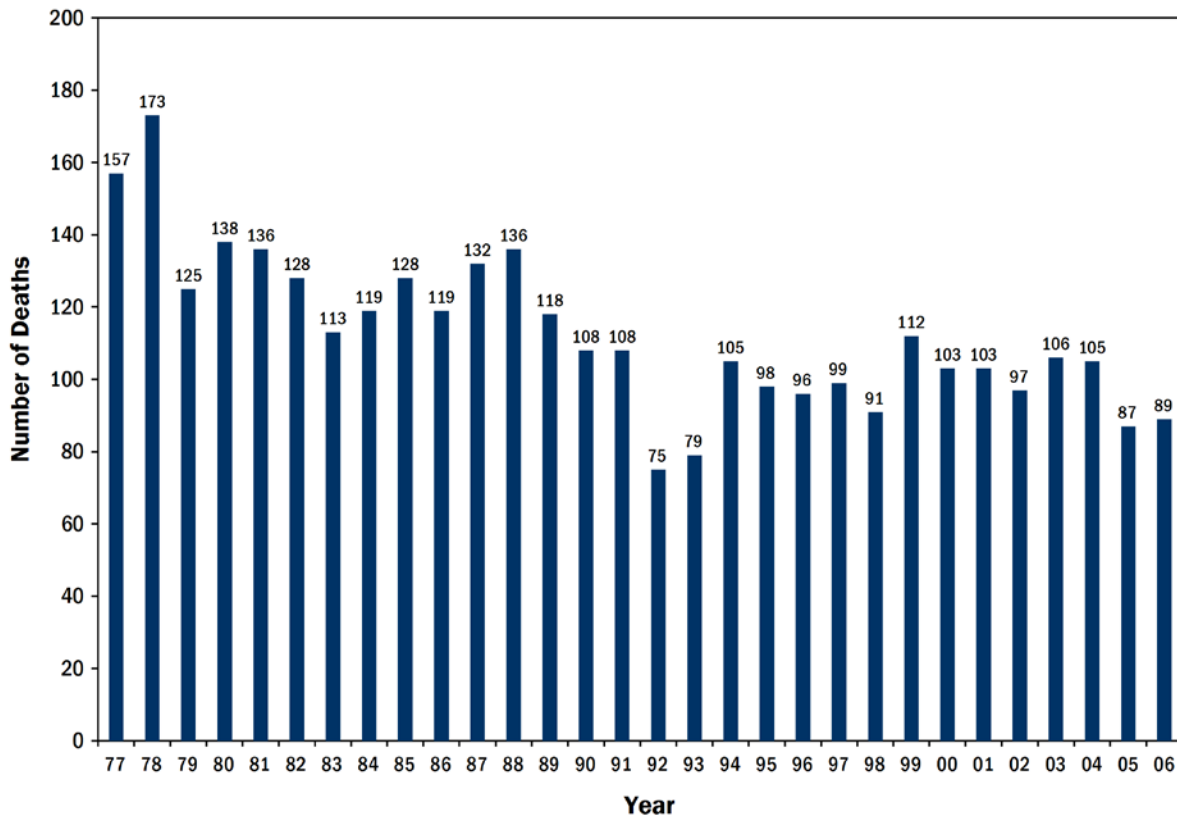
Epidemiological studies of firefighter mortality conducted in various years provide interesting insights for comparing firefighter health and mortality rates to those of other population groups, but they, too, fall short of explaining conclusively why firefighters die, and especially why any particular firefighter dies. The interest in occupational health factors relates to the frequency of sudden deaths due to heart attacks, as well as chronic conditions which include respiratory disorders, heart disease, and cancer.

---

<sup>1</sup> USFA Web site—based on figures from the National Fire Protection Association's (NFPA) U.S. Fire Department Profile through 2005.

<sup>2</sup> NFPA Journal, July/Aug 2007

\*The USFA shows 344 firefighters died on duty and the National Fallen Firefighters Foundation have honored 347 firefighters from the World Trade Center.

**Figure 1. On-Duty Firefighter Deaths (1977-2006)<sup>3</sup>**

## I.2 Rationale for the Protocol

The autopsy protocol was developed to give guidance to qualified professionals on the specific procedures that will be most appropriate in performing an autopsy on a deceased firefighter. The recommended procedures are intended to address the complex relationship between the firefighter and the inherently dangerous work environment where the duties of a firefighter must be performed. **It has been assumed that the user will be qualified, skilled, and experienced in performing autopsies, as the protocol is intended only to provide guidance on the special considerations that should apply to a firefighter autopsy that go beyond standard autopsy practice.**

It is anticipated that the application of this firefighter autopsy protocol will lead to a more thorough documentation of the causes of firefighter deaths and achieve three goals:

1. It will advance the analysis of the causes of firefighter deaths to aid in the development of improved firefighter health and safety equipment, procedures, and standards.
2. It will help determine eligibility for death benefits under the Federal government's PSOB, as well as State and local programs.
3. It will address an increasing interest in the study of deaths that could be related to occupational illnesses among firefighters, both active and retired.

<sup>3</sup> Fahy, Rita F., Paul R. LeBlanc, and Joseph L. Molis. *Firefighter Fatalities in the U.S.—2006*. Quincy: National Fire Protection Association, June 2007.

The work environment of the firefighter is undoubtedly one of the most inherently dangerous workplaces. To survive in that environment, the firefighter routinely uses protective clothing, respiratory protection, safety equipment, and standard operating procedures (SOPs) intended to reduce the level of risk, but which cannot eliminate all risks. It is extremely important, in the event of a failure of those protective systems, to fully and carefully determine what, if anything, may have gone wrong and how, if possible, similar occurrences may be prevented from happening again. An autopsy may provide some of the essential evidence to make those determinations.

Several areas of interest in the study of chronic health issues are addressed in Part III of this document. The specific issues relating to the determination of eligibility for death benefits are discussed in Part IV of this document.

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*,<sup>4</sup> section 10.4.4 recommends, “If a member dies as a result of occupational injury or illness, autopsy results, if available, shall be recorded in the health data base.” Appendix A-10.4.4 states, “The fire department should try to obtain autopsy or other medical information for all deceased employees or former employees. This information could be useful in establishing relationships between occupational factors and resulting fatalities at some time in the future. Autopsies for fire fatalities should be conducted and recorded according to a standard protocol.” Annex B, *Monitoring Compliance with a Fire Safety Occupational Safety and Health Program*, Section B-2, Figure B-2 includes space for recording compliance with recording autopsy results in the health database.

### **I.3 Description of the Protocol**

The Firefighter Autopsy Protocol is provided at the end of this section. The protocol is divided into the following sections:

- preliminary;
- initial examination;
- external examination;
- internal examination;
- toxicological examination;
- microscopic examination;
- summary of pathological findings; and
- conclusions.

The specific areas of procedures are described, but detailed step-by-step instructions are not provided as autopsy practice varies and changes with the specific circumstances of death.

---

<sup>4</sup> NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*. 2007 Ed. Quincy: National Fire Protection Association (617-770-3000; [www.nfpa.org](http://www.nfpa.org)).

## September 2007 Firefighter Autopsy Protocol

PROTOCOL	DISCUSSION
<b>I. Preliminary</b> <ul style="list-style-type: none"> <li>A. Circumstances of Death           <ul style="list-style-type: none"> <li>1. Line-of-duty               <ul style="list-style-type: none"> <li>a. Fire suppression</li> <li>b. Special operations (e.g., hazmat, technical rescue)</li> <li>c. In transit to emergency</li> <li>d. Other official activity</li> </ul> </li> <li>2. Non-line-of-duty               <ul style="list-style-type: none"> <li>a. Active firefighter, unrelated activity</li> <li>b. Former firefighter activity or exposure</li> </ul> </li> </ul> </li> <li>B. Medical Records Review           <ul style="list-style-type: none"> <li>1. Fire department injury/exposure records               <ul style="list-style-type: none"> <li>a. Prior incidents</li> <li>b. Prior injuries and treatments</li> </ul> </li> <li>2. Current medical conditions/medications               <ul style="list-style-type: none"> <li>a. Prescribed</li> <li>b. Over-the-counter</li> <li>c. Administered by paramedics</li> </ul> </li> </ul> </li> <li>C. Complete Work History           <ul style="list-style-type: none"> <li>1. Length of fire suppression duty</li> <li>2. Other jobs held during fire service</li> <li>3. Jobs held after fire service</li> </ul> </li> <li>D. Scene Investigation</li> <li>E. Scene Photography           <ul style="list-style-type: none"> <li>1. The body as discovered</li> <li>2. The site after the body is removed</li> <li>3. The body clothed at autopsy</li> <li>4. The body after removal of clothing</li> <li>5. Specific shots of body depending on type of injury</li> </ul> </li> <li>F. Jurisdiction/Authority to Conduct Autopsy</li> </ul>	<p>Firefighters are subject to many uncommon occupational hazards, including toxic and superheated atmospheres; explosions; falls; crushing/penetrating forces; contact with fire, electricity, or hazardous materials; and extremely strenuous and stressful physical activities.</p> <p>The autopsy results may be essential to determine why or how a firefighter was incapacitated, how the activity related to the cause of death, and whether protective equipment performed properly. Having a clear picture of the nature of firefighting operations that were taking place (and to which the deceased was assigned) will assist in identifying possible mechanisms of injury. If the firefighter was reported missing, try to determine the time of last contact or the length of time between the initial report and the finding of the body.</p> <p>The fire department should have an officer or internal Line-of-Duty Death Investigation Team assigned to conduct a death investigation. Other investigators may include the police, the State Fire Marshal (or other State officials), and/or Federal/State agencies responsible for occupational safety and health, including the National Institute for Occupational Safety and Health (NIOSH). Consult with these officials as necessary.</p> <p>In conducting the medical records review, obtain any documents that pertain to the incident. Document the occupational history of the deceased, including the number of years assigned as a "line" firefighter, any history of unusual exposures (or changes in frequency of exposure) to hazardous substances or diseases, and any relevant occupational medical history. Finally, all recent medical history should be reviewed, including documentation of any attempts at onscene resuscitation.</p>
<b>II. Initial Examination</b> <ul style="list-style-type: none"> <li>A. Identification of Victim</li> <li>B. Document Condition of PPE           <ul style="list-style-type: none"> <li>1. Refer to PPE diagram in Figure 8 and information in Appendix C for standardized nomenclature. Ppe description should include:               <ul style="list-style-type: none"> <li>a. Turnout coat</li> <li>b. Turnout pants</li> <li>c. Helmet</li> <li>d. Gloves</li> <li>e. Boots</li> <li>f. Self-contained breathing apparatus (SCBA)</li> <li>g. Personal Alert Safety System (PASS)</li> <li>h. Protective hood</li> <li>i. Clothing worn under turnouts</li> <li>j. Other PPE not listed above</li> </ul> </li> <li>2. Use photographs to enhance documentation (see Appendix C)</li> </ul> </li> </ul>	<p><b>Exercise caution when handling contaminated PPE, especially from hazardous materials incidents, as residue may be harmful to those involved in the autopsy. Gloves and other PPE should be used.</b></p> <p>Ppe should be sealed in a plastic bag if fire accelerants or other volatile/toxic chemicals are suspected to be present; otherwise PPE should be air-dried and preserved for examination. (Do not store clothing wet.) Preservation of the original state of PPE, including clothing, is essential. Ppe should be considered as evidence, and handled according to the Special Incident Procedures in NFPA 1851, <i>Standard on Selection, Care, and Maintenance of Structural and Proximity Firefighting Protective Ensembles</i> (2008 edition). The Death Investigation Team should perform or assist in the evaluation/documentation of PPE condition and performance. Documentation of the chain of custody of the PPE is required, especially as it may be examined by a number of individuals; however, examinations should be limited if the condition of the clothing is fragile and will be further destroyed upon successive evaluations. Upon completion of any examination, PPE should be secured in an evidence storage area. (International Association of Fire Fighters. <i>Guide for Investigation of a Line-of-Duty Death</i>. Washington, DC, 2000).</p>

PROTOCOL	DISCUSSION
<p>C. Maintenance of Custody of Equipment</p> <ol style="list-style-type: none"> <li>1. Appropriate storage conditions</li> <li>2. Chain of custody</li> <li>3. Limitation of handling if clothing and equipment is fragile</li> </ol>	<p>Observations and photos recorded at the scene should indicate whether the deceased was found wearing SCBA and/or other PPE. If SCBA and PASS are user-controlled, were they properly activated or working at the time of discovery of the deceased? A swab from the inside of the SCBA facepiece may help in determining operability.</p> <p>A qualified specialist should inspect the PPE and note any damage. NIOSH can assist in the determination of any contribution of the deceased's SCBA to the death. Ppe manufacturers may be able to assist in evaluating damage, but PPE should not be returned to the manufacturer for examination (because of concerns about product liability).</p> <p>Breathing apparatus filter cartridges, if any, should be retained.</p>
<p><b>III. External Examination</b></p> <p>A. Document Condition of Body</p> <ol style="list-style-type: none"> <li>1. Photograph</li> <li>2. Radiograph</li> <li>3. Record color of fingernails</li> <li>4. Record appearance of blood</li> </ol> <p>B. Document Evidence of Injury</p> <p>C. Document Evidence of Medical Treatment</p> <p>D. Collect Evidence from External Surfaces</p> <ol style="list-style-type: none"> <li>1. Swabs of nasal/oral soot or other substances*</li> <li>2. Hair*</li> <li>3. Injection sites</li> </ol> <p>E. Collect Vitreous Fluid</p> <p>F. Document Burns*</p> <ol style="list-style-type: none"> <li>1. Location</li> <li>2. Degree</li> <li>3. Etiology</li> <li>4. Percentage of body surface area (BSA)</li> </ol> <p>G. Biopsy Skin Lesions</p>	<p>A complete initial examination of the body is important prior to the full autopsy, including X-rays, to help with identification, locate equipment, and look for nonobvious causes of death.</p> <p>Firefighters are trained to provide emergency medical care for fire casualties. Of particular importance is that resuscitative efforts for fellow firefighters are likely to be heroic and prolonged. This fact should be taken into account when examining the body for evidence of medical intervention and when interpreting the results of blood gas assay.</p> <p>Note the presence of soot or other unidentified substances on the skin and place samples (swabs) in a sealed container.</p> <p>Certain internal samples (such as soot swabs and vitreous fluid) which can be done before the body is opened are taken at this point because collection can be accomplished in a more controlled manner, thus reducing the potential for cross-contamination of the surfaces.</p> <p>Hair samples should be about the thickness of a finger, pulled out so as to include the roots, tied around the middle, with the proximal and distal ends marked, and stored in a plastic evidence bag. Match burn injury locations to areas of heat/thermal damage on clothing and equipment.</p> <p>Vitreous fluid should be taken from both eyes. Vitreous fluid can be used to corroborate blood alcohol levels.</p>
<p><b>IV. Internal Examination</b></p> <p>A. Document Evidence of Injury</p> <p>B. Document Evidence of Medical Treatment</p> <p>C. Describe Internal Organ System</p> <p>D. Collect Samples for Toxicologic Analysis</p> <ol style="list-style-type: none"> <li>1. Blood (2 x 20 cc red- and grey-top tubes)</li> <li>2. Urine (20 to 30 cc) and/or trimmed bladder</li> <li>3. Bile (all available) or gallbladder (if bile unavailable)</li> </ol>	<p>Soot swabs should be obtained from the upper and lower airways as well as from the inside of the SCBA facepiece. These will assist in the determination of SCBA usage and operability. Note any unusual odors/colors of anything found during the internal examination. Fresh-frozen samples of vital organs should be taken and retained a minimum of 90 days, preferably longer, as storage space permits.</p> <p>An area of growing interest is the cancer rate of firefighters. Potentially cancerous tissue should be biopsied and saved. Additionally, histological type and the exact location of the tumor (if site-specific) within an organ should be documented in detail.</p>

\*May not be required for clear traumatic death

PROTOCOL	DISCUSSION
<ol style="list-style-type: none"> <li>4. Cerebrospinal fluid (up to approx. 30 ml)</li> <li>5. Soot swabs from airway*                         <ol style="list-style-type: none"> <li>a. Tracheal</li> <li>b. Bronchial</li> </ol> </li> <li>6. Representative sampling of gastric and duodenal contents (50 g; note total amount)</li> <li>7. Take and retain fresh-frozen samples                         <ol style="list-style-type: none"> <li>a. Lung 100 g</li> <li>b. Kidney 100 g</li> <li>c. Liver 100 g</li> <li>d. Spleen 100 g</li> <li>e. Skeletal muscle (psoas or thigh) 20 g</li> <li>f. Subcutaneous fat 20 g</li> <li>g. Section of bone with marrow (3-4 cm)</li> <li>h. Brain 100 g</li> </ol> </li> <li>8. Additional specific samples to be taken:                         <ol style="list-style-type: none"> <li>a. Tied-off lower lobe of right lung (store in arson debris paint can)</li> <li>b. Peripheral blood from leg vein (fluoridated and red-top tubes)</li> <li>c. Any specimens taken in field or during hospital resuscitation</li> <li>d. Sample hematomas</li> <li>e. Any other sites should be labeled</li> </ol> </li> </ol>	<p>In the case of incinerated remains, bone marrow or spleen may be the only source of tissue for toxicological studies, especially for those establishing carbon monoxide levels. Request determination of carbon monoxide content and of carbon monoxide-binding capacity of mixture from water extract of spleen, kidneys, or other organs. Gastric and duodenal contents should be representative. Solid dosage forms should be removed, counted, and analyzed.</p> <p>When taking lung samples, use the right lung because aspirated foreign materials have a greater propensity to lodge in the right lung. Soot particles and other heat injuries indicate that the victim was breathing in fire. Absence of soot particles does not prove that the victim was already dead when exposed to the fire.</p>
<p><b>V. Toxicological Examination</b></p> <ol style="list-style-type: none"> <li>A. Urine Screen/Analysis                         <ol style="list-style-type: none"> <li>1. Volatile compounds (e.g., benzene, hydrocarbons including accelerants, ethanol)</li> <li>2. Psychoactive substances (e.g. opiate derivatives, marijuana metabolites, cocaine metabolites, stimulants, phencyclidine)</li> </ol> </li> <li>B. Blood Analysis.                         <ol style="list-style-type: none"> <li>1. Carboxyhemoglobin, methemoglobin, sulfhemoglobin</li> <li>2. Volatile compounds (see A.I. above)</li> <li>3. Other (e.g., hydrocyanic acid, fluoride)</li> <li>4. Confirm results of positive urine screen</li> </ol> </li> <li>C. Subcutaneous Fat Analysis                         <ol style="list-style-type: none"> <li>1. Organic compounds, including:                                 <ol style="list-style-type: none"> <li>a. Herbicides</li> <li>b. Pesticides</li> </ol> </li> <li>2. Polychlorinated biphenyls (PCBs)</li> </ol> </li> <li>D. Soot Screen (from swabs)*                         <ol style="list-style-type: none"> <li>1. Metals, including:                                 <ol style="list-style-type: none"> <li>a. Arsenic</li> <li>b. Antimony</li> <li>c. Lead</li> </ol> </li> </ol> </li> </ol>	<p>The toxicologic analysis performed for firefighters should be of a higher order than that performed for civilian fire casualties. In addition to ascertaining blood levels of various toxic products that are commonly found in a fire environment, it is beneficial to know about the presence of any judgment-impairing substances. This may be important in the determination of eligibility for death benefits as well as for determining causality.</p> <p>Determinations of asphyxiation from carbon monoxide levels should take into account victim medical history (i.e., smoking) in addition to other types of exposure. If victim survived carbon monoxide poisoning for several hours, portmortem samples usually will fail to show presence of carboxyhemoglobin. Blood taken at time of admission to hospital still may be available and of particular value.</p> <p>Determination of specific levels of metals, organic compounds, and gross particulate matter should be conducted because firefighter exposure to these substances is believed to be greater than that for civilians. Additionally, this information may yield important clues about the cause, manner, and mechanism of firefighter death.</p> <p>Use vitreous fluids or bile to confirm presence of ethanol in either blood or urine.</p>

\* May not be required for clear traumatic death



PROTOCOL	DISCUSSION
2. Organics, including: <ol style="list-style-type: none"> <li>Pesticides</li> <li>Herbicides</li> <li>Vinyl chloride</li> <li>Acrylonitrile</li> <li>Acrolein</li> </ol> 3. Particulate analysis (e.g., asbestos)	<p>Use caution when noting the presence of hydrocyanic acid, as it can be produced by bacterial decomposition within the tissues of the deceased.</p> <p>Check for the presence of PCBs and polynuclear aromatic compounds in the subcutaneous fat, as this will help in the determination of a history of exposure.</p>
<b>VI. Microscopic Examination</b> A. Findings of Microscopic Examination	<p>Representative samples of all organs and body systems should be collected. The sections should be microscopically examined for malignant neoplasms and other abnormalities, including suggestive premalignant changes</p>
<b>VII. Summary of Pathological Findings</b> A. Medical Facts <ol style="list-style-type: none"> <li>Correlation</li> </ol>	<p>State objective findings related to gross and microscopic examinations. Correlate physical circumstances, toxicological analyses, and other investigative studies to pathological findings.</p>
<b>VIII. Conclusions</b> A. Discrepancies <ol style="list-style-type: none"> <li>Inconsistent observations</li> <li>Differences between death certificate and subsequent findings</li> </ol> B. Conclusions <ol style="list-style-type: none"> <li>List diagnoses on a separate page</li> <li>Cause and manner of death</li> </ol>	<p>Include determination of <b>cause, manner, and mechanism</b> of death. Describe discrepancies between evidence collected or observations of eyewitnesses and the autopsy findings.</p>



## ■ II. Medicolegal Autopsy Procedures in the United States

**T**he need to investigate and understand the cause of death, particularly when it occurs under unusual, confusing, or ambiguous circumstances, is almost universal. Nearly every country has established requirements for the medicolegal investigation of unforeseen, unnatural, or violent deaths, usually including workplace accidents and job-related deaths. However, unlike some other industrialized nations, no national system of death investigation exists in the United States. Death investigation in the United States falls under the authority of State and local officials

Legal structures governing death investigation vary considerably among the 50 States, the District of Columbia, and the territories. Depending on the jurisdiction, the official responsible for determining the cause, manner, and mechanism of death may be a coroner or medical examiner. Eleven States operate coroner systems (either district or county coroners). Eighteen States use a State, district, or county medical examiner system. Eighteen States operate under a mixed system of State or county medical examiners and county coroners/medical examiners.<sup>5</sup> Appendix A lists the specific practices used in each State.

Most firefighter deaths are investigated as unusual or unforeseen deaths according to State laws and regulations, and a high level of discretion is afforded to coroners and medical examiners in the manner of fulfilling their duties and responsibilities. Only one State, Maryland, specifically requires a medicolegal investigation of all firefighter deaths and, in fact, has a staff epidemiologist to study firefighter deaths. Other States such as New Jersey have designated the Division of Fire Safety as the lead agency for investigating fire service accidents, but have established no autopsy requirements.

Three publications attempt to organize and describe medicolegal autopsy requirements in the United States:

1. Wecht, C.H. *United States Medicolegal Autopsy Laws*. 3rd ed. Arlington: Information Resources Press, 1989.
2. Combs, D.L., R.G. Parrish, R. Ing, et al. *Death Investigation in the United States and Canada*, 1995. Atlanta: Centers for Disease Control, U.S. Health Services, 1995.
3. Ludwig, Jurgen. *Autopsy Practice*. 3rd ed. Totowa: Humana Press, 2002.

Notwithstanding the differences among the various systems, all death investigation systems are intended to respond to questions of who died, how and why a death occurred, and (as applicable) who is responsible for the occurrence. This information, in turn, may be used in legal proceedings; to compile vital statistics; to evaluate medical care and treatment; and to compile factual information on clinical, anatomical, pathological, physiological, and epidemiological subjects for research purposes.

---

<sup>5</sup> [www.cdc.gov/epo/dphsi/mecisp/death\\_investigation\\_in\\_the\\_united\\_states\\_and\\_canada.htm](http://www.cdc.gov/epo/dphsi/mecisp/death_investigation_in_the_united_states_and_canada.htm)

## II.1 When Is an Autopsy Required?

An autopsy is not performed as a part of every death investigation. In most cases, the determination of the need to perform an autopsy is a discretionary responsibility of the coroner or medical examiner. The issuance of a death certificate does not require an autopsy, and only a death certificate is needed to qualify for most insurance and death benefit programs. The coroner or medical examiner may determine that no autopsy is required in any situation where there is sufficient other evidence to make conclusive determinations on the cause and manner of death. In past years, an autopsy typically was omitted when the firefighter death was believed to have been caused by natural causes, such as cardiac ischemia, even when it occurred on the scene of, or en route to or from, a fire or emergency incident (see Goode, 1990). However, autopsies are now recommended for all firefighter deaths, and the International Association of Fire Fighters (IAFF) and other organizations encourage this practice. NIOSH's Fire Fighter Fatality Investigation and Prevention Program (FFFIPP) uses autopsy results in the analysis of firefighter fatalities and specifically recommends that an autopsy be performed even if the cause of death is presumed to be natural. Section III.3, Investigation of Line-of-Duty Deaths, provides additional details on this NIOSH program.

Many coroners and medical examiners have had to limit the number of autopsies performed because of cost and time constraints. Fiscal pressures have increased as the number of death investigation cases has increased, particularly those involving violent deaths. The cases in which an autopsy is most likely to be omitted include those where there is a known and undisputed cause of death without suspicion of criminal activity; line-of-duty deaths often fall within these parameters. Autopsies are sometimes omitted because of the religious or personal preferences of the deceased and his or her family.

The failure to conduct autopsies appears to be of significant concern throughout the medicolegal community. Performing autopsies, even in cases of prolonged illness or involving individuals with prior medical histories, would be valuable in conclusively determining the cause of death, gaining a more detailed understanding of injury and disease processes, and evaluating the quality of medical care. According to some in the death investigation profession, a decline in the level of interest in pathology and forensic pathology among medical students has led to a shortage of trained professionals to conduct these procedures.

Autopsies usually are performed to establish or verify the cause of death, or to gather information or evidence that would be helpful in an investigation. Without an autopsy, specific causes, contributing factors, and underlying conditions may go undiscovered and unreported. In the case of firefighter fatalities, this lack of information may hamper industry and fire service understanding of the hazards of firefighting significantly, and limit the ability to develop more effective ways to prevent firefighter deaths and injuries.

## II.2 Definition of Manner, Cause, and Mechanism of Death

Because the firefighter death certificate and autopsy results have legal ramifications, it is important to clarify the differences among manner, cause, and mechanism of death, and especially to recognize that various entities may use the terms "cause of death" or "nature of death" in ways quite different from their appropriate use in the medicolegal autopsy.

■ **Manner of death** refers to classification of the death as natural, accidental, homicidal, or suicidal.<sup>6</sup>

The phrases "cause of death" and "mechanism of death" often are used interchangeably by clinicians and laymen, but they are not synonymous:

---

<sup>6</sup>Ludwig, Jurgen. *Autopsy Practice*. 3rd ed. Totowa: Humana Press, 2002.

- **Cause of death** is the “disease or injury that sets in motion the physiologic train of events culminating in cerebral and cardiac electrical silence.”<sup>7</sup>
- **Mechanism of death** is the “physiological derangement set in motion by the causes of death that leads to cessation of life.”

Thus, for example, a firefighter who dies from a cardiac event at the scene of a fire may have “atherosclerotic heart disease” as the “cause of death” and “ventricular arrhythmia” as the “mechanism of death.”

## II.3 Chain of Custody and Documentation

Careful documentation is essential both because of the legal ramifications, and the medical and epidemiological issues surrounding firefighter deaths. Documentation to maintain the chain of custody is of particular importance in medicolegal cases. The following recommendations are made for the information that is included with specimens that are submitted for toxicological studies:

- information that identifies each specimen, including the site where taken;
- specific details about the requested analytical test methods;
- relevant information about circumstances surrounding the specimen (e.g., emergency room measures that could affect certain drug levels); and
- signatures that document the chain of custody.

Shipping of autopsy specimens requires special consideration. Specimens must be packaged appropriately to guard against breakage and to ensure the integrity of the samples. Tissues or body fluids submitted for analysis for volatile substances should be packaged in glass rather than plastic, although plastic may be acceptable for other samples. Any caps, lids, stoppers, or other loose parts of a container should be taped into place. The materials used in shipping the specimens must not compromise the samples (e.g., paraffin blocks should not be wrapped in cotton because cotton fibers could adhere to the paraffin). Containers with wet or frozen samples must be packaged inside a second container that includes material sufficient to absorb all liquid in case of leakage. Frozen samples require ice or dry ice around the sample and in the secondary container; an insulated mailing container is necessary.

The *Autopsy Handbook*<sup>8</sup> specifies that “medicolegal material is sent by messenger, registered mail, or air express” and that specimen labels (inside the shipping container) include the following information:

- name and address of sender;
- name and address of recipient;
- description of container and source and nature of contents;
- tag stating that the shipment is evidence; and
- detailed requests for specific examinations.

Containers should be sealed with a tamper-proof method, such as with sealing wax imprinted with the sender’s thumbprint. The outer mailing container should have address labeling and also appropriate labels such as:

---

<sup>7</sup> Ibid.

<sup>8</sup> Ludwig, op.cit.

- Biohazard;
- Perishable Material;
- Fragile, Rush, Specimen; and/or
- Glass, Handle with Care.

Postal regulations must be followed. The publication “Domestic Mail Manual” is updated by the Postal Service periodically. It is recommended that the receiving party be notified by telephone or electronic mail when a shipment is initiated.

## II.4 Retention of Autopsy Specimens and Paperwork

Autopsy specimens should certainly be retained until the investigations into the firefighter’s death have been completed and any litigation surrounding the firefighter’s death has been resolved. After that point, specimens and paperwork should be retained for a significant period of time. Recommended minimum storage times, **following the completion of the investigation**, are listed in Table 1.

**Table 1. Recommended Minimal Storage Times for Autopsy Specimens and Paperwork<sup>9</sup>**

Sample Type	Minimum Retention Time
Wet tissues	6 months
Accession records	1 year
Quality assurance documents	2 years
Paraffin blocks and photographs	5 years
Autopsy authorization forms	7 years
Autopsy reports and slides	20 years

It is important to recognize that each State or local medical examiner or coroner’s office may have retention times that are very different from the recommendations provided above. In fact, these offices may have procedures in place that require automatic disposal of certain records or samples that will require extraordinary efforts on the part of fire departments or other individuals for continued storage and maintenance. Of principal concern is the retention of samples until after any investigation is completed. Further, certain statutes of limitation for potential litigation are likely to extend beyond the investigation period. In these instances, it is important to file a request for extending the retention times for specific samples with the State or local medical examiner or coroner. In certain circumstances, it may be necessary to identify alternative storage locations that meet all the storage requirements for autopsy samples complete with detailed chain of custody.

---

<sup>9</sup> Ibid.

## ■ III. Occupational Aspects of Firefighting of Specific Concern to Autopsy

**F**irefighter fatalities often result from complicated scenarios. Due to the nature of the occupation, a firefighter's death could be caused by a wide variety of single factors or a combination of several factors. For example, a firefighter could die from a stress-induced heart attack caused by simple overexertion; or a firefighter could die from asphyxiation which is actually caused by the failure of his or her breathing apparatus; or a firefighter could die from hypothermia, resulting from being trapped in a structural collapse while fighting a fire on an extremely cold day. A firefighter's death could be caused by the inhalation of toxic products of combustion, burns, traumatic injury, exposure to hazardous materials, radiation, a variety of other singular causes, or a combination of factors.

A better understanding of the actual causes of firefighter deaths, including all of the causal factors, will require a thorough examination of the protective clothing and equipment that are involved in the incident, a detailed analysis of the situation, and the details, such as carboxy-hemoglobin levels and the presence of toxic products in the respiratory and circulatory systems, that can be obtained only through an autopsy.

### III.1 Firefighter Death Classification

The USFA and the NFPA separately publish annual analyses of firefighter line-of-duty deaths. Although the two entities share information, they collect data independently. The NFPA identifies cases of firefighter fatalities through sources including newspaper reports and Internet sites such as firehouse.com. The NFPA then makes contact with the department (after the funeral) and collects information about the fatality.

To describe the mechanism of injury, the NFPA uses categories based on coding used in the 1981 edition of NFPA 901, *Uniform Coding for Fire Protection*. The NFPA studies incident reports and witness accounts as available, and then determines which classification best describes that individual fatality. The nine causal categories on which the system is based include

- |  |                                |
|--|--------------------------------|
| 1. Fell/Slipped.                       | 6. Contact with/Exposure to.   |
| 2. Struck by.                          | 7. Exiting or Escaping/Jumped. |
| 3. Overexertion/Strain.                | 8. Assaulted.                  |
| 4. Fire Department Apparatus Accident. | 9. Other.                      |
| 5. Caught/Trapped.                     |                                |

In any particular year, the categories used in summary reports do not include all of the above categories. The NFPA analyst makes classifications based on the actual events for that year, and the reported causal categories may vary from year to year. In certain years, some categories which had extremely few events may be grouped into the "other" category.

While cardiac arrest and other stress-related fatalities are the leading cause of fireground deaths, this classification system does not differentiate the causes of cardiac and stress-related cases; all are classified

as “Overexertion/Strain.” Although firefighting is widely recognized as a highly stressful occupation, the physiological and psychological effects of job-related stress have not been clearly established or differentiated, particularly as they affect mortality and morbidity.

The annual reports also describe firefighter fatalities according to the nature of the death (i.e., the medical cause of death), using the following categories:

■ Sudden cardiac event	■ Drowning	■ Aneurysm
■ Internal trauma	■ Stroke	■ Fracture
■ Asphyxiation	■ Electrocution	■ Heat stroke
■ Crushing	■ Hemorrhage	■ Pneumonia
■ Burns	■ Gunshot	■ Other

Depending on the fatalities sustained for that year, the categories included in the report may not include all of those listed above. In addition, new categories may be created to reflect different circumstances.

Because the reported categories may vary from year to year, one must be careful when comparing results from year to year. For example, if there are several drowning deaths in one year, those would likely be reported as a separate category in the annual report; however, if there were only a single drowning in the next year, then likely that death would be included as part of the “other” category in that year’s report. Therefore, upon request, NFPA is willing to analyze data for particular situations.

It should be noted that these categories do not correspond with International Classification of Disease (ICD-10, released July 2007) or SNOMED (Standardized Nomenclature of Medicine) cause categories. There are also new classifications of death and injury as the result of terrorism incidents that have been established by the National Center for Health Statistics of the Department of Health and Human Services.

### III.2 Trends in Line-of-Duty Deaths

The overall downward trend in line-of-duty deaths has been driven primarily by the downward trends in deaths attributed to cardiac arrest and in deaths during fireground operations or while at the fire scene. Fireground deaths account for more than half of all firefighter duty deaths over the last 30 years; in 42.9 percent of the cardiac-related deaths, the firefighters’ cardiac symptoms appeared during fireground operations. The downward trend in the number of fireground deaths has corresponded with a downward trend in the number of structural fires, although in recent years the death rate has continued to decline while the number of structural fires has held steady (see Figure 2). Death rates due to traumatic injuries (smoke inhalation, burns, and crushing or internal trauma) injuries remain a significant concern.

Other areas of concern for the period 1977 through 2006 include the following<sup>10</sup>:

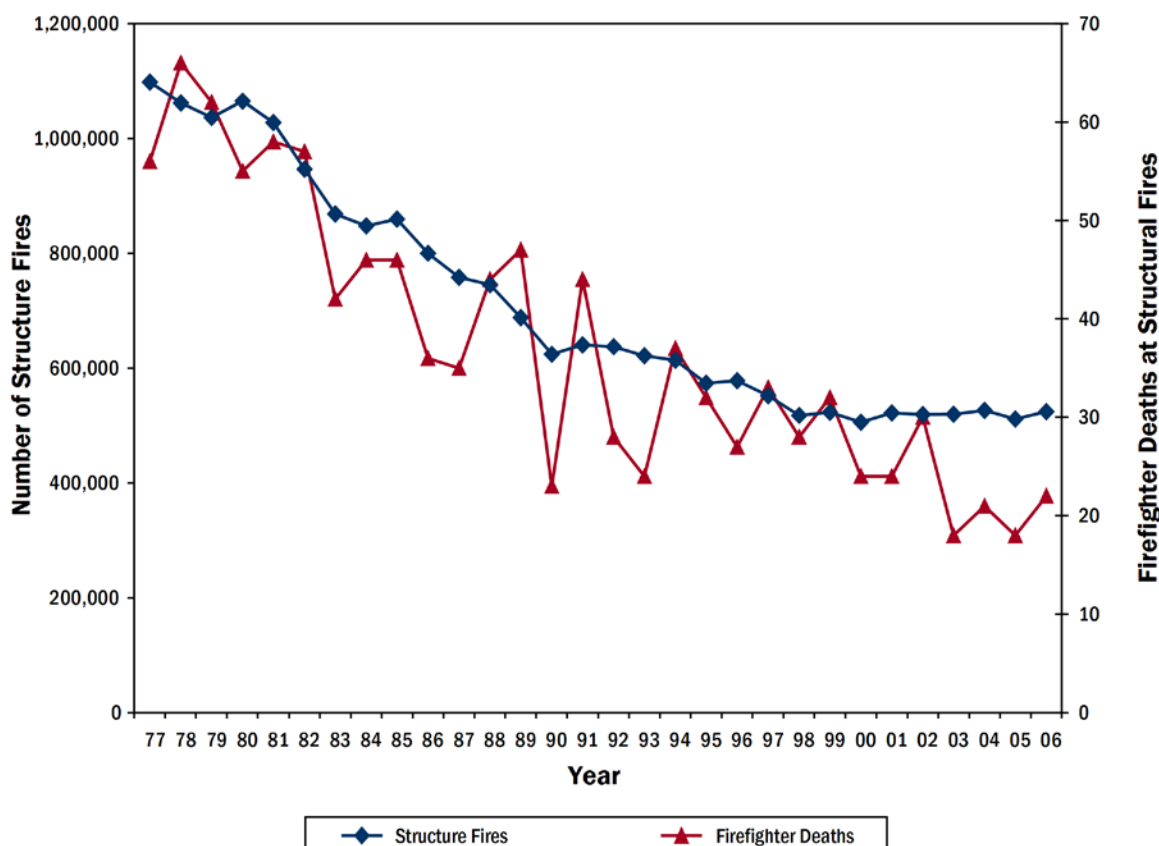
- Wildland firefighting accounted for 338 fatalities, and aircraft crashes contribute significantly to this number.
- Road vehicle crashes accounted for 406 fatalities, mostly volunteer firefighters, and are the second greatest cause of firefighter fatalities.

---

<sup>10</sup> Fahy, Rita, Paul LaBlanc, and Joseph Molis. “Firefighter Fatality Studies 1977-2006.” NFPA Journal, July/Aug. 2007.

- Falls from apparatus while en route to or from alarms accounted for 41 deaths in the first 10 years, but only 4 in the years 1999-2006 (and none in most of the 1990s).
- Training deaths accounted for 247 fatalities, and the number of deaths in the most recent decade is nearly twice that of the first decade in this time period.

**Figure 2. Trend for Firefighter Deaths at Structure Fires (courtesy of NFPA)**

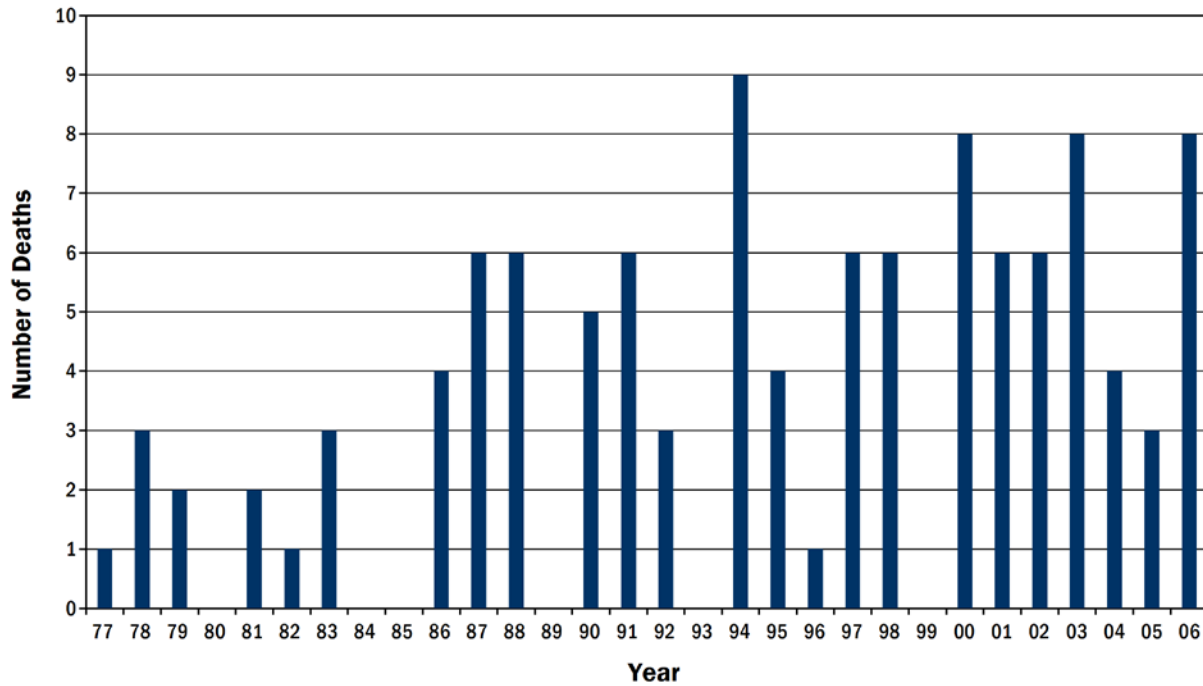


Figures 3 to 5 show these trends for the period 1977 to 2006.

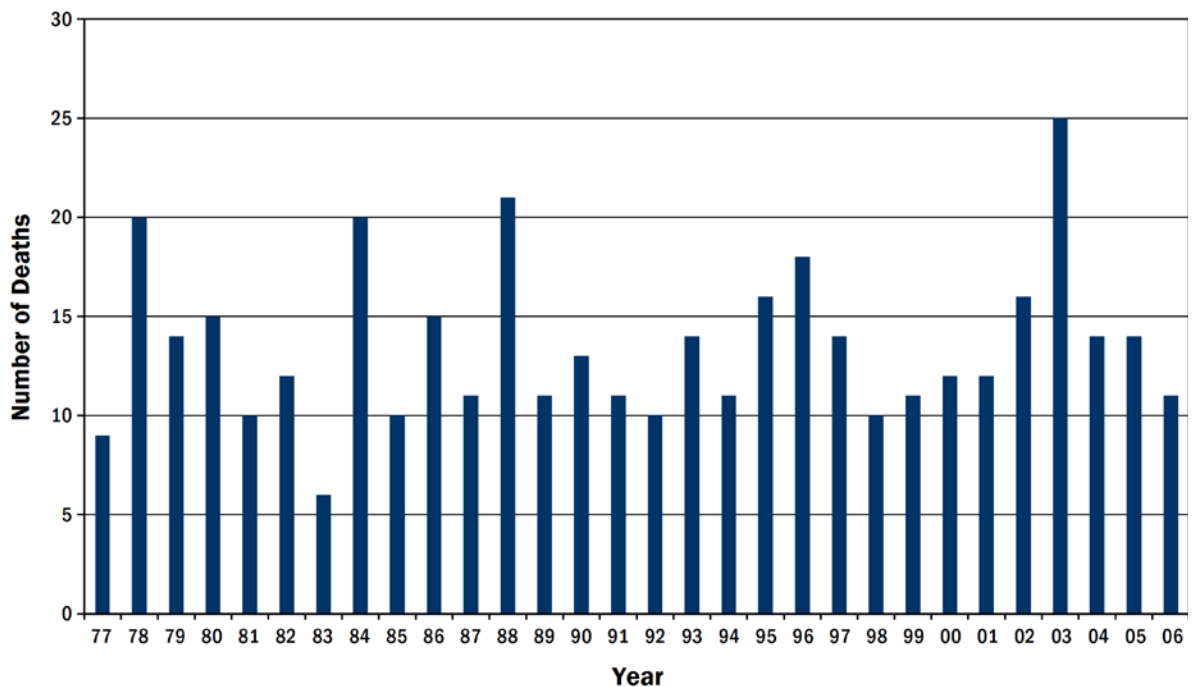
Sudden cardiac death leads all categories of line-of-duty deaths. Between 1977 and 1991, 45 percent of all firefighter deaths resulted from cardiac disorders, most from myocardial infarction. The proportion of deaths resulting from heart attacks has varied from 33.6 percent to 53.9 percent over the 15-year period. Fahy (2007) reports that the number of deaths has remained between 40 and 50 per year for the period since the early 1990s, although the year 2006 saw a record low of only 34 sudden cardiac deaths.

continued on next page

**Figure 3. Firefighter Deaths in Aircraft Crashes Related to Wildland Fires (1977-2006)**  
(courtesy of NFPA)

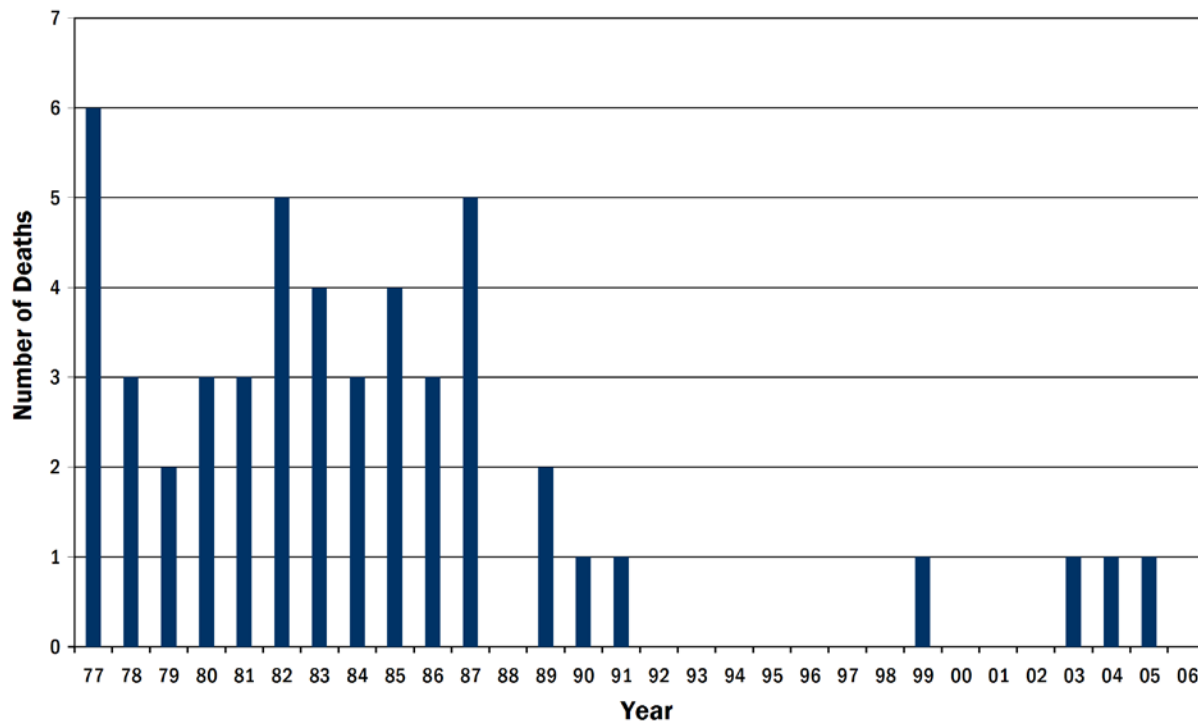


**Figure 4. On-Duty Firefighter Deaths in Road Vehicle Crashes (1977-2006)**  
(courtesy of NFPA)





**Figure 5. Deaths of U.S. Firefighters During Training (1977-2006)**  
(courtesy of NFPA)



That same report points out that, according to NIOSH, “Firefighting activities are strenuous and often require firefighters to work at near maximal heart rates for long periods. The increase in heart rate has been shown to begin with responding to the initial alarm and to persist throughout the course of fire suppression activities.” Fahy’s report also refers to a study published this year by Kales, et al.<sup>11</sup>; in which the risk of dying during specific fire department duties was evaluated. The risk of death due to coronary heart disease was 10 to 100 times higher during firefighting activities than during nonemergency duties.

Fahy (1993) reported that an NFPA study of fatal firefighter heart attacks conducted for the USFA determined that about 40 percent of the firefighters who died on duty from heart attacks between 1981 and 1990 (and for whom medical documentation was available) had prior histories of cardiac ischemia, myocardial infarction, or coronary artery bypass surgery. An additional 39 percent had prior histories of acute atherosclerosis (defined as more than 50 percent occlusion); most of these cases involved occlusions greater than 70 percent. Any of these conditions could have represented sufficient cause for disqualification from continued firefighting duty under the provisions of NFPA 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments*, which was adopted in 1992.

The adoption of health maintenance and physical fitness requirements for firefighters is a controversial subject and the requirements of NFPA 1582 have not been widely adopted. This subject is further

<sup>11</sup> Kales, Stephanos, Elpidoforos Soteriades, Costas Christophi, and David Christiani. “Emergency Duties and Deaths from Heart Disease among Firefighters in the United States.” *New England Journal of Medicine*, Vol. 356 (12), 2007, pp. 1207-1215.

complicated by the provisions of the Americans with Disabilities Act (ADA), which may restrict the ability of fire departments to limit the duties of high risk individuals.

### III.3 Investigation of Line-of-Duty Deaths

Fire suppression and emergency operations are inherently dangerous; however, the data on firefighter line-of-duty deaths presented by the statistics in this document suggest that a significant proportion of firefighter deaths, particularly those on the fireground, are preventable. The IAFF has developed the *Fire Fighter Line-of-Duty Death and Injury Investigations Manual*,<sup>12</sup> which provides a systematic approach to the overall investigation of fireground fatalities. The IAFF Manual notes that an autopsy should be requested for every line-of-duty death and the results of the autopsy should be included in the report of the investigation. The IAFF Manual further states

The medical histories of firefighters are best analyzed and interpreted by a physician. The autopsy of a firefighter who died in the line of duty is always conducted by the local medical examiner, in accordance with accepted procedures. However, the investigation team may need a physician to help interpret the medical examiner's findings and/or review other medical records. Physicians are also useful in investigations in which firefighters are severely injured. The fire department's physician is a suitable candidate for the investigation and already familiar with the demands of the job and the physiological burden of protective clothing and equipment.

There has been a significant decline in the number of firefighter deaths during fireground operations, particularly from exposure to combustion products, which appears to be related to the increased use of better protective equipment. Firefighter deaths due to cardiac ailments remain a significant concern, as do traumatic injuries from vehicle accidents and training accidents.

Evaluating the thermal performance of various types of firefighter protective clothing is an example of an area where considerable insight can be gained through accurate anatomical descriptions obtained from an autopsy. Toxicological studies can help investigators better understand the effectiveness of SCBA use and operating procedures on preventing fireground exposures to hazardous atmospheres. Evaluations of body fat, muscle development, and special coronary studies can help develop a database on the relative fitness of firefighters. These types of studies will help reinforce lessons that should help the fire service improve fireground operating procedures, protective equipment, training, and physical fitness. They also can help support the development and use of criteria for regular medical evaluations for firefighters.

If the number of line-of-duty deaths continues to decline, it will become more difficult to evaluate improvements in firefighter safety through the mortality statistics. This will place increased emphasis on the need for a detailed investigation and documentation of each and every line-of-duty death. It is a matter of compelling public interest that information about the cause and manner of all firefighter line-of-duty deaths should be thoroughly and systematically collected. The autopsy results should be an important part of the record in each case.

In 1998, the National Institute for Occupational Safety and Health (NIOSH) instituted the Fire Fighter Fatality and Prevention Program (FFFIPP). The FFFIPP investigates firefighter line-of-duty deaths (and selected non-fatal injuries) with the goal of formulating recommendations for the prevention of future casualties. The investigators use the Fatality Assessment and Control Evaluation (FACE) model.

---

<sup>12</sup> *Fire Fighter Line-of-Duty Death and Injury Investigations Manual* (updated in 2000). International Association of Fire Fighters (IAFF), 1750 New York Avenue, NW, Washington DC 20006. (202-737-8484; [www.iaff.org](http://www.iaff.org)).

Medical records, death certificates, and autopsy reports as well as interviews and evaluations of personal protective equipment (PPE), particularly SCBA, are integral to the process of investigating fatalities. Each report includes a summary of the incident and specific recommendations for preventing similar events. Reports omit department and individual identifiers, as the focus is not on determining fault or blame, but rather on understanding the causes of firefighter fatalities and then developing and disseminating recommendations for prevention of fatalities. An examination of each NIOSH firefighter fatality report was conducted with the specific focus of discerning specific comments related to the conduct of autopsies. These results are provided in Appendix C.

### III.4 Alcohol and Drugs

A relatively routine examination as part of any autopsy is an alcohol and drug screen. These analyses are provided as part of toxicology reports. Toxicology reports in most autopsies document the positive and negative findings of a series of tests conducted to detect specific substances that may have caused death. Such tests commonly include tests for the presence of pharmacological agents and illegal drugs. Blood tests for the presence of ethyl alcohol are conducted to determine whether the deceased was under the influence of an intoxicating beverage at the time of death. In the case of fire victims, the toxicology report should include analyses of blood, urine, other body fluids, and tissues for the presence of combustion products and other toxicants and their biomarkers (see section below), as well as alcohol and drugs.

It is extremely important that, in the determination of alcohol levels, the effects of postmortem changes and specimen storage be accounted for. Blood alcohol concentrations obtained at autopsy are valid until putrefaction begins. This may vary from several hours to a few days, depending on the environment. Most autopsy procedures recommend the addition of sodium fluoride at a concentration of 10 mg/mL of blood to the sample and the storage of the sample in a refrigerator. Considerations for evaluation of blood alcohol levels include

- If the blood is analyzed soon after withdrawal or if the blood is kept in the refrigerator, results usually are reliable, even if no sodium fluoride has been added.
- If the air space about the blood sample is large, alcohol can evaporate and a falsely low blood alcohol level can result.
- Putrefaction changes before autopsy or during storage may cause a falsely high blood alcohol concentration. Ethanol can be produced in the specimen container, usually in the absence of a preservative, as the fluoride inhibits bacteria far more effectively than fungi. Higher fluoride concentrations are required for inhibiting fungal growth.<sup>13</sup>
- Although there is no major difference in alcohol concentrations of blood samples from the intact heart chambers and the femoral vessels, autopsy samples from pooled blood in the pericardial sac or pleural cavity are unsatisfactory; blood should be withdrawn from peripheral vessels.
- Blood alcohol concentrations vary from vitreous, urine, or tissue samples as compared to alcohol determined through stomach contents. These variations depend on whether blood alcohol concentrations were increasing or decreasing at the time of death.<sup>14</sup>

---

<sup>13</sup> Harper D.R. and J.E.L. Correy. "Collection and storage of specimens for alcohol analysis." In *Medicolegal Aspects of Alcohol*, J.C. Garriott, ed. Phoenix: Lawyers and Judges Publishing Co., 1997, pp. 145-169.

<sup>14</sup> Caplan Y.H., "Blood, urine and other tissue specimens for alcohol analysis." In *Medicolegal Aspects of Alcohol*, J.C. Garriott, ed. Phoenix: Lawyers and Judges Publishing Co., 1997, pp. 74-86.

The principal drugs for analysis include those for common narcotics, barbiturates, amphetamines, hallucinogens, or cannabinoids. Tests for other prescription and nonprescription drugs are performed occasionally to detect such compounds as common steroids, analgesics, and other indicators of coexisting illnesses/conditions, as well as of drugs used in emergency resuscitation attempts. Methods typically used in these analyses are described in Table 2.

**Table 2. Common Methodologies for Toxicological Analysis**

Technique	How Used
Volatiles by Gas Chromatography (GC)	Usually used for testing ethanol content; testing is applied as part of a general panel to detect and quantify numerous volatile compounds that include methyl, ethyl, and isopropyl alcohols and ketones. t-Butyl alcohol is used as an internal standard because it does not occur naturally.
Specific drug screening by Enzyme-Multiplied Immunoassay (EMIT)	EMIT can detect but not quantify dependence drugs of abuse. Specific test panels are available for cocaine metabolites, tricyclic antidepressants, barbiturates, cannabinoids, amphetamines, opiates, and propoxyphene. The technique does not detect drugs at parts per billion (ppb) levels.
Specific drug screening by Enzyme-Linked Immunosorbent Assay (ELISA)	ELISA uses antibodies as a more effective technique compared to EMIT (which it is supplanting). ELISA can detect drugs at ppb levels.
Drug screening by Thin-Layer Chromatography (TLC)	TLC is used a general drug screen in lieu of EMIT and ELISA, which use panels for specific drugs.
General drug screening, identification, and quantification by High-Performance Liquid Chromatography (HPLC)	HPLC is used most commonly in place of TLC, given its greater sophistication and use of computerized compound matching. HPLC can be used as a general screening technique, but also has been configured for specific drug or substance analyses. HPLC is preferred for drugs that decompose in GC/MS injection procedures.
Specific drug identification and quantification by Gas Chromatography linked to Mass Spectrometry (GC/MS)	GC/MS is now the preferred overall technique for analysis of specific drugs. Gas chromatography provides the separation of compounds in wet sample fluids while the mass spectrometry provides the identification and quantification of each analyte using computerized matching compound libraries. Specific separation techniques must be applied to identify specific drugs.

Advances are being made each year in progressively more capable and sensitive analytical equipment and procedures that can be applied to the analysis of substances in autopsy tissues and fluid samples. It is important to apply the most up-to-date techniques when conducting specific analyses for alcohol and drug levels. A number of references are provided at the back of the protocol on the subject of alcohol and drug testing.

### III.5 Fire Toxicology

A complete understanding of the cause of a firefighter's death must include some consideration of emergency scene-specific toxicological agents that may have been involved and how they may have interacted with the deceased's biological processes and systems to cause death.

- For instance, did the inhalation of carbon monoxide result in cardiac ischemia and subsequent cardiac arrest?
- Did a toxin enter the body through some route other than the respiratory system, such as through dermal exposure, injection, or ingestion?
- Did protective clothing or SCBA fail to protect the user, or was the user's air supply depleted or otherwise compromised?

These conditions are often accompanied by other injuries which may or may not themselves have caused death, such as crushing forces (trauma) or prolonged exposure to high radiant heat levels (burns).

Firefighters respond to a variety of incidents, each presenting its own unique hazards. Traditionally, most firefighting activity has centered around structural fires. The combustion of wood releases several combustion products into the atmosphere, principally carbon monoxide and other simple hydrocarbons. Structural fires have changed over the past several years because building materials have changed. Roofing, insulation, carpets, paints, and other construction materials all contribute to an ever-growing diversity of chemical products found at fires. The increased use of plastics and other synthetic materials release different kinds of combustion products, many of them highly toxic or carcinogenic. Some examples of fire combustion products:

- carbon monoxide and carbon dioxide;
- inorganic gases (hydrogen sulfide, hydrogen cyanide, nitrogen oxides);
- acid gases (hydrochloric acid, sulfuric acid, nitric acid);
- organic acids (formic acid, acetic acid);
- aldehydes (acrolein, formaldehyde);
- chlorinated compounds (carbon tetrachloride and vinyl chloride);
- hydrocarbons (benzene);
- polynuclear aromatic compounds (PNA); and
- metals (cadmium, chromium).

In addition, chemicals at the site of a fire further contribute to hazardous contaminants in fire smoke. A classic example are PCBs, found in electrical transformers and other equipment, which, when burned, may form dioxin, an acutely deadly substance. Even the normal household will contain cleaning supplies, pesticides, pool chlorine, and other substances that contribute to release of toxic substances at fires. Table 3 lists some common fire smoke contaminants, the sources of these substances, and toxic effects from repeated or high concentration exposure to these chemicals. Table 4 shows chemicals identified in an analysis of fire smoke for several different fires.

Most protective clothing and equipment used by firefighters permits the ready penetration and permeation of toxic chemicals through protective fabrics and components. Since most firefighter protective clothing uses porous fabrics, the chemical vapors or liquids simply penetrate or pass through the pores of the material. Molecules of chemicals can also permeate into the fibers or coatings of clothing materials and can remain in the material for long periods of time, depending on the types of exposure chemical(s) and care given to the clothing. Chemicals that get into the clothing from either means often directly contact the firefighter's skin.

Different areas of the firefighter protective ensemble are likely to demonstrate varying propensities for the absorption or adsorption of chemicals. Any porous fabric material found in the clothing or other items may be contaminated, such as:

- turnout clothing outer shells, moisture barriers, thermal liners, collars, and wristlets;
- station/work uniforms;
- glove shells and liners;
- protective hoods;

- boot linings;
- helmet straps; and
- SCBA straps.

Coated materials such as moisture liners, reflective trim, boot outer materials, a respirator masks are more likely to be affected by permeation. The same is true for hard plastics or resins such as those used in the helmet, SCBA components, and certain turnout clothing hardware.

In addition to liquid or vapor chemical contaminants, a tremendous amount of ash, soot, and other solid matter is released during fires and firefighting activities. This solid matter provides the visible portion of smoke and is the primary cause of residue left on structures and clothing following fires. Soot and ash represent incomplete products of combustion; that is, unburned fuel or agglomerated solids which fail to burn completely during the fire. During combustion, synthetic materials create an increase in the amount of particulate matter, hence the "black" smoke from burning plastics. Since soot particles are very porous, they tend to adsorb other hazardous chemicals. Ash, resins, and other particles from fire smoke can become entrapped within the fibers of clothing or adhere to skin. Accumulation of soot on protective clothing becomes visible as soiled or "dirty" areas. In some cases, these "soils" are made of melted resins or plastics which, in the heat of the fire, become liquid and spread even further throughout the protective clothing. In other cases, many of the particles are too small to see (less than 10 microns) and can penetrate easily into the inner layers of clothing, such as liner and barrier materials, contacting the firefighter's skin.

**Table 3. Examples of Fireground Contaminants**

Contaminant	Sources	Toxicology
Polychlorinated Biphenyl (PCBs)	Power transformers/capacitors Televisions Air conditioners Carbonless copy paper Hydraulic systems Elevators	<ul style="list-style-type: none"> <li>• PCBs can produce dioxins that are toxic by inhalation and ingestion.</li> <li>• PCBs also absorb through the skin.</li> <li>• PCBs cause cancer of the liver and pancreas.</li> </ul>
Asbestos	Roofing and shingles Acoustic ceiling tiles Sprayed ceilings Old pipe insulation Old octopus-type furnaces Pre-1975 drywall	<ul style="list-style-type: none"> <li>• Principal hazard is inhalation of fibers (&lt;5 microns length) causes cancer.</li> <li>• Asbestos fibers can be aerosolized from clothing and inspired or and ingested.</li> </ul>
Creosote	Power poles Railroad ties Treated wood or buildings Lumber yards Piers and docks	<ul style="list-style-type: none"> <li>• Creosote is toxic through inhalation and skin absorption.</li> <li>• Causes cancer of skin, prostate, and testicles.</li> </ul>
Plastic Decomposition Products • Polycarbonates • Polystyrene • Polyurethane • (PVC)	Electrical insulation Plumbing Furniture Construction materials Insulation and packaging Tools/Toys Automobiles	<ul style="list-style-type: none"> <li>• Variety of decomposition products including acrylonitrile, hydrogen cyanide, nitrogen oxides, hydrogen chloride, benzene.</li> <li>• Various routes of toxicity through skin absorption, inhalation or ingestion.</li> </ul>

**Table 4. Specific Chemical Contaminants Identified in Various Fires<sup>15</sup>**

Compound	1(K)	1(K)	2(K)	3(O)	4(O)	5(K)	6(K)	6(O)
Furan	X			X				
C <sub>4</sub> H <sub>8</sub> isomers	X		X					
Benzene	X	X	X	X	X	X	X	X
Dimethylfuran	X		X					
Methyl methacrylate	X						X	
Toluene	X	X	X				X	
Furfural	X		X					
Xylene	X		X			X		
Styrene	X		X				X	
Pinenes	X		X				X	
Limonene	X						X	
Indane	X		X			X	X	
Methylcyclopentane	X					X		
2,4-Dimethyl-1-pentene						X		
Ethyl benzene						X	X	
C <sub>3</sub> -Alkyl benzene						X		
C <sub>4</sub> -Alkyl benzene						X	X	
n-Butane							X	
Freon 11							X	
t-Butyl anisole						X	X	
Methyl naphthalene						X	X	

K-knockdown; O-overhaul

Firefighters may be exposed to other particulate hazards. Chemical dusts, lead particles, and asbestos also may be encountered at fires and other responses. For example, though asbestos is principally an inhalation hazard, it can cling to protective clothing and be released when the responder is not wearing his or her SCBA. Similarly, lead and other toxic dusts can fill clothing pores and contaminate the firefighter's skin after the incident.

Firefighters also are subject to exposure to blood or other body fluids containing pathogens, particularly the Human Immunodeficiency Virus (HIV) or Acquired Immunodeficiency Syndrome (AIDS) virus, and Hepatitis B and C viruses. These viruses are extremely small in size and are transmitted by blood or other biological fluids. The risk is high since emergency patient care is a major function of many responses. The extrication of victims from automobile accidents and rescue of injured persons from fires and other incidents all involve the potential for this exposure. Even minute droplets of blood are capable of carrying thousands of virus that potentially can cause infection through mucous membrane contact or nonintact skin. Firefighters also face serious health threats from exposure to existing and nontraditional airborne pathogens that can be encountered in providing medical care or general interface with the public, including tuberculosis, sudden acquired respiratory syndrome (SARS), and more recently avian flu. Though these exposures may not be fatal, they can contribute to firefighter fatalities.

<sup>15</sup> Noonan, Gary P., Judith A. Stobbe, Paul Keane, Richard M. Ronk, Scott A. Hendricks, Laurence D. Reed, and Robert L. McCarthy. *Firesmoke: A Field Evaluation of Self-Contained Breathing Apparatus*. NIOSH and U. S. Fire Administration, 1989.



An emerging concern for firefighters and other first responders is the potential lethality from exposure to chemical, biological, radiological, nuclear, and explosive (CBRNE) hazards. These hazards may take the form of chemical warfare agents, toxic industrial chemicals, biological agents that are both liquid and airborne, ionizing radiation, nuclear material, and explosives. Terrorism has become a real threat to firefighters and is likely to cause multiple casualties, including firefighters. Under the circumstances of a terrorism event, special provisions will be needed for the handling of first responder and civilian deaths.

### III.6 Burns

Firefighters encounter flames, high heat, physical obstacles, and a number of other hazards in carrying out their response duties. Each hazard serves as an individual stressor on the firefighter that given its relative intensity, length of exposure, and the degree to which protection is provided, creates specific risks of injury, disease, or death.

Particularly relevant to this report is structural firefighting, which the NFPA defines as “the activities of rescue, fire suppression, and property conservation in buildings, enclosed structures, vehicles, marine vessels, or like properties that are involved in a fire or emergency situation.” Structural firefighting is likely to expose firefighters to a range of thermal conditions when responding to a fire. While several researchers have attempted to classify these conditions, one system is shown in Figure 1, where the fireground is characterized in terms of level of thermal radiation (expressed in cal/cm<sup>2</sup>s) and the air temperature (expressed in degrees Celsius and degrees Fahrenheit).<sup>16,17</sup> Three possible structural firefighting situations are illustrated in this figure and are described below:

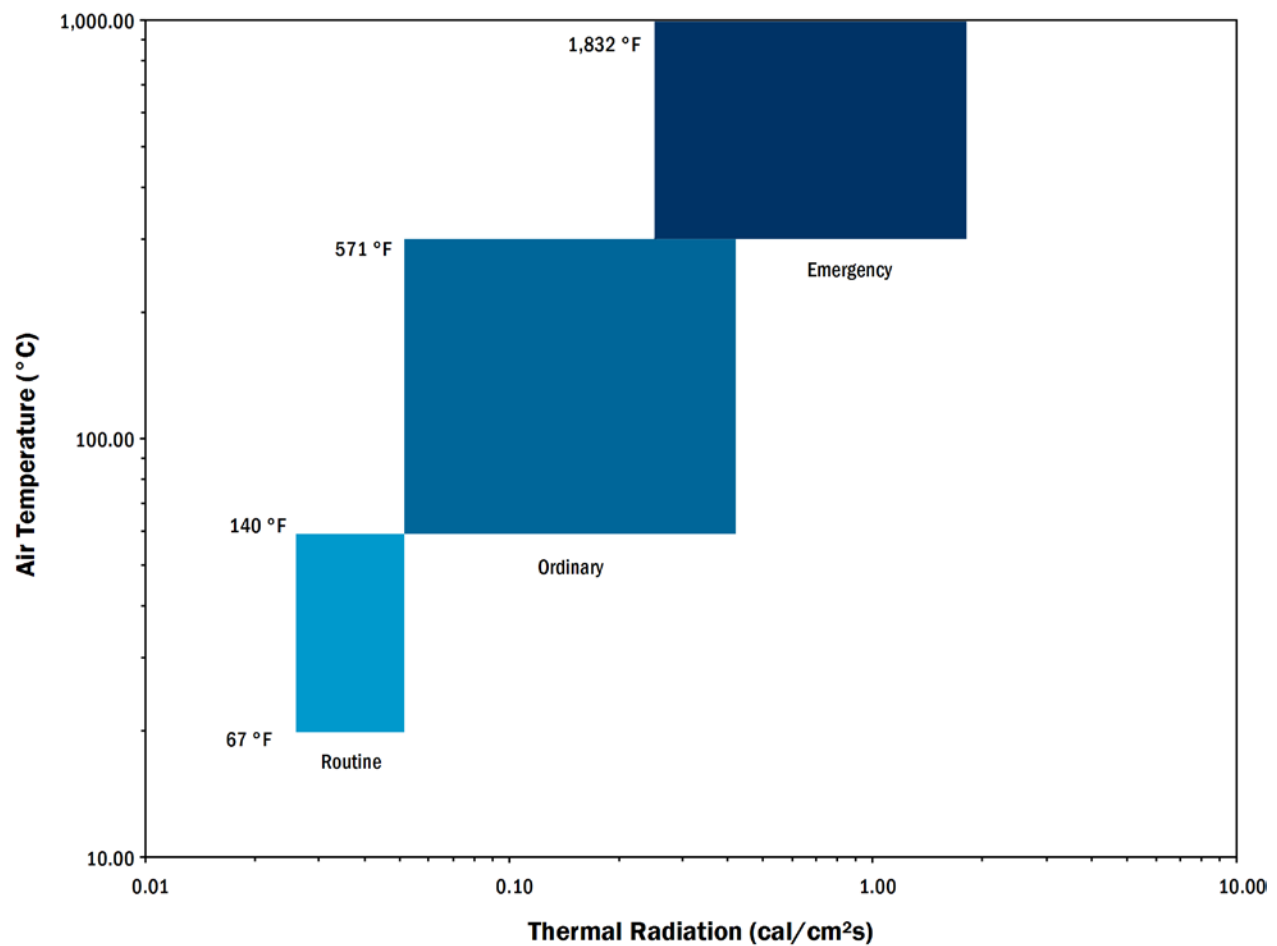
- The **Routine** region describes conditions where one or two objects, such as a bed or waste basket, are burning in a room. The thermal radiation and the air temperatures are virtually the same as those encountered on a hot summer day. As shown in Figure 1, **Routine** conditions are accompanied by a thermal radiation range of 0.025 to 0.05 cal/cm<sup>2</sup>s and by air temperatures ranging from 68 to 140 °F (20 to 60 °C). Protective clothing for firefighters typically provides protection under these conditions, but excessive exposure times may create a burn injury situation.
- The **Ordinary** region describes temperatures encountered in fighting a more serious fire or being next to a “flashover” room. **Ordinary** conditions are defined by a thermal range of 0.05 to 0.6 cal/cm<sup>2</sup>s, representing an air temperature range of 140 to 571 °F (300 °C). Under these conditions, protective clothing may allow sufficient time to extinguish the fire or to fight the fire until the nominal air supply is exhausted (usually less than 30 minutes).
- The **Emergency** region describes conditions in a severe and unusual exposure, such as those caused inside a “flashover” room or the firefighter being next to a flame front. In **Emergency** conditions, the thermal load exceeds 0.3 cal/cm<sup>2</sup>s and temperatures exceed 571 °F. In such conditions, the function of firefighters’ clothing and equipment is simply to provide protection during the short time needed for an escape without serious injury.

---

<sup>16</sup>Abbott, N. J. and S. Schulman. “Protection from Fire: Nonflammable Fabrics and Coatings.” *Journal of Coated Fabrics*, Vol. 6, July 1976, pp. 48-64.

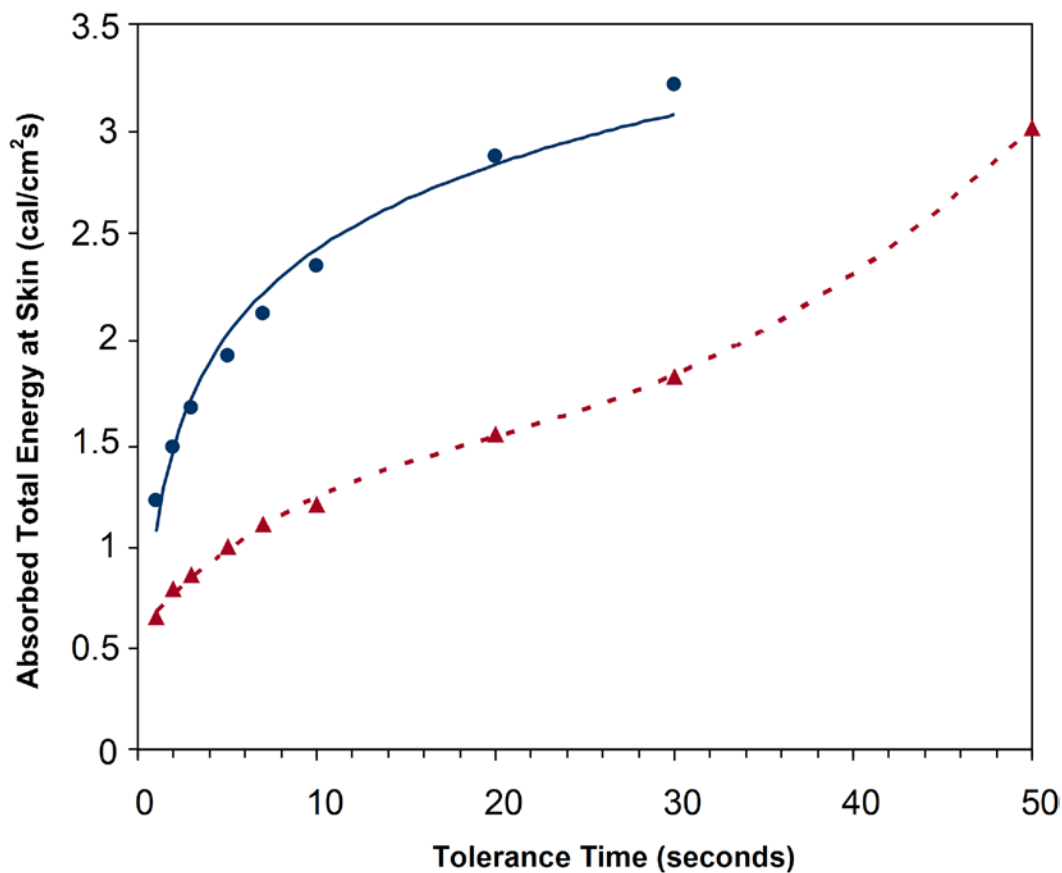
<sup>17</sup>Utech, H.P. “High Temperatures vs. Fire Equipment.” *International Fire Chief*, Vol. 39, 1973, pp. 26-27.



**Figure 6. Classification of Fireground Conditions**

Burns occur as the consequence of heat transfer to the skin at a rate greater than the body's ability to dissipate that heat. The occurrence of a burn injury can be predicted by plotting the heat energy versus time, as shown in Figure 7. This relationship shows that burns occur very quickly for high levels of heat energy exposure, while exposures to lower heat energies require a greater amount of time to cause a burn injury. Thus, burn injury is a function of both the intensity of heat exposure and the length of the exposure.

Increasing amounts of stored heat energy in the skin cause progressively greater damage. The defined degrees of burn injury distinguish the levels (depth) of skin damage and how permanent the damage becomes. For example, third-degree burns, also referred to as full-thickness burns, involve damage to the entire skin thickness and are considered irreversible (complete healing is not possible). It is also important to point out that burn injuries may occur under portions of protective clothing and equipment that show no damage.

**Figure 7. Relationship of Heat Energy and Time to Burn Injury**

### III.7 Personal Protective Equipment

Detailed knowledge of the manner of death requires, among other things, an evaluation of the performance of the firefighter's personal protective equipment (PPE), which includes protective clothing and breathing apparatus. There is voluminous anecdotal evidence that failure to use proper protective equipment has been responsible for many firefighter injuries, illnesses, and deaths.

Typically, firefighter protective ensembles consist of several elements of clothing and equipment that are worn together to provide protection against fireground hazards:

- SCBA;
- protective coat and pants;
- protective helmet;
- protective hood;
- protective gloves;
- protective footwear; and
- PASS (may be integrated with SCBA)

An example protective ensemble for structural firefighting is shown in Figure 8. Additional PPE information is provided in Appendix C. Other types of specialized ensembles are worn by firefighters for different applications. These include specialized ensembles for emergency medical operations, hazardous materials incidents, and technical rescue events.

**Figure 8. Typical Structural Firefighting Ensemble  
(Courtesy of Morning Pride Manufacturing)**



In order to provide intended protection, the ensemble elements must be chosen to work together without interference and must be properly sized and worn consistent with manufacturer instructions. Even when these instructions are followed, it still is possible to overwhelm the protective qualities of the firefighter PPE when fireground conditions exceed the designed capabilities of the clothing and equipment. In addition, the burden of insulative clothing under hot working conditions also creates stressors on the firefighter's body that can contribute to illness and death.

The use of SCBA has reduced significantly the number of firefighter injuries and deaths that are attributable to smoke inhalation. While thermal and respiratory injuries remain a concern in cases of firefighter autopsies, the widespread use of SCBA has introduced new considerations into the evaluation of these injuries. For example, knowing that a firefighter's death was the result of inhalation of combustion products, when the firefighter was using an SCBA, would indicate the need to fully evaluate the performance of the SCBA. This investigation can be conducted by the NIOSH, which is responsible for the certification of this equipment. Reviews are particularly important to ascertain the correct functioning of the equipment and the amount of service air remaining in the cylinder. Obtaining this information may

not always be possible when the SCBA is destroyed in the fire. Regardless, it is important to check the service life of the SCBA as part of any investigation, particularly where there is a question of asphyxiation. The actual service life provided by an SCBA is always significantly less than the rated service life, since firefighters can exhaust the air supply through more rapid breathing due to physical activity and stress. Some instances also may be able to compromise the positive pressure of the facepiece, permitting the infiltration of outside contaminants.

Experts may need to be consulted to determine how a firefighter's protective clothing and equipment performed or failed to perform. NIOSH has several independent consultants who are available to assist in the evaluation of PPE. Checks of PPE include the following reviews:

- the identification on each item of PPE that was worn;
- the identification of each personal item of clothing that is worn underneath the protective clothing;
- the manufacturer and date of manufacturing of each PPE item;
- the standard to which the specific item of PPE complies;
- any specific options or attributes of the clothing item; and
- the condition of the item as found on the injured or deceased firefighter.

Specific guidelines for the examination of PPE items are provided in Appendix C.

### III.8 Non-Line-of-Duty Deaths

Because of their repetitive exposure to toxic environments and carcinogens, many firefighters are concerned that they are at a higher risk to die prematurely, particularly as their longevity on the job increases. The causes of firefighter deaths that occur off-duty (or non-line-of-duty) sometimes can be attributed to one exposure or to a series of exposures to toxins. There have been some major, well-documented exposures of firefighters to certain known carcinogens. It has been suggested, for instance, that fires in occupancies manufacturing or storing chemicals in Elizabeth, New Jersey, and Fort Lauderdale, Florida, are responsible for increased incidence of cancer among the firefighters who fought these blazes.

In one of those examples, as many as 29 cases of cancer, including 19 cancer deaths, have occurred among the approximately 100 firefighters who fought a fire in 1968 at the Everglades Fertilizer Plant in Fort Lauderdale, Florida. All but one of these cases was diagnosed after the firefighter had retired or resigned from the fire department. This case has prompted the NIOSH to initiate an epidemiological study of firefighters involved in the Everglades fire.

More recently, additional medical and industry reviews have found the incidence of firefighter cancers to be elevated as compared to other occupations.

- A study of Seattle firefighters shows excess mortality from diseases of a priori concern, such as lung cancer, nonmalignant respiratory disease, and cardiovascular disease.<sup>18</sup>
- An analysis of firefighter deaths in the Boston area indicated a 3-to-1 increase in firefighter cancers when compared to the general population.<sup>19</sup>

---

<sup>18</sup>Heyer, Nicholas, Noel S. Weiss, Paul Demers, and Linda Rosentock. "Cohort Mortality Study of Seattle Fire Fighters: 1945-1983." *American Journal of Industrial Medicine*, Vol. 17, 1990, pp. 493-504.

<sup>19</sup>Musk, A. William, John M. Peters, and David H. Wegman. "Lung Function in Fire Fighters, I: A Three Year Follow-Up of Active Subjects." *American Journal of Public Health*, Vol. 67(7), 1977, pp. 86-89.

- In Los Angeles, cancer mortality among surviving firefighters is elevated for all lung and circulatory system cancers.<sup>20</sup>
- A study of firefighter mortality as compared to police officers in three northwestern U.S. cities showed excesses of brain tumors, and lymphatic and hematopoietic cancers.<sup>21</sup>
- A detailed mortality study in Toronto showed firefighters to have statistically significant excesses of brain, central nervous system, and other cancers.<sup>22</sup>

A more recent study has documented the risk of increased rates of multiple myeloma, non-Hodgkin lymphoma, and testicular cancer for firefighters based on a review of 32 different studies related to firefighter cancer risks.<sup>23</sup>

It can be very difficult to directly attribute a non-line-of-duty death to a line-of-duty exposure, especially if the exposure occurred years before the death. Comprehensive autopsies of firefighters whose death may have been caused by a line-of-duty exposure could help establish a better understanding of the relationship between exposures and premature deaths; however, this will require much better data be obtained and maintained than is currently the norm.

Many fire departments have mandated physical requirements and medical examinations for firefighters. Regular medical exams and physical testing can track a firefighter's physical and medical status from hire to retirement, and can serve as a baseline against which to compare, especially after an incident or series of incidents where a firefighter may be concerned that an exposure has jeopardized his or her health.

Records of exposures to particular toxins should be kept by the fire department along with the medical records. Such documentation would be valuable in determining whether an exposure led to medical problems, or whether a non-line-of-duty death is related to firefighting or other emergency or occupational activities.

The firefighter autopsy protocol is primarily intended to be applicable to line-of-duty deaths; however, it would also be appropriate for non-line-of-duty deaths where an occupational factor is suspected to be involved in the cause of death. For most firefighter deaths that are not duty-related or that involve former firefighters, existing clinical autopsy procedures consistent with the individual's medical history should be appropriate. The USFA Firefighter Autopsy Protocol has been designed to uncover pertinent forensic information consistent with the distinct occupational aspects of firefighting.

### III.9 Firefighter Health

Several studies have looked at the frequency of premature death rates among active and retired firefighters. Rubin has described the relationships between the hazards of fire suppression and the risk of premature

---

<sup>20</sup> Lewis, S.S., H.R. Bierman, and M.R. Faith. "Cancer Mortality Among Los Angeles City Fire Fighters." Published Report Submitted to the Los Angeles Fire Department, Dec., 1982.

<sup>21</sup> Demers, Paul A., Nicholas J. Heyer, and Linda Rosenstock. "Mortality Among Firefighters from Three Northwestern United States Cities." *British Journal of Medicine*, 1992, 49: 664-670.

<sup>22</sup> L'Abbe, Kristan A. and George A. Tomlinson. "Fire Fighters in Metropolitan Toronto: Summary of the Mortality Study." *Industrial Standards Panel*, Toronto, Ontario, Canada, 1994.

<sup>23</sup> LeMasters, Grace K. et al. "Cancer Risk Among Firefighters: A Review and Meta-Analysis of 32 Studies." *Journal of Environmental Medicine*, Vol. 48, No. 11, November 2006, pp. 1189-1202.

death from heart disease or cancer as “Firefighter’s Disease.”<sup>24</sup> He notes that relatively little research has been conducted on firefighter mortality and morbidity or the medical treatment of firefighters.

Rubin proposes that a concern for firefighter health should begin with prevention. He suggests that diet, lack of exercise, and lifestyle may be as responsible for premature firefighter deaths as any job-related exposure. The relationships of lifestyle, exercise, and diet with firefighter mortality appear to be more than just conjecture. Epidemiological studies have demonstrated that firefighters are much less likely than the general population to die from natural causes at a given age, early in their careers, because they must be healthier than the average person to pass the rigorous health and fitness standards in order to be hired or approved for volunteer duty. The death rate for firefighters catches up with the rest of the population by their retirement age, which suggests that the so-called “healthy worker effect” diminishes with time, especially if the individuals do not take care of themselves. This takes into account the factor that firefighters tend to retire at a younger age than the general population.

The USFA<sup>25</sup> describes a number of resources that address the implementation of firefighter health programs. These include the IAFF/International Association of Fire Chiefs (IAFC) “Fire Service Joint Labor Management Wellness-Fitness Initiative;” the USFA/National Volunteer Fire Council (NVFC) “Health and Wellness Guide for the Volunteer Fire Service”; the NVFC “Heart-Healthy Firefighter Program”; the IAFF/IAFC “Candidate Physical Ability Test” for recruits; and the 16 Life Safety Initiatives from the National Fallen Firefighter Foundation’s (NFFF’s) “Everyone Goes Home” program.

---

<sup>24</sup> Rubin, D.L. “Firefighters’ Disease,” *Firehouse Magazine*, Jan. 1992, pp. 40-43. U.S. Bureau of the Census. 1991. *Statistical Abstract of the United States*, 111th ed. Washington, D.C.: U.S. Government Printing Office.

<sup>25</sup> Fire in the United States: 1992-2001, Chapter 5, p. 153.

## ■ IV. PUBLIC SAFETY OFFICER BENEFITS (PSOB) PROGRAM

### IV.1 Summary of the PSOB Law<sup>26</sup>

The Public Safety Officers Benefits Act, (42 USC 3796, Public Law 94-430) became law on September 29, 1976. The legislation provided for a \$50,000 death benefit for firefighters (paid and volunteer) and law enforcement officers who died in the line of duty (emergency or non-emergency) from a traumatic injury. On December 15, 2003, the Act was amended (Hometown Heroes Act) to cover deaths from heart attack and stroke occurring in the line of duty. The Act does not cover deaths resulting from occupational illness or pulmonary disease unless a traumatic injury is a substantial factor to the death. On August 10, 2006, new regulations for the PSOB were issued that incorporated all prior amendments to the original regulations and adds the regulations for the Hometown Heroes Act.

On November 11, 1988, the benefit was increased from \$50,000 to \$100,000 and made retroactive to June 1, 1988. The dependency test for parent(s) was eliminated. Additionally, it provided that, on October 1, 1988, and every year thereafter, the benefit would be increased to reflect any increase in the consumer price index. On October 26, 2001, as part of the Patriot Act of 2001, the benefit was increased to \$250,000 and made retroactive to January 1, 2001.

The Act did exclude Federal firefighters; however on October 12, 1984, the Act was amended to correct this exclusion. Likewise, on October 15, 1986; public-sector EMS personnel also were amended into the coverage of the Act. On June 25, 2002, the Act was amended by the enactment of the Mychal Judge Police and Fire Chaplains Safety Officers Benefit Act, which now allows coverage of fire chaplains under the Act and authorizes all beneficiaries of fallen firefighters, not just parents, spouses; or children to receive the Federal compensation. The legislation, named after the FDNY Chaplain Father Judge, was proposed after it was discovered that 10 public safety officers who gave their lives on Sept. 11 would not be eligible for death benefits because they did not have any surviving immediate family.

On August 10, 2006, new regulations for administration of all PSOB benefits were issued that incorporated all prior amendments to the original regulations and added the provisions of the Hometown Heroes Act (see below). These new regulations address the PSOB Act and regulations in five parts:

1. The first part of this document describes the structure and background of the PSOB Program and aspects of the history of its administration.

---

<sup>26</sup> From Summary of the Federal (U.S.) Benefits for Public Safety Officers PSOB and PSOE Programs, IAFF Division of Occupational Health Safety and Medicine, [www.iaff.org](http://www.iaff.org)

2. The second part covers the recent changes to the PSOB Act contained in Public Law 109–162, which provided a number of clarifying and conforming changes to the PSOB Act. New definitions included the term “member of a rescue squad or ambulance crew,” which is now defined as “an officially recognized or designated public employee member of a rescue squad or ambulance crew.” It also amended the PSOB Act to ensure that the pre-existing statutory limitation on payments to noncivilians referred to the individual who was injured or killed, and not to any potential beneficiaries. Finally, this legislation amended certain provisions of the PSOB Act regarding designation of beneficiaries when the officer dies without a spouse or eligible children and removed the need for a 1-year waiting period to ensure payment to the beneficiary of the officer’s “most recently executed life insurance policy.”
3. The third part addresses the comments received by the Bureau of Justice Assistance (BJA) that relate to the proposed provisions implementing the Hometown Heroes Act, and explains the changes being made in the final rule.
4. The fourth part is a specific discussion of the terms “line of duty” and “authorized commuting.”
5. The last part addresses the remainder of the comments in a section-by-section analysis, indicating where changes to provisions were made, or where the BJA determined no changes were necessary.

## **IV.2 Summary of the Heart/Stroke Amendment<sup>27</sup>**

The Hometown Heroes Survivors Benefits Act of 2003 (HHA) amends the PSOB Act and was signed into Law on December 15, 2003. If a public safety officer dies as a direct and proximate result of a heart attack or stroke, that officer shall be presumed to have died as the direct and proximate result of a personal injury sustained in the line of duty unless such presumption is not overcome by competent medical evidence to the contrary.

The law requires that the officer, while on duty engaged in a situation, and such engagement involved nonroutine stressful or strenuous physical law enforcement, fire suppression, rescue, hazardous material response, emergency medical services (EMS), prison security, disaster relief, or other emergency response activity; or participated in a training exercise, and such participation involved nonroutine stressful or strenuous physical activity. Any claim for nonroutine stressful or strenuous physical activities will be excluded if such actions are of a clerical, administrative, or nonmanual nature.

Further, the law requires that the officer must have died as a result of a heart attack or stroke suffered

- while engaging or participating in such activity as described above;
- while still on that duty after so engaging or participating in such an activity; or
- not later than 24 hours after so engaging or participating in such an activity.

The HHA provision only covers deaths occurring on or after December 15, 2003. The HHA is not retroactive, and therefore it does not apply to deaths that occurred before the aforementioned date.

---

<sup>27</sup> From Summary of the Federal (U.S.) Benefits for Public Safety Officers PSOB and PSOE Programs, IAFF Division of Occupational Health Safety and Medicine, [www.iaff.org](http://www.iaff.org)



### IV.3 Useful Web sites

The following Web sites provide useful information either directly or indirectly related to the Public Service Officer Benefits Program:

Department of Justice Public Service Officer Benefits	<a href="https://www.psob.gov/">https://www.psob.gov/</a>
National Fallen Firefighters Foundation	<a href="http://www.firehero.org/">http://www.firehero.org/</a>
U.S. Fire Administration (firefighter fatality page)	<a href="http://www.usfa.dhs.gov/fireservice/fatalities/index.shtm">http://www.usfa.dhs.gov/fireservice/fatalities/index.shtm</a>
National Institute for Occupational Safety and Health (Fire Fighter Fatality Investigation and Prevention Program)	<a href="http://www.cdc.gov/niosh/fire/">http://www.cdc.gov/niosh/fire/</a>
International Association of Fire Fighters (line-of-duty deaths)	<a href="http://www.iaff.org/HS/LODD/index.html">http://www.iaff.org/HS/LODD/index.html</a>
International Association of Fire Chiefs (Near Miss reporting system)	<a href="http://www.iafc.org/displaycommon.cfm?an=1&amp;subarticlenbr=328#nearmiss">http://www.iafc.org/displaycommon.cfm?an=1&amp;subarticlenbr=328#nearmiss</a>
National Volunteer Fire Council (in the line of duty)	<a href="http://nvfc.org/index.php?id=657">http://nvfc.org/index.php?id=657</a>

## ■ Selected Bibliography

### **Determination of Alcohol Levels During Autopsy (abstract provided where available)**

Barillo DJ, Rush BF Jr, Goode R, Lin RL, Freda A, Anderson EJ Jr

**Am Surg.**1986 Dec;52(12):641-5.

#### **Is ethanol the unknown toxin in smoke inhalation injury?**

Of the 12,000 fire-related deaths occurring annually in the United States, it is estimated that 60 to 80 per cent are due to smoke inhalation. Plastic and synthetic materials which have been introduced in home construction and furnishings produce a more toxic smoke when burned. Efforts to identify a "supertoxin" in this smoke have been unsuccessful to date. An alternative approach is to examine why victims are unable to escape, and become exposed to smoke for lethal periods of time. The authors examined the circumstances of death in 39 fire victims (27 adults, 12 children) over a 25-month period. Detailed examination of the fire scene, autopsy studies, and toxicologic analysis were carried out. Position of the victim, and escape efforts were noted. Carbon monoxide was elevated in all victims, with "lethal" levels (= greater than 50%) in 21/39 victims. Cyanide was detected in 24/29 victims, but none had lethal (3 mg/L) levels present. Ethanol was detected in 21/26 adults (80%) and 0/12 children (0%). 18/26 adult victims had ethanol levels above the statutory level of intoxication (10 mg%). Victims found in bed (no escape attempt) had a mean blood ethanol level of 268 mg%, compared with a mean level of 88 mg% in those victims found near an exit ( $P = .006$ ). Ethanol intoxication significantly impairs the ability to escape from fire and smoke and is a contributory factor in smoke-related mortality.

Bonnichsen R, Moller M, Maehly AC.

**Zacchia.**1970 Apr-Jun;6(2):219-25.

#### **How reliable are post-mortem alcohol determinations?**

Brown GA, Neylan D, Reynolds WJ, Smalldon KW.

**Anal Chim Acta.**1973 Sep;66(2):271-83.

#### **The stability of ethanol in stored blood. I. Important variables and interpretation of results.**

Buchsbaum RM, Adelson L, Sunshine I.

Cuyahoga County Coroner's Office, Cleveland, OH 44106.

**Forensic Sci Int.**1989 Jun;41(3):237-43.

#### **A comparison of post-mortem ethanol levels obtained from blood and subdural specimens.**

Post-mortem subdural ethanol levels have been proposed as a useful test in certain forensic cases involving head trauma, particularly when the time interval from injury to death may have caused a

lowering of the blood ethanol concentration to insignificant or undetectable levels. This study of 75 autopsied persons from whom both blood and subdural ethanol levels were obtained, shows the usefulness of the subdural ethanol level, especially where there is a prolonged or unknown post-traumatic time interval. Use of such a test is recommended in these situations.

Budd RD.

**J Chromatogr.** 1982 Dec 3;252:315-8.

**Ethanol levels in postmortem body fluids.**

Chao TC, Lo DS.

Institute of Science and Forensic Medicine, Singapore.

**Am J Forensic Med Pathol.** 1993 Dec;14(4):303-8.

**Relationship between postmortem blood and vitreous humor ethanol levels.**

The relationship between the blood to vitreous humor ethanol ratios (B/V) and the corresponding urine to blood ethanol ratios (U/B) of 200 postmortem cases were found to be bimodal in nature. Using the U/B ratio of 1.20 as a demarcation below which early absorption prevails, the results in the early absorption phase gave an average B/V ratio of 1.29, a range from 0.71 to 3.71, and a relatively large standard deviation of 0.57, whereas the results in the other phases (late absorption and elimination) gave an average B/V ratio of 0.89, a spread from 0.32 to 1.28, and a standard deviation of 0.19. It would appear that the blood ethanol levels can be estimated using  $B = 1.29 V$  for early absorption phase cases and  $B = 0.89 V$  for cases in subsequent phases. The former relationship would underestimate the blood ethanol levels in cases of very early absorption phase and the later overestimate the levels of late elimination cases. The ethanol distribution results in cases of fatal road traffic accidents and suicides by falling, in which 69% of the deceased sustained some form of head injury, were found to be similar to those of other postmortem cases. The observations reflect that vitreous humor, being reasonably protected, is likely to survive certain traumatic deaths and be available for postmortem ethanol investigation. The U/B ethanol ratios recorded in this work had an average of 1.29, a range from 0.19 to 5.19, and a standard deviation of 0.48.

Coe JJ, Sherman RE.

**J Forensic Sci.** 1970 Apr;15(2):185-90.

**Comparative study of postmortem vitreous humor and blood alcohol.**

de Lima IV, Midio AF.

University of Sao Paulo, Medicolegal Institute, College of Pharmaceutical Sciences, Brazil.

**Forensic Sci Int.** 1999 Dec 20;106(3):157-62.

**Origin of blood ethanol in decomposed bodies.**

Problems related to blood contamination by other postmortem fluids in decomposed bodies (DB) make the interpretation of medicolegal blood alcohol levels (B EtOH) a very difficult task. So the aim of this paper is to show the utilization of vitreous humor (VH) as the biological fluid for an unequivocal determination of ethanol origin in DB for forensic purposes. Alcohol was determined in VH, blood (chest fluid-CF) and urine (Ur) collected from 27 DB in different states of putrefaction. A simple head-space gas-chromatographic method was used. In fifteen cases alcohol was found to be of endogenous production due to its absence in VH. In the twelve remainders, alcohol was detected in

VH and CF in an atypical distribution. Examining the reliable scene and historical information together with the analytical data, ethanol origin in these cases was classified: endogenous production (3 cases), ingested (2 cases), both (2 cases), contaminated plus endogenous production (3 cases) and unable to determine (2 cases). According to the results obtained it was possible to conclude that alcohol analysis in VH is fundamental for determining the origin of ethanol detected in CF of DB.

Hardin GG.

Forensic Science Laboratory, Minnesota Department of Public Safety Bureau of Criminal Apprehension, St. Paul 55104, USA.

**J Forensic Sci.** 2002 Mar;47(2):402-3.

**Comment in:**

**J Forensic Sci.** 2002 Nov;47(6):1405; author reply 1405.

**Postmortem blood and vitreous humor ethanol concentrations in a victim of a fatal motor vehicle crash.**

A 20-year-old male was found on the passenger side of a small car after a collision with a semi-trailer truck. Postmortem blood, collected from the chest cavity, and vitreous humor samples were collected following harvesting of the heart and bones. Gas chromatographic analysis revealed a blood ethanol concentration of 0.32 g/dL and a vitreous humor ethanol concentration of 0.09 g/dL. The stomach was intact and full of fluid and food, but its contents were not collected. Possible explanations for the large difference between the two results include diffusion of ethanol from the stomach into the chest cavity, contamination of the blood sample prior to collection, and ingestion of a large quantity of ethanol shortly before death. This case demonstrates the importance of proper quality assurance procedures in collecting postmortem specimens and of collecting a vitreous humor sample for ethanol analysis in postmortem toxicology cases.

Heise HA.

**Rocky Mt Med J.** 1968 Jun;65(6):39-44.

**Alcohol and sudden death--importance of testing several body fluids.**

Ito A, Moriya F, Ishizu H.

Department of Legal Medicine, Okayama University Medical School, Japan.

**Acta Med Okayama.** 1998 Feb;52(1):1-8.

**Estimating the time between drinking and death from tissue distribution patterns of ethanol.**

To establish a method for estimating the time between the last consumption of alcohol and death, we examined the ethanol levels in body fluids and tissues of rats that had been orally administered 1 g/kg ethanol. We observed the following relationships between ethanol levels in the cardiac blood (blood in the heart itself), vitreous humor, and urine: cardiac blood > vitreous humor > urine at 10 min (early absorption stage); vitreous humor > cardiac blood > urine from 20 to 50 min (late absorption stage); vitreous humor > urine > cardiac blood from 60 to 120 min (distribution stage); and urine > vitreous humor > cardiac blood at 180 min (excretion stage). It was also observed that, in cases of death immediately following drinking, ethanol levels in the stomach contents are very high, and the following ratios of ethanol levels were observed: skeletal muscle to cardiac blood--less than 1; liver to cardiac blood--around 1. buccal mucosa to cardiac blood--greater than 1. These ratios at equilibrium after drinking were around 1, lower than 1 and around 1, respectively. We also measured alcohol

levels in the cardiac blood, urine, vitreous humor and stomach contents of nine cadavers who had consumed alcohol prior to death. The relationships between the time since last consumption of alcohol and relative ethanol levels in these specimens were in good accordance with the results of the animal experiments.

A W Jones and P Holmgren

**J. Clin. Pathol.**, Sep 2001; 54: 699 - 702.

### **Uncertainty in estimating blood ethanol concentrations by analysis of vitreous humour**

**Aims**—To determine the concentrations of ethanol in femoral venous blood (FVB) and vitreous humour (VH) obtained during forensic necropsies. The ratios of ethanol concentrations in VH and FVB, the reference interval, and the associated confidence limits were calculated to provide information about the uncertainty in estimating FVB ethanol concentrations indirectly from that measured in VH. **Methods**—Ethanol concentrations were determined in specimens of FVB and VH obtained from 706 forensic necropsies. The specimens were analysed in duplicate by headspace gas chromatography (HS-GC), with a precision (coefficient of variation) of 1.5% at a mean ethanol concentration of 500 mg/litre. The limit of detection of ethanol in body fluids by HS-GC in routine casework was 100 mg/litre. **Results**—In 34 instances, ethanol was present in VH at a mean concentration of 154 mg/litre, whereas the FVB ethanol concentration was reported as negative ( $< 100$  mg/litre). These cases were excluded from the statistical analysis. The concentration of ethanol in FVB was higher than in VH in 93 instances, with a mean difference of 160 mg/litre (range 0 to 900). The mean concentration of ethanol in FVB ( $n = 672$ ) was 1340 mg/litre (SD, 990) compared with 1580 mg/litre (SD, 1190) in VH. The arithmetic mean VH/FVB ratio of ethanol was 1.19 (SD, 0.285) and the 95% range was 0.63 to 1.75. The mean and SD of the differences ( $\log \text{VH} - \log \text{FVB}$ ) was 0.063 (SD, 0.109), which gives 95% limits of agreement (LOA) from -0.149 to 0.276. Transforming back to the original scale of measurement gives a geometric mean VH/FVB ratio of 1.16 and 95% LOA from 0.71 to 1.89. These parametric estimates are in good agreement, with a median VH/FVB ratio of 1.18 and 2.5th and 97.5th centiles of 0.63 and 1.92. **Conclusions**—The ethanol distribution ratios (VH/FVB) show wide variation and this calls for caution when results of analysing VH at necropsy are used to estimate the concentration in FVB. Dividing the ethanol concentration in VH by 2.0 would provide a very conservative estimate of the ethanol content in FVB, being less than the true value, with a high degree of confidence.

Leahy MS, Farber ER, Meadows TR.

**J Forensic Sci.** 1968 Oct;13(4):498-502.

### **Quantitation of ethyl alcohol in the postmortem vitreous humor.**

Kaye S.

**Am J Clin Pathol.** 1980 Nov;74(5):743-6.

### **The collection and handling of the blood alcohol specimen.**

Text Available @ [http://rcm-medicine.upr.clu.edu/publications/sidney\\_kaye/the-collection-and-handling-of-blood.htm](http://rcm-medicine.upr.clu.edu/publications/sidney_kaye/the-collection-and-handling-of-blood.htm)

Proper collection, handling, and storage of the blood alcohol specimen are essential in medicolegal cases involving the question of sobriety. A standard operating procedure is necessary to ensure maximum reliability. Comments are offered on the advantages of using blood specimens in preference to urine or tissue specimens. The use of a conversion factor to obtain a calculated “presumed blood level” can be dangerous. Cautions and suggestions are offered regarding how and from where

the blood should be obtained from a living person and during an autopsy. There are certain time limitations for storage of these blood-alcohol specimens. Each laboratory must establish its own limits for reliable storage, given the conditions in that laboratory. Unexpected and confusing results can lead to an erroneous interpretation if history, circumstances, type of injury, and survival time are not all carefully considered. Several possibilities for error in judgment are discussed.

Kaye S, Cardona E.

**Am J Clin Pathol.** 1969 Nov;52(5):577-84.

**Errors of converting a urine alcohol value into a blood alcohol level.**

Text Available @ [http://rcm-medicine.upr.clu.edu/publications/sidney\\_kaye/Error-of-Converting.htm](http://rcm-medicine.upr.clu.edu/publications/sidney_kaye/Error-of-Converting.htm)

A blood alcohol determination is one of the more frequently requested analyses in a toxicology or forensic chemical laboratory. There are many reliable methods for determining the concentration of alcohol in the blood. It is the purpose of this communication to show that it is, however, not reliable to determine the concentration of alcohol in the urine and report as a blood alcohol level. This is not reliable even using the best of average factors of equivalence. These factors used are an average of many determinations, some of which show very wide ranges from the mean. Random specimens of urine and blood were collected from 148 cases examined for alcohol content. An average urine-blood alcohol ratio of 1.28: 1, with a range of 0.21 to 2.66, was obtained. The blood alcohol level was calculated in each case from the corresponding urine alcohol determination by means of the average ratio obtained from our data. In 32 (21.5%) of the cases, the blood figures calculated from the urine value exceeded the actual level determined in blood. In 51 cases (34.5%) the calculated blood alcohol concentration was below the determined value. In 65 cases (44%) the values corresponded. This procedure was repeated using the conversion factor (1.25: 1) employed in some communities. In this instance, the calculated blood alcohol concentration exceeded the actual value in 39 cases (26.5%). In 49 cases (33%) the calculated value was below the observed level, and in 60 cases (40.5%) the values corresponded. In view of the wide ranges in the individual urine-blood alcohol ratios found in most published reports, we find it hard to understand how so many investigators can conclude that it is satisfactory procedure to calculate the alcoholic content of blood, to the second decimal place, from a selected specimen of urine. Our data clearly confirm what other investigators<sup>2,7-10</sup> have claimed: that the relationship (ratio-range) between the concentrations of alcohol in urine and in blood may vary widely. This renders it unreliable to use an average conversion factor in medicolegal cases.

Kuroda N, Williams K, Pounder DJ.

Department of Legal Medicine, Keio University, Tokyo, Japan.

**Am J Forensic Med Pathol.** 1995 Sep;16(3):219-22.

**Estimating blood alcohol from urinary alcohol at autopsy.**

Urine alcohol concentration (UAC) and blood alcohol concentration (BAC) measured by gas chromatography were available from 435 medicolegal autopsies. Simple linear regression with BAC as outcome variable and UAC as predictor variable (range, 3-587 mg%) gave the regression equation  $BAC = -5.6 + 0.811UAC$  with 95% prediction interval  $\pm 0.026$  square root of  $[9465804 + (UAC-213.3)^2]$  and 99% prediction interval  $\pm 0.034$  square root of  $[9465804 + (UAC-213.3)^2]$ . The standard error of the slope was 0.013 and the 95% confidence interval for the slope 0.785-0.837. In practice, a BAC of 80 mg% is predicted with 95% certainty by a UAC of 204 mg% and similarly

a BAC of 150% by a UAC of 291 mg%. The prediction interval is too wide to be helpful in the assessment of an individual case fatality. The UAC is useful in corroborating but not in predicting BAC.

Mackey-Bojack S, Kloss J, Apple F.

Hennepin County Medical Center, Clinical Laboratories, Minneapolis, Minnesota 55415, USA.

**J Anal Toxicol.** 2000 Jan-Feb;24(1):59-65

**Cocaine, cocaine metabolite, and ethanol concentrations in postmortem blood and vitreous humor.**

The use of postmortem cocaine and metabolite concentrations is a complex subject. This study was undertaken to determine (1) the usefulness of vitreous humor as a specimen, compared with blood, to quantitate cocaine and cocaine metabolites; (2) whether there is a preferential site of disposition for cocaethylene between vitreous humor and blood; and (3) if the presence of cocaethylene influences the concentration of benzoylecgonine in postmortem specimens. Cocaine, benzoylecgonine, and cocaethylene were quantitated in blood and vitreous humor by gas chromatography-mass spectrometry, and ethanol was quantitated by gas chromatography in 62 medical examiner cases. No differences were found between mean concentrations of vitreous cocaine 0.613 mg/L (standard deviation [SD] 0.994 mg/L), cocaethylene 0.027 mg/L (SD 0.59 mg/L), and ethanol 0.092 g/dL (SD 0.13 g/dL) compared to blood cocaine 0.489 mg/L (SD 1.204 mg/L), cocaethylene 0.022 mg/L (SD 0.055 mg/L), and ethanol 0.058 g/dL (SD 0.91 g/dL), respectively. However, a statistical difference was found between mean benzoylecgonine concentrations in vitreous 0.989 mg/L (SD 1.597 mg/L) and blood 1.941 mg/L (SD 2.912 mg/L) ( $p = 0.0004$ ). Regression analysis demonstrated that linear relationships were present between concentrations of vitreous and blood cocaine ( $r = 0.854$ ) and benzoylecgonine ( $r = 0.763$ ). However, the correlation coefficients were lower for cocaethylene ( $r = 0.433$ ) and ethanol ( $r = 0.343$ ). There were variations between the concentrations of cocaine and metabolites both in terms of magnitude and also direction of change. Mean concentrations of benzoylecgonine in blood and vitreous were higher in cases where ethanol was absent, 2.593 mg/L (SD 3.195 mg/L) and 1.431 mg/L (SD 2.021 mg/L), compared to when ethanol was present, 1.199 mg/L (SD 2.396 mg/L) and 0.469 mg/L (SD 0.553 mg/L). This study demonstrates that vitreous humor may be used to quantitate cocaine and cocaine metabolites; however, because the concentrations of cocaethylene in vitreous humor and blood were not well correlated, vitreous humor may not be a reliable specimen for measuring cocaine and cocaine metabolite concentrations.

Marks P.

**Med Leg J.** 1996;64 ( Pt 4):186-93.

**Comment in:**

**Med Leg J.** 1997;65 ( Pt 3):151-2.

**Blood alcohol level: the law and the medicine.**

Marraccini JV, Carroll T, Grant S, Halleran S, Benz JA.

Office of the Medical Examiner, Palm Beach County, FL.

**J Forensic Sci.** 1990 Nov;35(6):1360-6.

**Differences between multisite postmortem ethanol concentrations as related to agonal events.**

In a study of postmortem ethanol concentrations, blood was withdrawn from the right atrium, ascending aorta, and inferior vena cava. These samples, vitreous humor, and gastric fluid were analyzed in 307 autopsies, where a minimum blood ethanol concentration of 0.05% weight/volume (w/v) was present. Premortem, agonal, and postmortem events were reviewed in an attempt to account for



differences in blood ethanol concentrations between sites. The agonal aspiration of vomitus having at least 0.80% w/v ethanol appears to be associated with an increase in aortic ethanol concentrations. We conclude that valid interpretation of postmortem ethanol concentrations must take into consideration the possible entry of ethanol into the pulmonary venous circulation via the respiratory system.

McNeil AR, Gardner A, Stables S.

Department of Molecular Medicine, University of Auckland, New Zealand.

Alanmcn@ahsl.co.nz

**Clin Chem.** 1999 Jan;45(1):135-6.

**Simple method for improving the precision of electrolyte measurements in vitreous humor.**

Text Available @ <http://www.clinchem.org/cgi/content/full/45/1/135>

Penttilä A, Karhunen PJ, Pikkarainen J.

Department of Forensic Medicine, University of Helsinki, Finland.

**Forensic Sci Int.** 1990 Jan;44(1):43-8.

**Alcohol screening with the Alcoscan test strip in forensic praxis.**

The Alcoscan test strip was applied as an assay for the screening of alcohol in vitreous humor and urine samples in autopsy cases and in saliva from drunken drivers. The method gives instant and reliable semi-quantitative information on the presence of alcohol and is valuable when considering the necessity of chemical sampling especially during autopsy.

Pleuckhahn VD, Ballard B.

**Forensic Sci.** 1967 Oct;12(4):463-70.

**Diffusion of stomach alcohol and heart blood alcohol concentration at autopsy.**

Pounder DJ, Kuroda N.

Department of Forensic Medicine, University of Dundee, Scotland.

**Forensic Sci Int.** 1994 Mar 25;65(2):73-80.

**Comment in:**

**Forensic Sci Int.** 1995 May 22;73(2):155; author reply 159-60.

**Forensic Sci Int.** 1995 May 22;73(2):157-8; author reply 159-60.

**Vitreous alcohol is of limited value in predicting blood alcohol.**

Vitreous humour alcohol concentration (VHAC) and blood alcohol concentration (BAC) measured by gas chromatography were available from 345 medico-legal autopsies. Simple linear regression with BAC as outcome variable and VHAC as predictor variable (range 1-705 mg%) gave the regression equation  $BAC = 3.03 + 0.852 VHAC$  with 95% prediction interval  $\pm 0.019$  square root of  $[7157272 + (VHAC - 189.7)^2]$  and 99% prediction interval  $\pm 0.025$  square root of  $[7157272 + (VHAC - 189.7)^2]$ . The residual standard deviation of VHAC was 26 mg%, the standard error of the slope 0.0098 and the 95% confidence interval for the slope 0.833-0.871. In practice a BAC of 80 mg% is predicted with 95% certainty by a VHAC of 150 mg% and similarly a BAC of 150 mg% by a VHAC of 232 mg%. The prediction interval is too wide to be of real practical use. Previous authors have provided various formulae, including a simple conversion factor, to predict BAC from VHAC without taking into account the uncertainty of the prediction for an individual subject. A re-analysis of the raw data from previous publications gave in most instances regression equations significantly different from the authors' own.



Riggs JE, Schochet SS Jr, Frost JL.

Department of Neurology, West Virginia University School of Medicine,  
Morgantown, USA.

**Mil Med.** 1998 Oct;163(10):722-4.

**Ethanol level differential between postmortem blood and subdural hematoma.**

Alcohol use is a major risk factor for accidental injury and death. However, when death occurs several hours after injury, ethanol in the blood may be absent or low. Ethanol in sequestered hematomas has been used to retrospectively implicate alcohol as a contributing factor at the time of injury. A 69-year-old man died from a large acute subdural hematoma. He had been seen in a hospital emergency department 8 to 12 hours before his death for treatment of two lacerations (one on the head) that occurred during a fall. Postmortem blood ethanol was 0.07%, and subdural hematoma ethanol was 0.04%. This ethanol level differential between the postmortem blood and the subdural hematoma indicates that this man had consumed alcohol after being released from the hospital.

Semenov VA, Shaev AI.

**Sud Med Ekspert.** 1967 Jan-Mar;10(1):8-10.

**[On the possibility of photometric determination of alcohol in the blood and urine of cadavers with the use of photoelectrocolorimetry]**

[Article in Russian]

Shepherd RT.

**Med Leg J.** 1997;65 ( Pt 3):105-6.

**Postmortem toxicology.**

Sylvester PA, Wong NA, Warren BF, Ranson DL.

University Department of Surgery, University of Bristol, Bristol Royal  
Infirmary, UK.

**J Clin Pathol.** 1998 Mar;51(3):250-2.

**Unacceptably high site variability in postmortem blood alcohol analysis.**

Blood alcohol concentration is a frequently requested test in forensic pathology. The variability of this value was studied by measuring the blood alcohol concentration from six sites in nine subjects at necropsy in whom alcohol was the implicated cause of death. There were small consistent differences in the blood alcohol concentrations between the sites in the nine subjects ( $p < 0.04$ ). Calculation of the mean blood:vitreous humour alcohol concentration ratio (B:V ratio) showed that vitreous humour alcohol concentration most closely reflected the concentration at the femoral vein (B:V ratio = 0.94,  $r = 0.98$ ), which is considered the optimal site for blood alcohol measurement. The correlation of left heart blood with femoral blood was lower compared with the other sites. There is a potential for an unacceptably large variation in the postmortem measurement of blood alcohol within each subject.

Trojanowska M.

**Acta Pol Pharm.** 1967;24(3):331-4.

**[The formation of endogenous ethanol in the blood and urine of cadavers]**

[Article in Polish]

Van den Oever R.

**Arch Belg Med Soc.**1977 Mar;35(3):181-91.

**[Postmortem alcohol concentration in blood and vitreous humor]**

[Article in Dutch]

Winek CL, Esposito FM.

**Leg Med.**1985;:34-61.

**Blood alcohol concentrations: factors affecting predictions.**

As a result of extensive alcohol research conducted on both humans and animals, it is possible to predict a BAC, given pertinent data. In addition, it is possible to estimate from a given BAC the quantity of alcohol consumed. Caution must be used in these predictions, for certain factors will affect the final estimation. Absorption of alcohol is influenced by gastrointestinal contents and motility, and also the composition and quantity of the alcoholic beverage. The vascularity of tissues influences the distribution of alcohol, and their water content will determine the amount of alcohol present after equilibrium. Elimination of alcohol begins immediately after absorption. The elimination rate varies for individuals but falls between .015 percent to .020 percent per hour, with an average of .018 percent per hour. In addition to these factors, a BAC will depend on the subject's weight, percentage of alcohol in the beverage, and the rate of drinking. The principal effect of alcohol in the body is on the central nervous system. Its depressant effect consists of impairment to sensory, motor and learned functions. When combined with some other drugs, a more intoxicated state occurs. Although tolerance to alcohol at low blood concentrations is possible, the tolerance most noted is a learned tolerance among chronic drinkers. Contamination of antemortem blood samples collected for alcohol analysis is minimal when swabbing with an ethanolic antiseptic is performed with routine clinical technique; sloppy swabbing has been shown to increase the BAC determination significantly. The alcoholic content of blood used for transfusion does not contribute significantly to the BAC of the recipient, since extensive dilution occurs; nor does the alcohol present in injectable medication contribute significantly. Although many factors may alter the concentration of alcohol present in autopsy specimens, postmortem synthesis of alcohol receives the most attention. The microorganisms that cause postmortem ethanol production can be inhibited by adding a preservative to the samples and storing them under refrigeration. Should putrefaction be present, it is recommended that, in addition to blood, several different specimens be collected and analyzed for the presence of alcohol. Antemortem blood samples containing ethanol, collected using sterile tubes and techniques, may be analyzed up to 14 days later with reasonable certainty that the ethanol level reflects that which was present at the time of collection.

Winek CL, Murphy KL, Winek TA.

**Forensic Sci Int.**1984 Aug;25(4):277-81.

**The unreliability of using a urine ethanol concentration to predict a blood ethanol concentration.**

Of approximately 5,000 forensic cases with a positive ethanol result, over 1,000 were available in which both blood and urine were present for comparison of ethanol content. Data were examined for calculation of the urine to blood ethanol concentration ratio, with the intent of evaluating the validity of predicting a blood ethanol level given a urine ethanol level. The overall urine to blood ethanol concentration ratio was 1.57:1 with a range of 0.7 to 21.0:1. The extremely wide range of values implies that a large degree of error would be introduced if a mean ratio was used when predicting a blood ethanol level from a urine ethanol level.

## Additional References

1. Jones AW, Pounder DJ. Measuring blood alcohol concentration for clinical and forensic purposes. In: Karch S, ed. *Handbook of drug abuse*. Boca Raton, Florida: CRC Press, 1997.
2. Garriott JC. Analysis of alcohol in postmortem specimens. In: Garriott JC, ed. *Medicolegal aspects of alcohol determination in biological specimens*. Littleton, Mass: PSG Publishing, 1988.
3. Corry JE. Possible sources of ethanol ante- and post-mortem: its relationship to the biochemistry and microbiology of decomposition. *J Appl Bacteriol* 1978;44:1-56.
4. Nanikawa R, Moriya F, Hashimoto Y. Experimental studies on the mechanism of ethanol formation in corpses. *Z Rechtsmed* 1988;101:21-6.

Various in vitro experiments were performed for the purpose of clarifying the mechanism of ethanol production in corpses. Whereas a negligible quantity of ethanol was produced in the blood alone, which was left at room temperature, the quantity of ethanol was slightly increased by addition of glucose to the blood. When saprogens were further added, the quantity was markedly increased. Various materials were added to blood-liver homogenates as specimens, and the mixtures were stored in an incubator at 37 degrees C. As a result of the addition of an antibiotic to the mixture every day, there was hardly any production of ethanol. When alcohol dehydrogenase (ADH) and reduced nicotinamide adenine dinucleotide (NADH) were added, ethanol production was slightly increased. When acetaldehyde was added first, ethanol production was inhibited the next day, but on and after day 2, the quantity of ethanol was more than that in the control material. When pyruvic acid was added first, the results were similar to the above. Pyrazole, cyanamide, and disulfiram completely inhibited the production of ethanol. Ethanol production in corpses is believed to take place through a pathway opposite to that of ethanol metabolism in the living body, under the influence of ADH, ALDH, etc., in saprogens using carbohydrates as substrates.

5. Zumwalt RE, Bost RO, Sunshine I. Evaluation of ethanol concentrations in decomposed bodies. *J Forensic Sci* 1982;27:549-54.
6. Canfield DV, Kupiec T, Huffine E. Postmortem alcohol production in fatal aircraft accidents. *J Forens Sci* 1993;38:914-7.
7. Pounder DJ, Kuroda N. Vitreous alcohol is of limited value in predicting blood alcohol. *Forens Sci Int* 1994;65:73-80.
8. Kuroda N, Williams K, Pounder DJ. Estimating blood alcohol from urinary alcohol at autopsy. *Am J For Med Path* 1995;16:219-22.
9. Harper DR. A comparative study of the microbiological contamination of postmortem blood and vitreous humour samples taken for ethanol determination. *Forens Sci Int* 1989;43:37-44.
10. Levine B, Smith ML, Smialek JE, Caplan YH. Interpretation of low postmortem concentrations of ethanol. *J Forens Sci* 1993;38:663-7.
11. Mayes R, Levine B, Smith ML, Wagner GN, Froede R. Toxicological findings in the USS Iowa disaster. *J Forens Sci* 1992;37:1352-7.
12. Marraccini JV, Carroll T, Grant S, Halleran S, Benz JA. Differences between multisite postmortem ethanol concentrations as related to agonal events. *J Forens Sci* 1990;35:1360-6.
13. Pounder DJ, Smith DRW. Postmortem diffusion of alcohol from the stomach. *Am J Forens Med Path* 1995;16:89-96.

14. Briglia EJ, Bidanset JH, Dal Cortivo LA. The distribution of ethanol in postmortem blood specimens. *J Forens Sci* 1992;37:991-8.
15. Knight B. *Forensic pathology*. London: Edward Arnold, 1991:493-4.
16. Cox DE, Sadler DW, Pounder DJ. Alcohol estimation at necropsy. *J Clin Pathol* 1997;50:197-201.

AIMS: To gather data on blood alcohol concentrations in a forensic necropsy population and to analyse the information on trends that may predict where alcohol testing is going to prove cost-effective. METHODS: Alcohol assays were performed on blood, urine, and vitreous samples in 1620 consecutive medicolegal necropsy examinations. RESULTS: Alcohol was detected in only 7% of natural deaths from all causes and in four of 40 deaths categorised as unknown/obscure. Alcohol concentrations  $\geq 350$  mg/100 ml were found in nine drug/alcohol abuse deaths (range 362-506 mg/100 ml), five accidental deaths (356-504 mg/100 ml), and one homicide victim (400 mg/100 ml). Those categorised as alcohol abusers were represented in all but one category of death (unknown/obscure deaths in males), showing that many true alcoholics die with their alcoholism rather than of it; 39% of males and 34% of females with histories of alcohol abuse had alcohol present in their blood at necropsy at concentrations  $\geq 50$  mg/100 ml, v only 9% (male) and 6% (female) without such history. CONCLUSIONS: The study highlights the problems of elderly and "hidden" alcoholics and illustrates cases where routine assays would provide additional significant information. Routine alcohol testing is useful in all cases of suspected unnatural death but universal testing of forensic necropsies is not cost-effective.

### Website Information

<http://www.coheadquarters.com/coFire/cofire4.htm>

Death from CO in Fire and Non-Fire Situations: Role of Alcohol (Ethanol, Ethyl Alcohol, ETOH) in Death from CO

[http://www.vv.se/traf\\_sak/t2000/POSTER7.pdf](http://www.vv.se/traf_sak/t2000/POSTER7.pdf)

"Blood alcohol concentrations in an autopsy material in practice of the Institute of Forensic Research in 1990-1999"

Gubala, W.; Piekoszewski, W. (Poland)

<http://bmj.bmjjournals.com/cgi/content/full/316/7125/87>

BMJ 1998;316:87 (10 January)

"Dead sober or dead drunk? May be hard to determine"

### Carbon Monoxide Determination During Autopsy (abstracts provided where available)

Barillo DJ, Rush BF Jr, Goode R, Lin RL, Freda A, Anderson EJ Jr.

**Am Surg.1986 Dec;52(12):641-5.**

**Is ethanol the unknown toxin in smoke inhalation injury?**

Of the 12,000 fire-related deaths occurring annually in the United States, it is estimated that 60 to 80 per cent are due to smoke inhalation. Plastic and synthetic materials which have been introduced in home construction and furnishings produce a more toxic smoke when burned. Efforts to identify a "supertoxin" in this smoke have been unsuccessful to date. An alternative approach is to examine why victims are unable to escape, and become exposed to smoke for lethal periods of time. The authors

examined the circumstances of death in 39 fire victims (27 adults, 12 children) over a 25-month period. Detailed examination of the fire scene, autopsy studies, and toxicologic analysis were carried out. Position of the victim, and escape efforts were noted. Carbon monoxide was elevated in all victims, with “lethal” levels (=greater than 50%) in 21/39 victims. Cyanide was detected in 24/29 victims, but none had lethal (3 mg/L) levels present. Ethanol was detected in 21/26 adults (80%) and 0/12 children (0%). 18/26 adult victims had ethanol levels above the statutory level of intoxication (10 mg%). Victims found in bed (no escape attempt) had a mean blood ethanol level of 268 mg%, compared with a mean level of 88 mg% in those victims found near an exit ( $P = .006$ ). Ethanol intoxication significantly impairs the ability to escape from fire and smoke and is a contributory factor in smoke-related mortality.

Blackmore DJ.

**Analyst.1970 May;95(130):439-58.**

**The determination of carbon monoxide in blood and tissue.**

Chen KC, Lee EW, McGrath JJ.

**J Appl Toxicol.1984 Jun;4(3):145-9.**

**Effect of intermittent carbon monoxide inhalation on erythropoiesis and organ weights in rats.**

Sprague-Dawley rats were exposed to 450 ppm carbon monoxide (CO) for 6 h per day, 5 days per week for 33 days. The effect of CO on reticulocyte count, hematocrit, hemoglobin concentration, body weight and selected organ weights was measured. Exposure to CO caused a three-fold increase in the youngest reticulocyte population, concomitant with an increase in the total reticulocyte count. Despite continued CO exposure, reticulocyte number and distribution returned to normal by day 9, suggesting that reticulocyte response of the organism to CO had changed. Both hematocrit and hemoglobin concentrations began to increase 16 days after CO exposure and remained at the increased level for the duration of the exposure period. There were no changes in kidney, liver and adrenal weights throughout the course of study. However, spleen weight was increased after 5 days of CO exposure. Left and right ventricular organ weight ratios increased equally at the same time during the study. These results indicate that the increase in the young reticulocyte population and the subsequent increase in total reticulocyte count are the earliest erythropoietic responses to intermittent CO exposure and that CO-induced polycythemia is associated with cardiac hypertrophy in rats.

Christensen AM, Icove DJ.

U.S. Tennessee Valley Authority Police, 400 W. Summit Hill Dr., WT-3D,

Knoxville, TN, USA

**J Forensic Sci.2004 Jan;49(1):104-7.**

**The application of NIST's Fire Dynamics Simulator to the investigation of carbon monoxide exposure in the deaths of three Pittsburgh fire fighters.**

A case is reported in which computer fire modeling was used to reevaluate a fire that killed three fire fighters. NIST's Fire Dynamics Simulator (FDS) was employed to model the fire in order to estimate the concentration of carbon monoxide present in the dwelling, which was the immediate cause of death of two of the fire fighters, who appear to have removed their face pieces in order to share available air. This estimate, along with an assumed respiration volume and known blood carboxyhemoglobin, was plugged into a standard equation to estimate the time of exposure. The model indicated that 27 min into the fire, the carbon monoxide concentration had already reached approximately 3600 ppm. At this

concentration, and a respiration of 70 L/min, an estimated 3 to 8 min of exposure would have been required to accumulate the concentrations of carboxyhemoglobin (49, 44, and 10%) measured on the fire fighters at autopsy.

Freireich AW, Landau D.

**J Forensic Sci.1971 Jan;16(1):112-9.**

**Carbon monoxide determination in postmortem clotted blood.**

Grabowska T, Sybirska H, Malinski M.

Katedry Medycyny Sadowej Slaskiej AM w Katowicach

**Arch Med Sadowej Kryminol.2003 Jan-Mar;53(1):9-17.**

**[Attempt to estimate risks of fatal poisoning on the basis of HCN and HbCO concentrations in blood of fire victims]**

[Article in Polish]

Using the results of HCN and HbCO concentrations in the blood of 174 deceased found in different burning spaces and 35 people with symptoms of poisoning evacuated from the scene of a fire and then admitted to hospital. The correlation between blood concentration of both these xenobiotics and death or chance of survival in a fire was estimated by statistical analysis. An attempt was made to define a value of so-called "cut-off" points for HbCO and HCN by independence test chi 2 with Yates's correction. Point and interval estimations (95% Comfield's confidence interval) were used for the odds ratio (OR). The research showed that there was a strict statistical correlation between the chance of survival and death risks dependent on blood concentrations of HCN and HbCO in all the groups examined.

Hirsch CS, Adelson L.

**JAMA.1969 Dec 22;210(12):2279-80.**

**Absence of carboxyhemoglobin in flash fire victims.**

Iffland R, Sticht G.

**Arch Toxikol.1972;29(4):325-30.**

**[Gas chromatographic method for determination of carbon monoxide in blood]**

[Article in German]

Jones JS, Lagasse J, Zimmerman G.

Emergency Medicine Residency Program, Butterworth Hospital, Grand Rapids, MI.

**Am J Emerg Med.1994 Jul;12(4):448-51.**

**Computed tomographic findings after acute carbon monoxide poisoning.**

Selective necrosis and degeneration of the globus pallidus are characteristic autopsy findings in patients with severe carbon monoxide (CO) poisoning. The objective of this study was to show that computed tomography (CT) may demonstrate these morphological changes in the brain during life, and provide a clue to prognosis. The authors reviewed the medical records of 19 consecutive patients with acute CO poisoning who underwent CT examination during hospitalization. Abnormal CT findings were found in 10 of the 19 patients (53%). The most common abnormal findings were low-density areas in the basal ganglia. These lesions were found in 7 of the 10 cases, and varied from small (limited to

the globus pallidus) to large (extending to the internal capsule). Of the 10 patients with abnormal CT scans, 9 survived to hospital discharge but all had some degree of functional neurological impairment. Eighty-nine percent (8 of 9) of the patients with normal CT scans were discharged neurologically intact. Awareness of the potential for basal ganglia lesions in CO poisoning should lead to more accurate CT interpretation and may have significant prognostic implications

Kojima T, Nishiyama Y, Yashiki M, Une I.

**Forensic Sci Int.1982 May-Jun;19(3):243-8.**

**Postmortem formation of carbon monoxide.**

Since carbon monoxide (CO) production after death was suggested in a drowned body, CO and carboxyhemoglobin (HbCO) levels in blood and body cavity fluids of cadavers which were not exposed to fire and CO have been analyzed. CO released from the tissues was determined by gas chromatography and gas chromatography-mass spectrometry, and the total concentration of hemoglobin (Hb) was measured as cyanmethemoglobin (CNmHb). The HbCO level was calculated by the ratio of CO content and CO-binding capacity. CO levels (ml/100 g at STP) of the seven cases in which blood and body cavity fluids could be collected ranged from 0.13 to 0.87 in blood and 0.02 to 0.80 in body cavity fluids. HbCO levels in blood and body cavity fluids were from 0.3 to 6.0% and from 2.3 to 44.1%, respectively. In a typical case showing postmortem formation of CO, the CO levels in body cavity fluids were higher than that in blood. It is suggested that CO in a putrefied body is due to CO in blood prior to death and the CO formed by the decomposition of Hb, myoglobin and other substances during putrefaction. The significance of HbCO levels in body cavity fluids of cases with marked postmortem decomposition seems difficult to interpret without the value of HbCO in blood.

Kuller LH, Radford EP, Swift D, Perper JA, Fisher R.

**Arch Environ Health.1975 Oct;30(10):477-82.**

**Carbon monoxide and heart attacks.**

A study of the relationship between carbon monoxide exposure and heart attacks was conducted in Baltimore. There was no evidence of clustering of either myocardial infarction or sudden ASHD on a specific day, nor was there correlation between the number of cases per day and ambient CO levels. Postmortem HbCO levels were slightly higher in ASHD sudden deaths than in sudden deaths due to other causes. Any differences were probably primarily due to cigarette smoking. Cigarette smokers who died suddenly due to ASHD had substantially higher postmortem HbCO levels than nonsmokers. Practically all of the elevated HbCO levels could be related to cigarette smoking or specific environmental exposure. There were no differences between HbCO levels in ASHD sudden death patients and in living controls. There was also no relationship between cardiac pathologic findings and postmortem HbCO levels among patients dying suddenly of ASH.

Kunsman GW, Presses CL, Rodriguez P.

Forensic Toxicology Laboratory, Bexar County Medical Examiner's Office, San Antonio, Texas 78229, USA.

**J Anal Toxicol.2000 Oct;24(7):572-8.**

**Carbon monoxide stability in stored postmortem blood samples.**



Carbon monoxide (CO) poisoning remains a common cause of both suicidal and accidental deaths in the United States. As a consequence, determination of the percent carboxyhemoglobin (%COHb) level in postmortem blood is a common analysis performed in toxicology laboratories. The blood specimens analyzed are generally preserved with either EDTA or sodium fluoride. Potentially problematic scenarios that may arise in conjunction with CO analysis are a first analysis or a reanalysis requested months or years after the initial toxicology testing is completed; both raise the issue of the stability of carboxyhemoglobin in stored postmortem blood specimens. A study was conducted at the Bexar County Medical Examiner's Office to evaluate the stability of CO in blood samples collected in red-, gray-, and purple-top tubes by comparing results obtained at the time of the autopsy and after two years of storage at 3 degrees C using either an IL 282 or 682 CO-Oximeter. The results from this study suggest that carboxyhemoglobin is stable in blood specimens collected in vacutainer tubes, with or without preservative, and stored refrigerated for up to two years.

Malik MO.

**J Forensic Sci Soc.**1971 Jan;11(1):21-8.

**Problems in the diagnosis of the causes of death in burned bodies.**

Mallach HJ, Mittmeyer HJ.

**Beitr Gerichtl Med.**1979;37:393-9.

**[Effect of exposure, alcohol and body disposition on the carbon monoxide concentration of fatal poisonings]**

[Article in German]

Mayes RW.

RAF Institute of Pathology and Tropical Medicine, Halton Aylesbury.

**J Clin Pathol.**1993 Nov;46(11):982-8.

**ACP Broadsheet No 142: November 1993. Measurement of carbon monoxide and cyanide in blood.**

Miyazaki T, Kojima T, Yashiki M, Chikasue F, Iwasaki Y.

Department of Legal Medicine, Hiroshima University School of Medicine, Japan.

**Int J Legal Med.**1992;105(2):65-8.

**Interpretation of COHb concentrations in the left and right heart blood of cadavers.**

Carbon monoxide hemoglobin (COHb) concentrations in left and right heart blood samples from cadavers both exposed and not exposed to fire or CO gas were analyzed by the gas chromatographic method. The COHb concentration ratio between samples of left and right heart blood (L/R ratio) does not appear to be useful for establishing whether death has occurred before or after exposure to fire with the exception of cases where no soot can be detected in the airways by the naked eye and the COHb concentration in the blood sample is within the level considered normal for tobacco smokers.

Morinaga M, Kashimura S, Hara K, Hieda Y, Kageura M.

Department of Forensic Medicine, Fukuoka University School of Medicine, Japan.

**Int J Legal Med.**1996;109(2):75-9.

**The utility of volatile hydrocarbon analysis in cases of carbon monoxide poisoning.**



A new approach to investigate the circumstances relating to carbon monoxide intoxication by analysing volatile hydrocarbons in the blood of cadavers is reported. Headspace gas chromatography/mass spectrometry was used to demonstrate the hydrocarbons. The results can be characterized into four categories depending on the compounds detected. In construction fire cases where no accelerants were found at the scene benzene, toluene and styrene were detected in the blood. In cases where gasoline was found in the fire debris surrounding the victim, high levels of benzene, toluene, ethylbenzene, xylene isomers, n-hexane and n-heptane were detected in the blood. In cases where kerosene was found in the fire debris around the victim, benzene, toluene, ethylbenzene, xylene isomers, C9-aromatics (n-propylbenzene, trimethyl-benzene isomers), n-octane, n-nonane and n-decane were detected in the blood. In cases where the victim was found inside a gasoline-fuelled automobile filled with exhaust gas, benzene, toluene, ethylbenzene, xylene isomers, C9-aromatics were found, but no aliphatic hydrocarbons such as components of petroleum. The analyses of the combustion gases of inflammable materials, exhaust gas, gasoline vapours and kerosene vapours were also performed to evaluate the results of the blood analyses. Consequently, some compounds are proposed as indicators to discriminate between inhaled gases i.e. styrene in common combustion gas, n-hexane and n-heptane as well as benzene, toluene and C9-aromatics in gasoline cases, n-nonane and n-octane as well as benzene, toluene and C9-aromatics in kerosene cases, and benzene, toluene, C9-aromatics but no aliphatic hydrocarbons in exhaust gas cases.

Nakatome M, Matoba R, Ogura Y, Tun Z, Iwasa M, Maeno Y, Koyama H, Nakamura Y, Inoue H.  
Department of Legal Medicine, Course of Social Medicine, Osaka University Graduate School of Medicine,  
Suita City, Japan. nakatome@legal.med.osaka-u.ac.jp

**Int J Legal Med. 2002 Feb; 116(1):17-21.**

**Detection of cardiomyocyte apoptosis in forensic autopsy cases.**

The purpose of the present study was to determine reliable parameters for the detection of apoptotic cells for use as a diagnostic marker during the early stage of acute myocardial infarction (AMI) in forensic autopsy cases. Myocardial tissues taken from forensic autopsy cases were examined by immunohistochemical and molecular-biological methods using the terminal deoxynucleotidyl transferase-mediated dUTP biotin nick end-labelling (TUNEL) and the DNA laddering methods. In cases of AMI with a time period between 2 h from onset to death and 20 h post-mortem time, the nuclei of cardiomyocytes were stained positive with the TUNEL method and DNA fragmentation of myocardial cells was detected by agarose gel electrophoresis. Similar findings were obtained in cases of carbon monoxide (CO) intoxication. However, no apoptotic cells were found in other cases such as methamphetamine (MAP) intoxication, tetrodotoxin intoxication, alcohol intoxication, asphyxia, head injury, heart injury or myocarditis. These findings suggested that it would be possible to apply TUNEL-positive cells as a diagnostic marker during the early stages of AMI.

Perrigo BJ, Joynt BP.

Central Forensic Laboratory, Royal Canadian Mounted Police, Ottawa.

**J Anal Toxicol. 1989 Jan-Feb; 13(1):37-46.**

**Evaluation of current derivative spectrophotometric methodology for the determination of percent carboxyhemoglobin saturation in postmortem blood samples.**

Carbon monoxide intoxication continues to be a commonly encountered cause of death in most areas of Canada. The forensic nature of the samples in these cases presents special problems that are not

normally encountered in clinical determinations. A study was undertaken to assess various methods of determining the percent carboxyhemoglobin saturation in blood, more specifically, those using derivative spectrophotometric measurements in the Soret region of the UV spectrum. At the same time, other studies were carried out: the effects of storage time on the carboxyhemoglobin levels; evaluation of sample containers; comparison of percent carboxyhemoglobin saturation in blood samples taken ante-mortem and post-mortem. Blood for the study was obtained from laboratory animals that were exposed to carbon monoxide before death.

Oritani S, Zhu BL, Ishida K, Shimotouge K, Quan L, Fujita MQ, Maeda H.  
Department of Legal Medicine, Osaka City University Medical School, Asahi-machi  
1-4-3, Abeno, 545-8585, Osaka, Japan

**Forensic Sci Int.2000 Sep 11;113(1-3):375-9.**

**Automated determination of carboxyhemoglobin contents in autopsy materials using head-space gas chromatography/mass spectrometry.**

To establish a method for the routine analysis of carboxyhemoglobin (COHb) in autopsy materials including those which have undergone postmortem changes, e.g. thermo coagulation, putrefaction and contamination, an automated head-space gas chromatography/mass spectrometry (GC/MS) analysis was utilized. The procedure consisted of preparation of the sample in a vial and a carbon monoxide (CO) saturated sample, for estimation of hemoglobin content, in another vial, the addition of n-octanol, potassium ferricyanide and an internal standard (t-butanol), GC separation and determination of CO using a GC/MS system equipped with an automated head-space gas sampler. The method was practical not only with the blood and bone marrow aspirates to confirm the findings on the CO-oximeter system, but also with the thermo-coagulated and putrified blood.

Quan L, Zhu BL, Fujita MQ, Maeda H.  
Department of Legal Medicine, Osaka City University Medical School, Asahi-machi  
1-4-3, Abeno, 545-8585 Osaka, Japan. legalmed@med.osaka-cu.ac.jp

**Leg Med (Tokyo).2003 Mar;5 Suppl 1:S335-7.**

**Ultrasonographic densitometry of the lungs at autopsy: a preliminary investigation for possible application in forensic pathology.**

The aim of the present study was to examine the possible application of ultrasonographic (US) densitometry of the lungs to quantitative evaluation of pulmonary edema at autopsy (n=85). A diagnostic ultrasound device LOGIQ alpha200 (GE Yokogawa Medical Systems) equipped with an LH probe (linear, 7.5 MHz) was used and each lobe of the lungs was scanned on the anterior and posterior surfaces after resection. The US density showed a correlation between the left and right lobes, and also between the anterior and posterior surface scans of each lobe. Although there was a correlation between the US density and combined lung weight in total cases, the density ranged very widely when lung weight was below about 1300 g, depending on the cause of death. The density was high in drowning, asphyxia, poisoning and delayed traumatic death, whereas it was usually low in fire death mainly due to burns, hemorrhagic shock and head injury. In the other causes of death, a considerable case-to-case difference was observed independent of the lung weight. These findings suggested a possible contribution of pulmonary edema to high US density, possibly depending on the survival time and irrespective of the blood contents (congestion or postmortem hypostasis).

Quan L, Zhu BL, Oritani S, Ishida K, Fujita MQ, Maeda H.  
Department of Legal Medicine, Osaka City University Medical School, Japan.

**Int J Legal Med.2001;114(6):310-5.**

**Intranuclear ubiquitin immunoreactivity in the pigmented neurons of the substantia nigra in fire fatalities.**

To evaluate the significance of immunohistochemical staining of ubiquitin (heat shock protein) in the midbrain for medico-legal investigation of death in fires, we examined forensic autopsy cases of fire fatalities (n = 35) in comparison with controls (n = 27; brain stem injury, acute myocardial infarction and carbon monoxide poisoning other than fire fatality). There were two intranuclear staining patterns in the nuclei of pigmented substantia nigra neurons: a type of inclusion (possible Marinesco bodies) and a diffuse staining. Percentage of nuclear ubiquitin positivity (Ub-positive %) in fire fatalities (2.7-44.7%; mean, 18.5%) was significantly higher than in brain stem injury (n = 9; 0-10.4%; mean, 4.5%) and myocardial infarction (n = 14; 1.5-14.6%; mean, 6.9%), independently of blood carboxyhemoglobin (COHb) levels. Age-dependent increase in Ub-positive % was observed in lower COHb (< 60%) cases. The intranuclear diffuse ubiquitin staining was not observed in cases of high blood cyanide level (> 1.0 microg/ml). These observations showed that intranuclear ubiquitin immunoreactivity of the pigmented substantia nigra neurons in the midbrain was induced by severe stress in fires.

Reys LL, Santos JC.  
Institute of Legal Medicine, University School of Medicine, Lisbon, Portugal.

**Am J Forensic Med Pathol.1992 Mar;13(1):33-6.**

**Importance of information in forensic toxicology.**

Information in forensic toxicology plays a very important role. The forensic pathologist usually seeks toxicologic analyses on basis of the information available at the time of the medicolegal autopsy. Such information may be obtained from different sources: hospitals, authorities, relatives, friends, or neighbors of the deceased and, obviously, macroscopic findings at the time of the autopsy. In order to evaluate the relative importance of these different sources of information, the authors have studied, retrospectively, results of 580 postmortem examinations performed at the Institute of Legal Medicine of Lisbon, wherein toxicologic analyses had been requested. These cases pertain to the years 1987 and 1988, but do not include alcohol determination in the blood in cases of traffic accidents. In 274 (47.4%) of the 580 cases, there were positive findings while in the remaining 306 (52.6%) findings were negative. In cases with positive findings, circumstances and factors, which may have influenced the pathologist's decision to request toxicologic analysis, are discussed. In more than half the cases, hospital information was the decisive factor, while in approximately 25% of the cases, autopsy findings were the justification. In contrast, it is worth mentioning that in approximately 45% of the cases with analytical negative results, requests were made, in cases of blank autopsies, for toxicologic analyses in order to exclude the possibility of poisoning. It is interesting to note that in the same proportion requests were justified on grounds of hospital information. Some of the factors that may explain this apparent discrepancy are discussed. Finally, the relevance of background information is emphasized at the level of the interpretation of analytical results, whether positive or negative.

Schmidt P, Musshoff F, Dettmeyer R, Madea B.

Institut für Rechtsmedizin, Universität Bonn.

**Arch Kriminol.**2001 Jul-Aug;208(1-2):10-23.

**[Unusual carbon monoxide poisoning]**

[Article in German]

Despite of indicative death scenes or characteristic findings of the external examination, about 40% of the accidental fatal intoxications due to carbon monoxide are not recognized before the performance of the autopsy. Six cases are reported which illustrate possible reasons for the delayed establishment of the diagnosis: unusual circumstances of the intoxication or sources of carbon monoxide, only subtle degree or lack of external signs of the intoxication or a competing cause of death at autopsy.--Cases 1 and 2: 53, respectively 54-year-old couple, found dead in a caravan, extreme putrefaction of the bodies, spectrophotometric detection of the fatal carboxyhaemoglobin level in oedema fluid of the scalp.--Case 3: 23-year-old lorry driver, found dead in the tightly closed cab of his lorry, operation of a source of electricity with "environmentally friendly" fuel, carboxyhaemoglobin level 83%.--Case 4: 19-year-old man, found dead in the flat of friends, removal of the CO-source before alerting the police forces, lack of the bright pink coloration of livor mortis, haemopericardium due to atrial rupture at postmortem examination, carboxyhaemoglobin level 65%.--Case 5: 27-year-old man, found dead in his flat, advanced decomposition of the body, residues of a charcoal fire in a metal bucket in the sink, carboxyhaemoglobin level 80%.--Case 6: 42-year-old woman, lying dead in the garage beside her car, engine switched-off, ignition key next to the body on the floor under the car, carboxyhaemoglobin level 46%.

Shinomiya T, Shinomiya K.

**Acta Med Leg Soc (Liege).**1989;39(1):131-43.

**[The variation in carbon monoxide release in the blood stain and in visceral tissues]**

[Article in French]

Teige B, Lundevall J, Fleischer E.

**Z Rechtsmed.**1977 Jul 5;80(1):17-21.

**Carboxyhemoglobin concentrations in fire victims and in cases of fatal carbon monoxide poisoning.**

The study comprises an eleven-year autopsy material of 141 cases from the Institute of Forensic Medicine, Oslo. The fatal level of carboxyhemoglobin concentration is calculate from cases of pure carbon monoxide poisoning. Carboxyhemoglobin concentrations below this level are found in approximately thirty percent of the fire victims. Alcohol intoxication, present in many fire victims, is not related to low corboxyhemoglobin concentrations.

von Meyer L, Drasch G, Kauert G.

**Z Rechtsmed.**1979;84(1):69-73.

**[Significance of hydrocyanic acid formation during fires]**

[Article in German]

Cyanide concentrations of blood samples from fire victims autopsied in the Institute of Legal Medicine, Munich, have been determined. In 25% of 48 analyzed cases cyanide concentrations from 0.52 microgram to 6.24 microgram Cyanide/ml blood have been detected. These results are compared to former studies and the higher mean level in our collective is emphasized. The importance of

hydrocyanid acid in the toxicity of fire gases is evidently greater, than assumed. Hydrocyanic acid may be produced from nitrogen containing polymers during combustion. The quote of these polymers in clothing, furniture, and also in equipment of cars is increasing. Therefore, it is necessary to take more notice of the formation of hydrocyanic acid during combustion, even though carbon monoxide is in general the main toxic agent in fire gases.

Winek CL, Prex DM.

**Forensic Sci Int. 1981 Sep-Oct;18(2):181-7.**

**A comparative study of analytical methods to determine postmortem changes in carbon monoxide concentration.**

Twenty-one autopsy blood samples were analyzed using spectrophotometric and gas chromatographic procedures after storage for 30 and 150 days. When carboxyhemoglobin was measured spectrophotometrically at the absorbance ratio of 540 nm/555 nm, the observed average percent losses were 8 +/- 9% and 35 +/- 27% after 30 and 150 days of storage, respectively. When measured at the absorbance ratio of 540 nm/579 nm, the average percent losses of carboxyhemoglobin were 7 +/- 8% and 34 +/- 25% after 30 and 150 days, respectively. Wavelength shifts and distorted spectral scans were observed at 150 days. When carbon monoxide was determined by gas chromatographic methods based on combining capacity, the average percent loss was 15 +/- 24% and 37 +/- 36% after 30 days and 150 days, respectively. The average percent loss of calculated CO based on hemoglobin concentration after 30 days was 31 +/- 14% and at 150 days, 40 +/- 24%. The average percent loss of calculated CO based on iron content was 23 +/- 13% and 37 +/- 23% after 30 and 150 days, respectively.

Wirthwein DP, Pless JE.

Division of Forensic Pathology, Indiana University, Indianapolis 46202-5120, USA.

**Am J Forensic Med Pathol. 1996 Jun;17(2):117-23.**

**Carboxyhemoglobin levels in a series of automobile fires. Death due to crash or fire?**

The determination of death by trauma versus fire can be of major consideration, especially in civil product liability litigation. Blood carboxyhemoglobin levels can be instrumental in that differentiation. Twenty-eight fatalities involving fire in automobiles were reviewed. All subjects displayed some degree of body burn, and in 25 severe charring and/or incineration was present at autopsy. In only one case was there a history of explosion or flash fire. Carboxyhemoglobin levels varied from 92% to values of < 10%. In seven cases no collision occurred. In six of these subjects COHb values were > or = 47%. In all 16 cases with carboxyhemoglobin levels of < or = 10% a collision occurred. In 12 of 16 of these subjects, blunt force injury sufficient to cause death was discovered. Data presented in this article indicate that a carboxyhemoglobin level of > 30% strongly suggests inhalation of combustion products as the cause of death. In contrast, a level of < 20% should prompt a search for other causes.

Wu SC, Levine B, Goodin JC, Caplan YH, Smith ML.

Office of the Chief Medical Examiner, State of Maryland.

**J Anal Toxicol. 1992 Jan-Feb;16(1):42-4.**

**Analysis of spleen specimens for carbon monoxide.**

Crucial to the investigation of aircraft fatalities is the analysis of biological specimens for carbon monoxide (CO). In many cases, blood specimens are unavailable or unsuitable for analysis, and the

testing of an alternate specimen for CO becomes necessary. Spleen specimens provide a rich source of red blood cells and hence can be a primary substitute for blood. To verify this, 40 paired blood and spleen specimens were analyzed for CO by using a gas chromatographic method. Ten specimens with a spleen CO saturation level (sat.) of less than 10% were associated with corresponding blood specimens with CO sat. less than 10%. Fifteen of the 18 spleen specimens with CO sat. greater than 29% were associated with blood specimens with greater than 48% sat. Results were inconclusive when the spleen CO sat. was between 10 and 29%. We concluded that spleen CO sat. can reflect blood CO sat. in certain situations, particularly when spleen CO sat. is high.

## ■ Appendix A: Death Investigation Systems In The United States And Territories

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Alabama	Mixed: State Medical Examiner and County Coroners/Medical Examiners	County Coroner, State Medical Examiner	<p>Coroner—All deaths where the deceased died without being attended by a legally qualified physician.</p> <p>State Medical Examiner—</p> <ul style="list-style-type: none"> <li>• If the person dies by violence or homicide, suicide, accidental, or industrial.</li> <li>• Criminal abortion.</li> <li>• Sudden death, if in apparent good health.</li> <li>• In suspicious circumstances.</li> <li>• When a public health hazard.</li> <li>• If the body is to be cremated.</li> </ul>	<p>Emily Ward, MD Alabama Department of Forensic Sciences P.O. Box 240591 Montgomery, AL 36124-0591 (334) 242-3093 Fax: (334) 260-8734</p>	Slight differences in death investigation in Jefferson County (Birmingham) from those in other counties.
Alaska	State Medical Examiner	State Medical Examiner	<ul style="list-style-type: none"> <li>• Homicide.</li> <li>• Suspicion of criminal means.</li> <li>• Suicide.</li> <li>• With no physician in attendance.</li> <li>• When physician is unable to execute death certificate.</li> <li>• When cause of death cannot be determined.</li> </ul>	<p>Franc G. Fallico, MD Acting State Medical Examiner 4500 South Boniface Pkwy. Anchorage, AK 99507 (907) 269-5090 Fax: (907) 334-2216 Email: Franc_Fallico@HEALTH.STATE.AK.US</p>	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
American Samoa	Territorial Coroner	No death investigation official.	<ul style="list-style-type: none"> <li>• Where any dead body is found.</li> <li>• By accidental means.</li> <li>• Allegedly caused by unlawful means.</li> </ul>	Malaetasi M. Cogafau Attorney General of American Samoa P.O. Box 7 Pago Pago, AS 96799 (684) 633-4163	Pulenuu (village chief) reports deaths to the Attorney General, or, if necessary, to the Department of Medical Services' local representative, who is authorized to act as Coroner and report findings to the Attorney General.
Arizona	County Medical Examiner	County Medical Examiner	<ul style="list-style-type: none"> <li>• When not under current care of a physician for a potentially fatal illness.</li> <li>• When the attending physician is unavailable to sign the death certificate.</li> <li>• By violence.</li> <li>• Of a prisoner or occurring in prison.</li> <li>• Occurring suddenly to a person in apparent good health.</li> <li>• By occupational disease or accident.</li> <li>• Where a public health hazard is presented.</li> <li>• Occurring during anesthetic or surgical procedures.</li> <li>• Occurring in a suspicious, unusual, or unnatural manner.</li> </ul>	Philip E. Keen, M.D. Medical Examiner Maricopa County 120 South Sixth Avenue Phoenix, AZ 85003 (602) 506-3322 Fax: (602) 506-1546	
Arkansas	Mixed: State Medical Examiner and County Coroners/Medical Examiners	County Coroner, State Medical Examiner	<ul style="list-style-type: none"> <li>• Death appears to be caused by violence, homicide, suicide, or accident.</li> <li>• Death appears to be the result of the presence of drugs or poisons.</li> <li>• Death appears to be the result of a motor vehicle accident or the body was found in or near a roadway or railroad.</li> </ul>	William Q. Sturner, M.D. State Medical Examiner P.O. Box 8500 Little Rock, AR 72215 (501) 227-5936 Fax: (501) 221-1653 Email: William.Sturner@ASCL.State.AR.US	



State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Arkansas (cont'd)			<ul style="list-style-type: none"> <li>• Death appears to be the result of a motor vehicle accident and there is no obvious trauma to the body.</li> <li>• Death occurs while the person is in a State mental institution or hospital and there is no previous medical history to explain the death, or while the person is in police custody, a jail, or penal institution.</li> <li>• Death appears to be the result of a fire or explosion.</li> <li>• Death appears to be the result of drowning.</li> <li>• Death of a minor child appears to indicate child abuse.</li> <li>• Death of an infant or minor child without previous medical history.</li> <li>• Human skeletal remains are recovered.</li> <li>• Decomposition of the body prohibits external examination to rule out injury or circumstances of death cannot rule out the commission of a crime.</li> <li>• Manner of death appears to be other than natural.</li> <li>• Death is sudden and unexplained.</li> <li>• Death occurs at a worksite.</li> <li>• Death is due to criminal abortion.</li> <li>• A physician was not in attendance within 36 hours preceding death or, in pre-diagnosed terminal or bedfast cases, within 30 days. This includes persons admitted to an emergency room, unconscious and unresponsive, following cardiopulmonary resuscitation, who die within 24 hours of admission without regaining consciousness or responsiveness.</li> </ul>		

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
California	Mixed: County Medical Examiners/ Coroners	County Coroner, County Sheriff-Coroner, County Medical Examiner, Coroner	<ul style="list-style-type: none"> <li>• Violent, sudden, or unusual.</li> <li>• Unattended.</li> <li>• Deaths wherein the deceased has not been attended by a physician in the 20 days before death.</li> <li>• Self-induced or criminal abortion.</li> <li>• Known or suspected homicide, suicide, or accidental poisoning.</li> <li>• By recent or old injury or accident.</li> <li>• Drowning, fire, hanging, gunshot, stabbing, cutting, exposure, starvation, acute alcoholism, drug addiction, strangulation, aspiration.</li> <li>• Suspected sudden infant death syndrome.</li> <li>• By criminal means.</li> <li>• Associated with known or alleged rape or crime against nature.</li> <li>• By known or suspected contagious disease constituting a public hazard.</li> <li>• By occupational disease or hazard.</li> <li>• Of State mental hospital patient.</li> <li>• Of developmentally disabled patient in State developmental services hospital.</li> <li>• In prison or while under sentence.</li> <li>• Under other suspicious circumstances.</li> </ul>	Scotty D. Hill Executive Secretary California State Coroners Association 5925 Maybrook Circle Riverside, CA 92506-4549 (909) 788-2656 Fax: (909) 788-2934 Email: CSCA2000@aol. com	41 counties with Sheriff- Coroners. In addition, many County Coroners also serve as Public Administrator, Public Guardian, and Public Conservator.

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Colorado	County Coroner	County Coroner	<ul style="list-style-type: none"> <li>• From external violence.</li> <li>• Unexplained cause.</li> <li>• Under suspicious circumstances.</li> <li>• Suddenly, when in good health.</li> <li>• Where no physician is in attendance, or where the attending physician is unable to certify the cause of death.</li> <li>• From thermal, chemical, or radiation injury.</li> <li>• From criminal abortion.</li> <li>• From disease that may be hazardous or contagious or may constitute a hazard to the public health.</li> <li>• While in custody of law enforcement officials or while incarcerated in a public institution.</li> <li>• From industrial accident.</li> </ul>	<p>James L. Kramer, P.A.C. President Colorado Coroner Association 517 Colorado Avenue Pueblo, CO 81004 (719) 543-4016 Fax: (719) 583-6077 Email: kramerpa@ co.pueblo.co.us</p> <p>Thomas E. Henry, M.D. Chief Medical Examiner/ Coroner Denver City and County 660 Bannock Street Denver, CO 80204-4507 (303) 436-7711 (303) 436-7411 Fax: (303) 436-7709</p>	
Connecticut	State Medical Examiner	State Chief Medical Examiner	<ul style="list-style-type: none"> <li>• Due to criminal abortion, whether apparently self-induced or not.</li> <li>• Violent, whether apparently homicidal, suicidal, or accidental, including but not limited to deaths due to thermal, chemical, electrical, or radiation injury.</li> <li>• Sudden or unexpected deaths not caused by readily recognizable disease.</li> <li>• Under suspicious circumstances.</li> <li>• Where the body is to be cremated, buried at sea, or otherwise disposed of so as to be thereafter unavailable for examination.</li> <li>• Related to occupational disease or accident.</li> <li>• Related to disease which might constitute a threat to public health.</li> </ul>	<p>H. Wayne Carver, II, M.D. Chief Medical Examiner Office of the State Medical Examiner 11 Shuttle Road Farmington, CT 06032-1939 (860) 679-3980 Fax: (860) 679-1257 Email: H.Wayne.Carver@ po.state.ct.us</p>	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Delaware	State Medical Examiner	State Chief Medical Examiner	<ul style="list-style-type: none"> <li>• By violence, suicide, or casualty.</li> <li>• While under anesthesia.</li> <li>• By abortion or suspected abortion.</li> <li>• By poison or suspicion of poison.</li> <li>• Suddenly when in apparent health.</li> <li>• When unattended by a physician.</li> <li>• In prison or penal institution or police custody.</li> <li>• Resulting from employment.</li> <li>• From undiagnosed cause which may be related to a disease constituting a threat to public health.</li> <li>• In any suspicious or unusual manner.</li> <li>• If the body is unclaimed or to be cremated.</li> </ul>	Richard Callery, M.D. State Chief Medical Examiner Office of the Chief Medical Examiner Department of Health and Social Services 200 South Adam Street Wilmington, DE 19801 (302) 577-3420 Fax: (302) 577-3416 Email: rcallery@state.de.us	
District of Columbia	Medical Examiner	Chief Medical Examiner	<ul style="list-style-type: none"> <li>• By violence, whether apparently homicidal, suicidal, or accidental, including deaths due to thermal, chemical, electrical, or radiation injury.</li> <li>• Due to criminal abortion, whether apparently self-induced or not.</li> <li>• Under suspicious circumstances.</li> <li>• Of persons whose bodies are to be cremated, dissected, buried at sea, or otherwise disposed of so as to be thereafter unavailable for examination.</li> <li>• Sudden deaths not caused by readily recognizable disease.</li> <li>• Related to disease resulting from employment or to accident while employed.</li> <li>• Related to disease which might constitute a threat to public health.</li> </ul>	Johnathan L. Arden, M.D. Chief Medical Examiner Office of the Chief Medical Examiner Building 27 1910 Massachusetts Avenue, Southeast Washington, DC 20003 (202) 698-9000 Fax: (202) 698-9100	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Florida	District Medical Examiner	District Medical Examiner	<ul style="list-style-type: none"> <li>• By criminal violence.</li> <li>• By accident.</li> <li>• By suicide.</li> <li>• Suddenly, when in apparent good health.</li> <li>• Unattended by a physician or other recognized practitioner.</li> <li>• In a prison or penal institution.</li> <li>• In police custody.</li> <li>• In any suspicious or unusual circumstances.</li> <li>• By criminal abortion.</li> <li>• By poison.</li> <li>• By disease constituting a threat to public health.</li> <li>• By disease, injury, or toxic agent exposure resulting from employment.</li> <li>• When a body is brought into the State without proper medical certification.</li> <li>• When the body is to be cremated, dissected, or buried at sea.</li> </ul>	<p>Stephen J. Nelson, M.D., M.A., F.C.A.P. Chairman Medical Examiners Commission Florida Department of Law Enforcement P.O. Box 1489 Tallahassee, FL 32302-1489 (850) 410-8600 Fax: (850) 410-8621 Email: JNelsonMD@aol.com</p> <p>Vickie Marsey Program Admin. Medical Examiners Commission Same address as above (850) 410-8660 Fax: (850) 410-8621 Email: VickieMarsey@fdle.state.fl.us</p>	
Georgia	Mixed: State Medical Examiner and County Coroners/Medical Examiners	County Coroner, State Medical Examiner, Regional Medical Examiner, County Medical Examiner, Local Medical Examiner	<ul style="list-style-type: none"> <li>• By violence, suicide, or casualty.</li> <li>• Suddenly, when in apparent good health.</li> <li>• When unattended by a physician.</li> <li>• When an inmate of a State hospital or State, county, or city penal institution.</li> <li>• When ordered by a court having criminal jurisdiction.</li> <li>• After birth but before 7 years of age if the death is unexpected or unexplained.</li> </ul>	<p>Kris Sperry, M.D. State Medical Examiner Division of Forensic Sciences Georgia Bureau of Investigation P.O. Box 370808 Decatur, GA 30037-0808 (404) 244-2709 Fax: (404) 212-3047 Email: kris.sperry@gbi.state.ga.us</p>	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Georgia (cont'd)			<ul style="list-style-type: none"> <li>• In any suspicious or unusual manner, with particular attention to those persons 16 years of age and under.</li> <li>• As a result of an execution carried out pursuant to imposition of the death penalty.</li> </ul>	Randy Hanzlick, M.D. Chief Medical Examiner, Fulton County Fulton County Medical Examiner Center 430 Pryor Street SW Atlanta, GA 30312 (404) 730-4400 Fax: (404) 730-4407 Email: RandyHanzlick@ mail.co.fulton.ga.us	
Guam	Territorial Medical Examiner	Chief Medical Examiner	<ul style="list-style-type: none"> <li>• Violent, unusual, or unnatural deaths. This covers any death attributed to accident, suicide, homicide, criminal abortion, physical, mechanical, electrical, chemical, radiational, thermal, or related means.</li> <li>• All deaths under suspicious circumstances.</li> <li>• Sudden deaths in apparent health without obvious cause.</li> <li>• Deaths without medical attendance: <ol style="list-style-type: none"> <li>1. found dead without obvious or probable cause.</li> <li>2. unattended at anytime by a licensed physician.</li> <li>3. unattended by a physician during a terminal illness, particularly if such death appears unrelated to a disease previously diagnosed and treated.</li> <li>4. fetal death attended by midwife.</li> <li>5. deaths in prison, lock up, penitentiary, or juvenile justice facility.</li> <li>6. deaths during or following an acute or unexplained syncope or coma.</li> <li>7. during an acute or unexplained rapidly fatal illness which may be contagious to the public.</li> </ol> </li> </ul>	Aurelio A. Espinola, M.D. Chief Medical Examiner P.O. Box 7147 Tamuning, GU 96931 (671) 646-9363h	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Guam (cont'd)			<ul style="list-style-type: none"> <li>8. all hospital DOAs (dead on arrival) and those dying within 24 hours after admission.</li> <li>• Bodies to be cremated, buried at sea, or shipped off island.</li> </ul>		
Hawaii	Mixed: County Medical Examiners/ Coroners	County Coroner, Coroner Physician (titled Medical Examiner in Honolulu)	<ul style="list-style-type: none"> <li>• As the result of violence.</li> <li>• As the result of any accident.</li> <li>• By suicide.</li> <li>• Suddenly when in apparent health.</li> <li>• When unattended by a physician.</li> <li>• In prison.</li> <li>• In a suspicious or unusual manner.</li> <li>• Within 24 hours after admission to a hospital or institution.</li> </ul>	Kanthi Von Guenther, M.D. Department of the Medical Examiner 835 Iwilei Road Honolulu, HI 96817 (808) 527-6777 Fax: (808) 524-8797	
Idaho	County Coroner	County Coroner	<ul style="list-style-type: none"> <li>• As a result of violence whether apparently homicidal, suicidal, or accidental.</li> <li>• Under suspicious or unknown circumstances.</li> <li>• When not attended by a physician during his/her last illness and the cause of death cannot be certified by a physician.</li> </ul>	Erwin Sonnenberg Idaho Coroners Association 5550 Morrishill Road Boise, ID 83706 (208) 364-2676 Fax: (208) 364-2685 Email: CRSONNEL@ADAWEB.NET ~	
Illinois	Mixed: County Medical Examiners/ Coroners	County Coroner, County Medical Examiner	<ul style="list-style-type: none"> <li>• Sudden or violent death, whether apparently suicidal, homicidal, or accidental, including but not limited to deaths apparently caused or contributed to by thermal, traumatic, chemical, electrical or radiation injury, or a complication of any of them, or by drowning, suffocation, or motor vehicle accident.</li> <li>• Maternal or fetal death due to abortion.</li> <li>• Due to sex crime or crime against nature.</li> </ul>	Jeff Lair Secretary Illinois Coroners and Medical Examiners Association P.O. Box 1261 Jacksonville, IL 62651 (217) 245-7423 Fax: (217) 479-4637 Email: coroner@direcway.com	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Illinois (cont'd)			<ul style="list-style-type: none"> <li>• Where the circumstances are suspicious, obscure, mysterious, or otherwise unexplained; and where, in the written opinion of the attending physician, the cause is not determined.</li> <li>• Where addiction to alcohol or to any drug may have been a contributory cause.</li> <li>• Where the decedent was not attended by a licensed physician.</li> <li>• Occurring in State institutions or of wards of the State.</li> <li>• If a child under 2 years dies suddenly or unexpectedly and circumstances concerning the death are unexplained.</li> <li>• While being pursued, apprehended, or taken into custody by law enforcement officers or while in custody of any law enforcement agency.</li> </ul>		
Indiana	County Coroner	County Coroner	<ul style="list-style-type: none"> <li>• Has died from violence.</li> <li>• Has died by casualty.</li> <li>• Has died when apparently in good health.</li> <li>• Has died in an apparently suspicious, unusual, or unnatural manner.</li> <li>• Has been found dead.</li> </ul>	Lisa Barker Executive Director Indiana Coroners Association 1643 West 800 South Romney, IN 47981 (877) 692-7284 Fax: (765) 538-2880 Email: ISCABarker@aol.com  James St. Myer President Indiana Coroners Association 4109 Janney Ave. Muncie, IN 47305 (765) 289-0865 Fax: (765) 284-4606 Email: JSTM1079@aol.com	



State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Iowa	State Medical Examiner	State Medical Examiner, County Medical Examiner	<ul style="list-style-type: none"> <li>• Violent, including homicidal, suicidal, or accidental.</li> <li>• Caused by thermal, chemical, electrical, or radiation injury.</li> <li>• Caused by criminal abortion including those self-induced, or by rape, carnal knowledge, or crimes against nature.</li> <li>• Related to disease thought to be virulent or contagious, which might constitute a public hazard.</li> <li>• Occurring unexpectedly or from unexplained causes.</li> <li>• Of a person confined in jail, prison, or correctional institution.</li> <li>• Where a physician was not in attendance at any time at least 36 hours preceding death, with the exception of pre-diagnosed terminal or bedfast cases for which the time period shall be extended to 20 days.</li> <li>• Where the body is not claimed by relatives or friends.</li> <li>• Where the identity of the deceased is unknown.</li> <li>• Of a child under the age of 2 years when sudden infant death syndrome is suspected or cause of death is unknown.</li> </ul>	Julia C. Goodin, M.D., State Medical Examiner Office of the Iowa State Medical Examiner, Iowa Department of Public Health Lucas State Office Building, 5th Floor, 321 East 12th Street Des Moines, IA 50309 (515) 281-6726 Email: <a href="mailto:jgoodin@racoon.com">jgoodin@racoon.com</a>	
Kansas	District Coroner	District Coroner	<ul style="list-style-type: none"> <li>• Death is suspected to have been the result of violence caused by unlawful means, or by suicide.</li> <li>• By casualty.</li> <li>• Suddenly when the decedent was in apparent health.</li> <li>• When the decedent was not regularly attended by a licensed physician.</li> </ul>	Alan Hancock, M.D. President Kansas Coroners Association 9201 Parallel Parkway Kansas City, KS 66112-1598 (913) 299-1474 Fax: (913) 299-4931	
Kansas (cont'd)			<ul style="list-style-type: none"> <li>• In any suspicious or unusual manner, or when in police custody, or when in a jail or correctional institution.</li> <li>• When the determination of the cause of death is held to be in the public interest.</li> </ul>		

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Kentucky	Mixed: State Medical Examiner and County Coroners/Medical Examiners	County Coroner, State Medical Examiner, District Medical Examiner	<ul style="list-style-type: none"> <li>• Caused by homicide, violence, suicide, an accident, drugs, poison, motor vehicle, train, fire, explosion, drowning, illegal abortion, or unusual circumstances.</li> <li>• By criminal means.</li> <li>• Sudden infant death syndrome.</li> <li>• Child abuse.</li> <li>• Death in a person less than 40 years of age with no past medical history to explain the death.</li> <li>• Death occurring at a worksite.</li> <li>• Death in any mental institution.</li> <li>• Death in any prison, jail, or penal institution, or while decedent was in police custody.</li> <li>• When the death was sudden and unexplained or the decedent was unattended by a physician by more than 36 hours prior to death.</li> <li>• When skeletonized or extensively decomposed human remains are found.</li> <li>• When the body is to be cremated.</li> <li>• When circumstances of death result in a request by any responsible citizen for an investigation.</li> </ul>	<p>Tracey S. Corey, MD State Chief Medical Examiner Office of the State Medical Examiner Urban Government Center 810 Barrett Ave. Louisville, KY 40204 (502) 588-5587 Fax: (502) 852-1767</p> <p>Email: TraceySCorey@aol.com</p> <p>Dan Able Executive Director Office of the State Medical Examiner 100 Sower Blvd, Suite 202, Frankfort, KY 40601 (502) 564-4545 Fax: (502) 564-1699 Email: dan.able@ky.gov</p>	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Louisiana	County Coroner	Parish Coroner	<ul style="list-style-type: none"> <li>• When suspicious, unexpected, unusual or sudden.</li> <li>• By violence.</li> <li>• Due to unknown or obscure causes.</li> <li>• Where the body is found dead.</li> <li>• Without attending physician within 36 hours prior to the hour of death.</li> <li>• When abortion, whether self-induced or otherwise, is suspected.</li> <li>• Due to suspected suicide or homicide.</li> <li>• When poison is suspected.</li> <li>• From natural causes occurring in a hospital under 24 hours admission unless seen by a physician in the past 36 hours.</li> <li>• Following an injury or accident, either old or recent.</li> <li>• Due to drowning, hanging, burns, electrocution, gunshot wounds, stabs or cutting, lightning, starvation, radiation, exposure, alcoholism, addiction, tetanus, strangulation, suffocation, or smothering.</li> <li>• Due to trauma from whatever cause.</li> <li>• Stillborn deaths.</li> <li>• Due to criminal means.</li> <li>• If victim of alleged rape, carnal knowledge, or crime against nature.</li> <li>• By casualty.</li> <li>• In prison or while serving a sentence.</li> <li>• Due to virulent contagious disease that might be caused by or cause a public hazard (AIDS cases included).</li> </ul>	Allen Herbert, M.D. President Louisiana Coroners' Association P.O. Box 747 Alexandria, LA 71309 (318) 473-6831 Fax: (318) 473-6832 Email: LSCA@speed- gate.net	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Maine	State Medical Examiner	State Chief Medical Examiner, Medical Examiner	<ul style="list-style-type: none"> <li>• Violence of any kind.</li> <li>• Any cause where the death occurs suddenly while the person is in apparent good health.</li> <li>• Any cause where there is no attending physician capable of certifying the death as due to natural causes.</li> <li>• Poisoning, either chronic or acute.</li> <li>• Diagnostic or therapeutic procedures under circumstances indicating gross negligence or unforeseen clearly traumatic causes.</li> <li>• Any cause while the person is in custody or confinement, unless clearly certifiable by an attending physician as due to natural causes.</li> <li>• Disease or pathological process constituting a threat to public health, if the authority of the medical examiner is required to study the death adequately to protect the public health.</li> <li>• Deaths which may have been improperly certified or inadequately examined, including, but not limited to, bodies brought into the State under these circumstances.</li> <li>• In the case of a child under the age of 3 years, from any cause, including sudden infant death syndrome, unless the death is clearly due to a specific natural cause.</li> </ul>	Margaret S. Greenwald, MD State Chief Medical Examiner State House, Station #37 Augusta, ME 04333 (207) 624-7180 Fax: (207) 624-7178 Email: margaret.greenwald@state.me.us	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Maryland	State Medical Examiner	State Chief Medical Examiner	<ul style="list-style-type: none"> <li>• By violence, suicide, or casualty.</li> <li>• Suddenly when in apparent good health, or when unattended by a physician.</li> <li>• In any suspicious or unusual manner.</li> <li>• Fetuses, regardless of duration of pregnancy, if the mother is not attended by a physician at or after the delivery.</li> </ul>	David Fowler, M.D. Acting State Chief Medical Examiner State of Maryland 111 Penn Street Baltimore, MD 21201 (410) 333-3226 Fax: (410) 333-3063 Email: OCMEMD@aol.com	
Massachusetts	State Medical Examiner	State Chief Medical Examiner, District Medical Examiner	<ul style="list-style-type: none"> <li>• Where criminal violence appears to have taken place, regardless of the time interval between the incident and death, and regardless of whether such violence appears to have been the immediate cause of death, or a contributory factor.</li> <li>• By accident or unintentional injury, regardless of the time interval between the incident and death, and regardless of whether such violence appears to have been the immediate cause of death, or a contributory factor.</li> <li>• Suicide, regardless of the time interval between the incident and death.</li> <li>• Death under suspicious or unusual circumstances.</li> <li>• Death following an illegal abortion.</li> <li>• Death related to occupational illness or injury.</li> <li>• Death in custody, in any jail or correctional facility, or in any mental health or mental retardation facility.</li> <li>• Death where suspicion of abuse of a child, family or household member, elder person, or disabled person exists.</li> <li>• Death due to poison or acute or chronic use of drugs or alcohol.</li> </ul>	Richard Evans, M.D. State Chief Medical Examiner Commonwealth of Massachusetts 720 Albany Street Boston, MA 02118 (617) 267-6767 Toll free in Massachusetts (800) 962-7877 Fax: (617) 266-6763 Email: richard.evans@cme.state.ma.us	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Massachusetts (continued)			<ul style="list-style-type: none"> <li>• Skeletal remains.</li> <li>• Death associated with diagnostic or therapeutic procedures.</li> <li>• Sudden death when the decedent was in apparent good health.</li> <li>• Death within 24 hours of admission to a hospital or nursing home.</li> <li>• Death in any public or private conveyance.</li> <li>• Fetal death as defined by Section 202 of Chapter 111, where the period of gestation has been 20 weeks or more or where fetal weight is 350 grams or more.</li> <li>• Pediatric deaths under and including the age of 18 years from any cause.</li> <li>• Any person found dead.</li> <li>• Death in an emergency treatment facility, medical walk-in center, day care center, or under foster care.</li> <li>• Death occurring under such circumstances as the chief medical examiner shall prescribe in regulations promulgated pursuant to the provisions of Chapter 30 A.</li> </ul>		
Michigan	County Medical Examiner	County Medical Examiner	<ul style="list-style-type: none"> <li>• By violence.</li> <li>• When unexpected.</li> <li>• Without medical attendance during the 48 hours prior to the hour of death unless the attending physician, if any, is able to determine accurately the cause of death.</li> <li>• As the result of an abortion, whether self-induced or otherwise.</li> <li>• Of any prisoner in any county or city jail.</li> </ul>	Dan Remick, M.D. President Michigan Association for Medical Examiners M2210 Medical Science I, 1301 Catherine Road Ann Arbor, MI 48109-0602 (734) 763-6454 Fax: (734) 763-6476 Email: remickd@umich. edu	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Minnesota	Mixed: County Medical Examiners/ Coroners	County Coroner, Medical Examiner (Hennepin, Ramsey Counties)	<ul style="list-style-type: none"> <li>• Violent, whether apparently homicidal, suicidal, or accidental, including but not limited to deaths due to thermal, chemical, electrical, or radiation injuries.</li> <li>• Due to criminal abortion, whether apparently self-induced or not.</li> <li>• Under unusual or mysterious circumstances.</li> <li>• Of persons whose bodies are to be cremated, dissected, buried at sea, or otherwise disposed of so as to be thereafter unavailable for examination.</li> <li>• Of inmates of public institutions who are not hospitalized therein for organic diseases.</li> </ul>	<p>Andrew M. Baker, M.D. Medical Examiner Hennepin County 530 Chicago Avenue Minneapolis, MN 55415 (612) 215-6300 Fax: (612) 215-6330 Email: andrew.baker@co.hennepin.mn.us</p> <p>Michael Rossman Executive Secretary Minnesota Coroners' and Medical Examiners' Association 530 Chicago Avenue Minneapolis, MN 55415 (612) 215-6300 FAX (612) 215-6330 Email: michael.rossman@co.hennepin.mn.us</p>	
Mississippi	Mixed: State Medical Examiner and County Coroners/Medical Examiners	State Medical Examiner, County Medical Examiner (Coroner), County Medical Examiner Investigator (Coroner)	<ul style="list-style-type: none"> <li>• Violent, including homicidal, suicidal, or accidental.</li> <li>• Caused by thermal, chemical, electrical, or radiation injury.</li> <li>• Caused by criminal abortion, including self-induced, or abortion related to or by sexual abuse.</li> <li>• Related to disease thought to be virulent or contagious which may constitute a public health hazard.</li> <li>• Unexpected or from an unexplained cause.</li> <li>• Of a person confined in a prison, jail, or correction institution (autopsy mandatory if prisoner was in custody of State Correctional System).</li> <li>• Of a person where physician was not in attendance within 36 hours preceding death, or in prediagnosed terminal or bedfast cases within 30 days.</li> <li>• Of a person where the body is not claimed by a relative or friend.</li> <li>• Of a person where the identity of the deceased is unknown.</li> </ul>	<p>Sam Howell Administrator Mississippi Crime Laboratory 1700 East Woodrow Wilson Avenue Jackson, MS 39216 (601) 987-1440 Fax: (601) 987-1445 Email: showell@mcl.state.ms.us</p>	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Mississippi (continued)			<ul style="list-style-type: none"><li>• Of a child under the age of 2 years where death results from an unknown cause or where the circumstances surrounding the death indicate that sudden infant death syndrome may be the cause of death (autopsy mandatory).</li><li>• Where a body is brought into this State for disposal and there is reason to believe either that the death was not investigated properly or that there is not an adequate certification of death.</li><li>• Where a person is admitted to a hospital emergency room unconscious and/or unresponsive, with cardiopulmonary resuscitative measures being performed, and dies within 24 hours of admission without regaining consciousness or responsiveness, unless a physician was in attendance within 36 hours preceding presentation to the hospital, or in cases in which the decedent had a prediagnosed terminal or bedfast condition, unless a physician was in attendance within 30 days preceding presentation to the hospital.</li></ul>		



State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Missouri	Mixed: County Medical Examiners/ Coroners	County Coroner, County Medical Examiner	<p>Coroner—In any city of 700,000 or more inhabitants or in any county of the first or second class in which a Coroner is required, the Coroner must investigate all deaths where there is reason to believe that death was caused by criminal violence or following abortion.</p> <ul style="list-style-type: none"> <li>• By violence by homicide, suicide, or accident.</li> <li>• By criminal abortion, including those self- induced.</li> <li>• By some unforeseen occurrence and the deceased had not been attended by a physician during the 36-hour period preceding the death.</li> <li>• Occurring in any unusual or suspicious manner.</li> </ul> <p>Medical Examiner—</p> <ul style="list-style-type: none"> <li>• By violence by homicide, suicide, or accident.</li> <li>• By criminal abortion, including those self-induced.</li> <li>• By disease thought to be of a hazardous and contagious nature or which might constitute a threat to public health.</li> <li>• Suddenly when in apparent good health.</li> <li>• When unattended by a physician, chiropractor, or accredited Christian Science practitioner during the 36-hour period preceding the death.</li> <li>• While in the custody of the law.</li> <li>• While an inmate of a public institution.</li> <li>• Occurring in any unusual or suspicious manner.</li> </ul>	<p>Michael A. Graham, M.D. Medical Examiner City of St. Louis 1300 Clark Avenue St. Louis, MO 63103-2718 (314) 622-4971 Fax: (314) 622-4933 Email: GRAHAMMA@slu.edu</p>	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Montana	Mixed: State Medical Examiner and County Coroners/Medical Examiners	County Coroner, Chief State Medical Examiner, Associate Medical Examiner	<p>Coroner—</p> <ul style="list-style-type: none"> <li>• Death caused or suspected to have been caused by an injury, either recent or remote in origin.</li> <li>• Death caused or suspected to have been caused by the deceased or any other person that was the result of an act or omission, including, but not limited to, a criminal or suspected criminal act; a medically suspicious death, unusual death, or death of unknown circumstances, including any fetal death; or an accidental death.</li> <li>• Death caused or suspected to have been caused by an agent, disease, or medical condition that poses a threat to public health.</li> <li>• Death occurring while the deceased was incarcerated in a prison or jail or confined to a correctional or detention facility owned and operated by the State or a political subdivision of the State.</li> <li>• Death occurring while the deceased was in the custody of, or was being taken into the custody of, a law enforcement agency or a peace officer.</li> <li>• Death occurring during or as a result of the deceased's employment.</li> <li>• Death occurring less than 24 hours after the deceased was admitted to a medical facility or if the deceased was dead upon arrival at a medical facility.</li> <li>• Death occurring in a manner that was unattended or unwitnessed and the deceased was not attended by a physician at any time in the 30-day period prior to death.</li> </ul>	<p>Gary Dale, M.D. State Medical Examiner State Crime Lab Division of Forensic Sciences 2679 Palmer Street Missoula, MT 59808 (406) 728-4970 Fax: (406) 549-1067 Email: gdale@state.mt.us</p> <p>Terry Bullis Secretary-Treasurer Montana Coroners' Association P.O. Box 318 Hardin, MT 59034-0318 (406) 665-1207</p> <p>M.E. "Mickey" Nelson Lewis and Clark County Coroner 228 Broadway St. Helena, MT 59601-4263 (406) 442-7398 Fax: (406) 447-8298 Email: MNELSON@ co.lewis-clark.mt.us</p>	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Montana (cont'd)			<ul style="list-style-type: none"> <li>• If the dead body is to be cremated or shipped into the State and lacks proper medical certification or burial or transmit permits.</li> <li>• Death that occurred under suspicious circumstances.</li> <li>• Death that is the result of a judicial order.</li> <li>• Death that has occurred and no physician or surgeon licensed in Montana will sign a death certificate.</li> </ul> <p>ChiefState Medical Examiner—provides assistance and consultation to Coroners.</p>		
Nebraska	County Coroner	County Coroner, County Coroner's Physician	<ul style="list-style-type: none"> <li>• By criminal means or violence.</li> <li>• Homicide or suicide.</li> <li>• By drowning.</li> <li>• If sudden or unusual.</li> <li>• If drug-related.</li> <li>• If sudden infant death syndrome is suspected.</li> <li>• When involving the sudden and unexplained death of a child between the ages of 1 week and 3 years, and when neglect, violence, or any unlawful means are possible.</li> <li>• When death is not certified by attending physician.</li> <li>• When an individual has died while being apprehended by or while in the custody of a law enforcement officer or detention personnel.</li> <li>• Any suspicious, unexplained, or unattended death.</li> </ul>	DeMaris Johnson Executive Director Nebraska County Attorneys Association Suite 203 1233 Lincoln Mall Lincoln, NE 68508 (402) 476-6047 Fax: (402) 476-2469	In Lancaster and Douglas Counties, physicians have been appointed to assist in the investigations and the signing of the medical portion of death certificates. In Douglas County, the County Attorney has appointed a medical examiner to investigate deaths by unnatural causes.

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Nebraska (cont'd)					Coroner's physicians sign the death certificates. In Lancaster County, the County Attorney has retained a pathologist who assists in the investigation by performing autopsies and signing the medical portion of death certificates.
Nevada	District Coroner	District Coroner	<ul style="list-style-type: none"> <li>• Unattended deaths.</li> <li>• Deaths wherein the deceased has not been attended by a physician in the 10 days before death. The coroner shall issue the certificate of death following consultation with a physician licensed to practice in the State.</li> <li>• Deaths related to or following known or suspected self-induced or criminal abortion.</li> <li>• Known or suspected homicide, suicide, or accidental death.</li> <li>• Deaths known or suspected as resulting in whole or in part from or related to accident or injury.</li> <li>• Deaths from drowning, fire, hanging, gunshot, stabbing, cutting, exposure, starvation, alcoholism, drug addiction, strangulation, or aspiration.</li> <li>• Deaths in whole or in part occasioned by criminal means.</li> <li>• Deaths in prison.</li> </ul>	<p>Lary Simms, M.D. Chief Medical Examiner Clark County 1704 Pinto Lane Las Vegas, NV 89106 (702) 455-3210 Fax: (702) 455-0416 Email: LSI@co.clark.nv.us</p> <p>Vernon O. McCarty Washoe County Coroner P.O. Box 11130 Reno, NV 89520 (702) 785-6114 Fax: (775) 785-1468 Email: VMCCARTY@mail.co.washoe.nv.us</p>	Although they have coroner systems by ordinance, Washoe County (Reno) and Clark County (Las Vegas) employ board-certified forensic pathologists who provide medical examiner services for their respective counties, as well as for other counties on a fee-for-service basis.

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Nevada (cont'd)			<ul style="list-style-type: none"> <li>Deaths under such circumstances as to afford reasonable ground to suspect that the death was caused by the criminal act of another, or any deaths reported by physicians or other persons having knowledge of death for inquiry by the coroner.</li> </ul>		
New Hampshire	State Medical Examiner	State Chief Medical Examiner, County Medical Examiner	<ul style="list-style-type: none"> <li>By violence or unlawful act.</li> <li>In any suspicious, unusual, or unnatural manner.</li> <li>In prison.</li> <li>When unattended by a physician.</li> <li>Suddenly when in apparent health, including those sudden and unexpected deaths of children under 3 years of age or when sudden infant death syndrome is suspected.</li> </ul>	Thomas Andrew MD Chief Medical Examiner Office of State Chief Medical Examiner Suite 218 246 Pleasant Street Concord, NH 03301 (603) 271-1235 Fax: (603) 271-6308	
New Jersey	State Medical Examiner	State Medical Examiner, County Medical Examiner	<ul style="list-style-type: none"> <li>By violence whether apparently homicidal, suicidal, or accidental, including, but not limited to, deaths due to thermal, chemical, electrical, or radiation injury.</li> <li>Deaths due to criminal abortion, whether apparently self-induced or not.</li> <li>Not caused by readily recognizable disease, disability, or infirmity.</li> <li>Under suspicious or unusual circumstances.</li> <li>Within 24 hours after admission to a hospital or institution.</li> <li>Of inmates in prison.</li> <li>Of inmates of institutions maintained in whole or in part at the expense of the State or county where the inmate was not hospitalized therein for organic disease.</li> </ul>	Faruk B. Presswalla, M.D. State Medical Examiner Office of the State Medical Examiner P.O. BOX 094 Trenton, NJ 08625-0094 (609) 896-8900 Fax: (609) 896-8697 Email: <a href="mailto:presswallaf@dcj.lps.state.nj.us">presswallaf@dcj.lps.state.nj.us</a>	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
New Jersey (cont'd)			<ul style="list-style-type: none"> <li>• From causes which might constitute a threat to public health.</li> <li>• Related to disease resulting from employment or to accident while employed.</li> <li>• Sudden or unexpected deaths of infants and children under 3 years of age.</li> <li>• Fetal deaths occurring without medical attendance.</li> </ul>		
New Mexico	State Medical Examiner	State Medical Investigator, District Medical Investigator	<ul style="list-style-type: none"> <li>• Sudden, violent, or untimely.</li> <li>• Found dead and the cause of death is unknown or obscure.</li> <li>• If caused by criminal act or omission.</li> </ul>	Ross E. Zumwalt, M.D. State Chief Medical Investigator Office of the Medical Investigator State of New Mexico MSC11 6030 1 University of New Mexico Albuquerque, NM 87131-0001 (505) 272-3053 Fax: (505) 272-0727 Email: RZumwalt@salud.unm.edu	
New York	Mixed: County Medical Examiners/ Coroners	County Coroner, County Coroner's Physician, County Medical Examiner (in counties abolishing coroner system)	<ul style="list-style-type: none"> <li>• By violence, whether criminal violence, suicide, or casualty.</li> <li>• Caused by unlawful act or criminal neglect.</li> <li>• Occurring in a suspicious, unusual, or unexplained manner.</li> <li>• Caused by suspected criminal abortion.</li> <li>• While unattended by a physician, so far as can be discovered, or where no physician is able to certify the cause of death as provided in public health law and in form as prescribed by the Commissioner of Health can be found.</li> <li>• Of a person confined in a public institution other than a hospital, infirmary, or nursing home.</li> <li>• Death occurring to an inmate of a correctional facility.</li> </ul>	Charles S. Hirsch, M.D. Chief Medical Examiner City of New York (New York, Bronx, Kings, Queens, and Richmond Counties) 520 First Avenue, Room 134 New York, NY 10016 (212) 447-2034 Fax: (212) 447-2744	In some counties, there are multiple coroners, each having equal authority. In Lewis, Madison, and Oswego Counties, State law requires that the District Attorney serve as Coroner.

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
North Carolina	Mixed: State Medical Examiner and County Coroners/Medical Examiners	Chief Medical Examiner, County Medical Examiner, (Acting) Medical Examiner	<ul style="list-style-type: none"> <li>• Homicide.</li> <li>• Suicide.</li> <li>• Trauma-related.</li> <li>• Accidental.</li> <li>• Disaster related.</li> <li>• Violence related.</li> <li>• Unknown, unnatural, unusual, or suspicious circumstances.</li> <li>• In police custody, jail, prison, or correctional institution.</li> <li>• Poisoning or suspicion of poisoning.</li> <li>• Possible public health hazard (such as acute contagious disease or epidemic).</li> <li>• Deaths during surgical or anesthetic procedure.</li> <li>• Sudden unexpected deaths which are not reasonably related to known previous disease.</li> <li>• Deaths without medical attendance, as defined by statute.</li> </ul>	John D. Butts, M.D. Chief Medical Examiner State Department of Health and Human Services Office of the Chief Medical Examiner Chapel Hill, NC 27599-7580 (919) 966-2253 Fax: (919) 962-6263 Email: jbutts@ocme.unc.edu	North Carolina has coroners in some counties who work closely with the State Medical Examiner.
North Dakota	County Coroner	County Coroner	<ul style="list-style-type: none"> <li>• Generally, deaths occurring by unlawful means or without medical attendance.</li> <li>• In counties with more than 8,000 population.</li> <li>• As a result of criminal or violent means.</li> <li>• By casualty or accident.</li> <li>• By suicide.</li> <li>• Suddenly when in apparent good health.</li> <li>• In a suspicious or unusual manner.</li> <li>• Occurring without medical attendance.</li> <li>• When the Workers' Compensation Board deems it necessary under the Crime Victims Reparation Act.</li> </ul>	Beverly R. Wittman Deputy State Registrar and Director Division of Vital Records North Dakota State Department of Health 600 East Boulevard Bismarck, ND 58505 (701) 328-4508 Fax: (701) 328-1850 Email: BWITTMAN@state.nd.us	The office of Coroner is abolished in counties adopting the County Manager form of government, with the County Manager or Sheriff assuming the duties of the Coroner. However, if these duties conflict with those performed by the Sheriff, the county State's Attorney assumes the duties of the coroner.

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Northern Marina Islands	Not available	Not Available	<ul style="list-style-type: none"> <li>• Not available.</li> </ul>	Orana Castro Director Office of Vital Statistics Commonwealth Trial Courts P.O. Box 307 Saipan, MP 96950 (670) 234-6401	
Ohio	Mixed: County Medical Examiners/ Coroners	County Coroner	<ul style="list-style-type: none"> <li>• As a result of criminal or other violent means.</li> <li>• By casualty.</li> <li>• By suicide.</li> <li>• Suddenly when in apparent health.</li> <li>• In any suspicious or unusual manner.</li> <li>• Threat to public health.</li> </ul>	David P. Corey Executive Director Ohio State Coroners Association 6161 Busch Blvd Suite #87 Columbus, OH 43229-2508 614-262-OSCA Fax: 614-888-9767 Email: info@osca.net	Coroners are not allowed to actively practice law while in office.  Summit County has a County Medical Examiner system.
Oklahoma	State Medical Examiner	State Chief Medical Examiner, County Medical Examiner	<ul style="list-style-type: none"> <li>• By violence, whether apparently homicidal, suicidal, or accidental, including, but not limited to, death due to thermal, chemical, electrical, or radiation injury.</li> <li>• Due to criminal abortion, whether apparently self-induced or not.</li> <li>• Under suspicious, unusual, or unnatural circumstances.</li> <li>• Related to disease that might constitute a threat to public health.</li> <li>• Unattended by a licensed medical or osteopathic physician for a fatal or potentially fatal illness.</li> <li>• Of persons after unexplained coma.</li> <li>• That are medically unexpected and occur in the course of a therapeutic procedure.</li> <li>• Of any inmates occurring in any place of penal incarceration.</li> <li>• Of persons whose bodies are to be cremated, buried at sea, transported out of State, or otherwise made ultimately unavailable for pathological study.</li> </ul>	Fred B. Jordan, M.D. Chief Medical Examiner 901 North Stonewall Oklahoma City, OK 73117 (405) 239-7141 Fax: (405) 239-2430 Email: Medical_Examiner@ocmeokc.state.ok.us	



State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Oregon	State Medical Examiner	State Medical Examiner, County Medical Examiner	<ul style="list-style-type: none"> <li>• Apparently homicidal, suicidal, or occurring under suspicious or unknown circumstances.</li> <li>• Resulting from the unlawful use of dangerous or narcotic drugs or the use or abuse of chemicals or toxic agents.</li> <li>• Occurring while incarcerated in any jail, correction facility, or in police custody.</li> <li>• Apparently accidental or following an injury.</li> <li>• By disease, injury, or toxic agent exposure during or arising from employment.</li> <li>• While not under the care of a physician during the period immediately previous to death.</li> <li>• Related to disease which might constitute a threat to the public health.</li> </ul>	<p>Karen Gunson, M.D. State Medical Examiner Medical Examiner Division Oregon Department of State Police 301 Northeast Knott Street Portland, OR 97212-3092 (503) 988-3746 Fax: (503) 280-6041 Email: karen.gunson@state.or.us</p> <p>Eugene Gray Forensic Administrator Medical Examiner Division Oregon Department of State Police 301 Northeast Knott Street Portland, OR 97212-3092 (503) 280-6061 Fax: (503) 280-6041 Email: eugene.gray@state.or.us</p>	
Pennsylvania	Mixed: County Medical Examiners/ Coroners	County Coroner, County Medical Examiner	<ul style="list-style-type: none"> <li>• Sudden deaths not caused by readily recognizable disease, or wherein the cause of death cannot be properly certified by a physician on the basis of prior (recent) medical attendance.</li> <li>• Deaths occurring under suspicious circumstances, including those where alcohol, drugs, or other toxic substances may have had a direct bearing on the outcome.</li> <li>• Deaths occurring as a result of violence or trauma, whether apparently homicidal, suicidal, or accidental (including, but not limited to, those due to mechanical, thermal, chemical, electrical or radiational injury, drowning, cave-ins, and subsidences).</li> </ul>	<p>Dennis Kwiatkowski Secretary Treasurer Pennsylvania State Coroners Association 110 Franklin Street Suite 500 Johnstown, PA 15901 (814) 535-622 Fax: (814) 539-9057 Email: coroner@co.cambria.pa.us</p>	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Pennsylvania (cont'd)			<ul style="list-style-type: none"> <li>Any death in which trauma, chemical injury, drug overdose, or reaction to drugs or medication or medical treatment was a primary or secondary, direct or indirect, contributory, aggravating, or precipitating cause of death.</li> <li>Operative and perioperative deaths in which the death is not readily explainable on the basis of prior disease</li> <li>Any death wherein the body is unidentified or unclaimed.</li> <li>Deaths known or suspected as due to contagious disease and constituting a public hazard.</li> <li>Deaths occurring in prison or a penal institution or while in the custody of the police.</li> <li>Deaths of persons whose bodies are to be cremated, buried at sea, or otherwise disposed of so as to be thereafter unavailable for examination.</li> <li>Sudden infant death syndrome.</li> <li>Stillbirths.</li> </ul>		
Puerto Rico	Territorial Medical Examiner	Director	<ul style="list-style-type: none"> <li>As a result of criminal acts or acts that are suspected as such.</li> <li>As a result of any accident or act of violence or any subsequent act, regardless of its nature or time interval between said acts and death, if there is a reasonable doubt that there might have been a relation between said accident or act of violence and death.</li> <li>As a result of poisoning or suspicion of poisoning.</li> <li>Occurring in custody of the police or officers of the law, while in prison, or as a result of sickness or injury occurring while in prison, or suspicion thereof.</li> </ul>	Lyvia A. Alvarez, M.D. Director Institute of Forensic Sciences Call Box 11878 Caparra Height Station San Juan, PR 00922 (809) 765-0615 (809) 765-4880	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Puerto Rico (cont'd)			<ul style="list-style-type: none"> <li>• As a result of or in relation to the occupation of the deceased.</li> <li>• Due to acute intoxication with alcohol, narcotics, or any type of drug or controlled substance or suspicion of such.</li> <li>• Due to suicide or suspected suicide.</li> <li>• When in process of an autopsy that was not originally considered medicolegal, the pathologist discovers any clue, or any suspicion arises to indicate that such death could have occurred due to the commission of any crime.</li> <li>• Occurring suddenly or unexpectedly, while the person was enjoying relative or apparent good health.</li> <li>• Occurring during or after an abortion or childbearing.</li> <li>• When the physician who attended said person while living cannot reasonably establish that the death was due to natural causes.</li> <li>• Occurring during or after surgical, diagnostic, or therapeutic procedures or where the deceased was under anesthesia or recovering from it.</li> <li>• Occurring during the course of an illness, if there is a suspicion that factors extraneous to said illness could have contributed to the death.</li> <li>• Occurring in a convalescent home, asylum, or similar institution, whether it be commonwealth, municipal, or private.</li> <li>• Occurring to a person who has had a contagious disease that could constitute a threat to public health.</li> </ul>		

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Puerto Rico (cont'd)			<ul style="list-style-type: none"> <li>• Occurring within 24 hours after the admission of the patient to a hospital, clinic, or asylum, whether it be commonwealth, municipal, or private, whenever the death cannot be attributed to natural causes.</li> <li>• Occurring during hospitalization in a psychiatric institution, whether it be commonwealth, municipal, or private, except in cases of death due to childbirth, duly certified by a physician.</li> <li>• Death caused by physical force such as electricity, heat, cold, radiation, or the effect of chemical products.</li> <li>• Any death due to malnutrition, abandonment, or exposure to the elements, or as a result of negligence.</li> <li>• When the corpse is to be cremated, dissected, or it is to be disposed of in such a way that it will not be available subsequently for examination, regardless of how the death occurred.</li> <li>• When the prosecutor or trial judge investigating the death requests an autopsy.</li> </ul>		
Rhode Island	State Medical Examiner	State Medical Examiner	<ul style="list-style-type: none"> <li>• By homicide, suicide or casualty.</li> <li>• Due to a criminal abortion.</li> <li>• Due to an accident involving lack of due care on the part of a person other than the deceased.</li> <li>• Which is the immediate or remote consequences of any physical or toxic injury incurred while the deceased person was employed.</li> </ul>	Elizabeth A. Laposata, M.D. State Medical Examiner Office of State Medical Examiner Rhode Island Department of Health 48 Orms Street Providence, RI 02904 (401) 222-5500 Fax: (401) 222-5517	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Rhode Island (cont'd)			<ul style="list-style-type: none"> <li>• Due to the use of addictive or unidentifiable chemical agents.</li> <li>• Due to an infectious agent capable of spreading an epidemic within the State.</li> <li>• When unattended by a physician.</li> </ul>		
South Carolina	Mixed: County Coroner and Medical Examiner	County Coroner, County Medical Examiner	<ul style="list-style-type: none"> <li>• By violence.</li> <li>• By suicide.</li> <li>• When in apparent good health.</li> <li>• When unattended by a physician.</li> <li>• In any unusual or suspicious manner.</li> <li>• While an inmate in a penal or correctional institution.</li> <li>• As a stillbirth, medically unattended.</li> </ul>	Debbie Johnson Executive Director South Carolina Coroners Association 301 University Ridge, Suite 2300 Greenville, SC 29601 (864) 467-7446 Fax: (864) 467-7469	In counties with populations of 100,000 or more, the governing body of that county can chose to have a Medical Examiner system.
South Dakota	County Coroner	County Coroner	<ul style="list-style-type: none"> <li>• By unnatural means, including all deaths of accidental, homicidal, suicidal, and undetermined manner, regardless of suspected criminal involvement in the death.</li> <li>• Identity of victim is unknown or the body is unclaimed.</li> <li>• Inmates of any state, county or municipally operated correctional facility, mental institution or special school.</li> <li>• Those believed to represent a public health hazard.</li> <li>• Children under 2 years of age resulting from unknown cause or if circumstances suggest sudden infant death syndrome as the cause.</li> <li>• Natural deaths if the decedent is not under the care of a physician or the decedent's physician does not feel qualified to sign the death certificate.</li> </ul>	Kathlene A. Mueller Manager, Office of Data, Statistics and Vital Records State Department of Health 600 East Capitol Avenue Pierre, SD 57501-3182 (605) 773-3361 Fax: (605) 773-5683 Email: KATHIMU@doh.state.sd.us	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Tennessee	State Medical Examiner	State Chief Medical Examiner, Deputy Chief Medical Examiner, Assistant Chief Medical Examiner, County Medical Examiner	<ul style="list-style-type: none"> <li>• From sudden violence.</li> <li>• By casualty.</li> <li>• By suicide.</li> <li>• Suddenly when in apparent health.</li> <li>• When found dead.</li> <li>• In prison.</li> <li>• In any suspicious, unusual, or unnatural manner.</li> <li>• Where the body is to be cremated.</li> <li>• For workers compensation claims if cause of death is obscure or disputed.</li> </ul>	Bruce Levy, M.D. State Chief Medical Examiner State of Tennessee Center for Forensic Medicine 850 R.S. Gass Blvd. Nashville, TN 37216-2640 (615) 743-1800 Fax: (615) 743-1890 Email: blevy@forensic-med.com	
Texas	Mixed: County Medical Examiners/ Coroners	County Justice of the Peace, County/ District Medical Examiner	<p>Justice of the Peace—</p> <ul style="list-style-type: none"> <li>• In prison or jail.</li> <li>• When a person is killed, or from any cause dies an unnatural death, except under sentence of the law.</li> <li>• In the absence of one or more good witnesses.</li> <li>• When found dead, the circumstances of death unknown.</li> <li>• When the circumstances are such as to lead to suspicion of unlawful means.</li> <li>• By suicide or suspected suicide.</li> <li>• When unattended by a duly licensed and practicing physician and the local health officer or registrar required to report the cause of death does not know the cause of death.</li> <li>• When the attending physician(s) cannot certify the cause of death.</li> </ul> <p>Medical Examiner—</p> <ul style="list-style-type: none"> <li>• Same as above, and in addition, any death within 24 hours after admission to a hospital or institution.</li> </ul>	Vincent J.M. DiMaio, M.D. State Chief Medical Examiner Bexar County Forensic Science Center 7337 Louis Pasteur San Antonio, TX 78229-4565 (210) 615-2100	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
U.S. Virgin Islands	Territorial Medical Examiner	Medical Examiner	<ul style="list-style-type: none"> <li>• Unnatural deaths as prescribed by law.</li> <li>• From violence, whether criminal, suicide or casualty.</li> <li>• Unlawful act or criminal neglect.</li> <li>• Suspicious, unusual, or unexplained manner.</li> <li>• Suspect criminal abortion.</li> <li>• Death unattended by physician or where cause of death unable to be certified as provided by law.</li> <li>• When confined to a public institution other than hospital, infirmary, or nursing home.</li> <li>• As prescribed by the Governor or Attorney General.</li> </ul>	James Glenn, M.D. Medical Examiner Office of the Medical Examiner U.S. Virgin Islands Department of Justice Toro Building 3008 Golden Grove Christiansted St. Croix, VI 00820 (809) 778-6311 Francisco Landron, M.D. Medical Examiner Office of the Medical Examiner U.S. Virgin Islands Department of Justice 8050 Kronprindsens Gade St. Thomas, VI 00802 (809) 744-5666 ext. 663 (809) 776-8311	
Utah	State Medical Examiner		<ul style="list-style-type: none"> <li>• By violence, gunshot, suicide, or accident (except highway accidents).</li> <li>• Suddenly when in apparent health.</li> <li>• When unattended (not seen by a physician within 30 days).</li> <li>• Under suspicious or unusual circumstances.</li> <li>• Resulting from poisoning or overdose of drugs.</li> <li>• Resulting from diseases that may constitute a threat to public health.</li> <li>• Resulting from disease, injury, toxic effect, or unusual exertion incurred within the scope of the deceased's employment.</li> <li>• Due to sudden infant death syndrome.</li> </ul>	Todd C. Grey, M.D. State Medical Examiner Utah Department of Health 48 North Medical Drive Salt Lake City, UT 84113 (801) 584-8410 Fax: (801) 584-8435 Email: hldels.tgrey@state.ut.usa	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
			<ul style="list-style-type: none"> <li>• Resulting when the deceased was in prison, jail, police custody, the State hospital, or a detention or medical facility operated for the treatment of mentally ill or emotionally disturbed or delinquent persons.</li> <li>• Associated with diagnostic and therapeutic procedures.</li> <li>• Involving questions of civil liability, in accordance with provisions of the Worker's Compensation Act.</li> </ul>		
Vermont	State Medical Examiner	Chief Medical Examiner, Regional Medical Examiner	<ul style="list-style-type: none"> <li>• From violence.</li> <li>• Suddenly when in apparent good health.</li> <li>• When unattended by a physician.</li> <li>• By casualty.</li> <li>• By suicide.</li> <li>• As a result of injury.</li> <li>• When in jail, prison, or any mental institution.</li> <li>• In any unusual, unnatural, or suspicious manner.</li> <li>• In circumstances involving a hazard to public health, welfare, or safety.</li> </ul>	Paul L. Morrow, M.D. State Chief Medical Examiner Department of Health Baird 1 111 Colchester Ave. Burlington, VT 05401 (802) 863-7320 Fax: (802) 863-7265 Email: pmorrow@vdh.state.vt.us	



State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Virginia	State Medical Examiner	State Chief Medical Examiner, County/ City Medical Examiner	<ul style="list-style-type: none"> <li>• By trauma, injury, violence, poisoning, accident, suicide, or homicide.</li> <li>• Suddenly when in apparent good health.</li> <li>• When unattended by a physician.</li> <li>• In jail, prison, other correctional institution or in police custody.</li> <li>• Suddenly as an apparent result of fire.</li> <li>• In any suspicious, unusual, or unnatural manner.</li> <li>• The sudden death of any infant less than 18 months of age whose death is suspected as due to SIDS.</li> <li>• When the body shall be cremated or buried at sea.</li> <li>• Fetal death not attended by a physician.</li> </ul>	<p>Marcella Farinelli Fierro, M.D. State Chief Medical Examiner Department of Health Office of the State Chief Medical Examiner 400 East Jackson Street Richmond, VA 23219-3694 (804) 786-3174 Fax: (804) 371-8595 Email: mferro@vdh.state.va.us</p>	
Washington	Mixed: County Medical Examiners/ Coroners	County Coroner, County Medical Examiner	<ul style="list-style-type: none"> <li>• Those in which the Coroner suspects that the death was unnatural, or violent, or resulted from unlawful means, or from suspicious circumstances, or was of such a nature as to indicate the possibility of death by the hand of the deceased or through the instrumentality of some other person.</li> <li>• Those occurring suddenly when in apparent good health and without medical attendance within 36 hours preceding death.</li> <li>• Those resulting from unknown or obscure causes.</li> <li>• Those occurring within 1 year following an accident.</li> <li>• Those as a result of any violence whatsoever.</li> <li>• Those resulting from a known or suspected abortion, whether self-induced or otherwise.</li> </ul>	<p>Richard Harruff, M.D., Ph.D. Chief Medical Examiner, King County 325 Ninth Avenue HMC Box 35792 Seattle, WA 98104 (206) 731-3232 Fax: (206) 731-8555 Email: richard.harruff@metrokc.gov</p> <p>Dan Blasdel, President Washington Association of Coroners and Medical Examiners 1016 North 4th Avenue Pasco, WA 99301 (509) 546-5885 Fax: (509) 546-5812, page (509) 530-6906 Email: dblasdel@3-cities.com</p>	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Washington (cont'd)			<ul style="list-style-type: none"> <li>• Those apparently resulting from drowning, hanging, burns, electrocution, gunshot wounds, stabs or cuts, lightning, starvation, radiation, exposure, alcoholism, narcotics or other addictions, tetanus, strangulation, suffocation, or smothering.</li> <li>• Those due to premature birth or stillbirth.</li> <li>• Those due to virulent or suspected contagious disease which may be a public health hazard.</li> <li>• Those resulting from alleged rape, carnal knowledge, or sodomy.</li> <li>• Those occurring in a jail or prison.</li> <li>• Those in which a body is found dead or is not claimed by relatives or friends.</li> <li>• Industrial deaths when cause of death is unknown and investigation is requested by the Department of Labor and Industries.</li> </ul>		
West Virginia	State Medical Examiner	State Chief Medical Examiner, Deputy Chief Medical Examiner, County Medical Examiner	<ul style="list-style-type: none"> <li>• From violence or suspected violence, or where natural disease cannot be assumed.</li> <li>• When unattended by a physician.</li> <li>• When during incarceration, protective custody, as a ward of the State, or associated with police intervention.</li> <li>• From disease or environmental condition which might constitute a threat to the public health.</li> <li>• When in any suspicious, unusual, or unnatural manner.</li> <li>• In deaths thought to be due to, or associated with, suspected abuse or neglect.</li> </ul>	James Kaplan, M.D. State Chief Medical Examiner State of West Virginia Office of the Chief Medical Examiner 701 Jefferson Road South Charleston, WV 25309 (304) 558-3920 Fax: (304) 558-7886 Email: jkaplan@wvdhhr.org	

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Wisconsin	Mixed: County Medical Examiners/ Coroners	County Coroner, County Medical Examiner	<ul style="list-style-type: none"> <li>• If circumstances are unexplained, unusual, or suspicious.</li> <li>• By homicide or manslaughter, including death resulting from reckless conduct, negligent control of a vicious animal, or negligent use of a firearm.</li> <li>• By suicide.</li> <li>• Following an abortion.</li> <li>• By poisoning, whether homicidal, suicidal, or accidental.</li> <li>• Following accidents, whether the injury is or is not the primary cause.</li> <li>• When a physician or accredited practitioner of a bona fide religious denomination relying upon prayer or spiritual means for healing was not in attendance within 30 days preceding death, or if the deceased was not being treated for the condition causing death.</li> <li>• When a physician refuses to sign the death certificate.</li> <li>• When a physician cannot be obtained to sign the medical certification of death.</li> <li>• At the request of the Worker's Compensation Department.</li> </ul>	Tom Terry, M.D. President Wisconsin Coroner and Medical Examiner Association 730 Wisconsin St Racine, WI 53403 (262) 636-3303 Fax: (262) 636-3728 Email: TOMT@racineco.com	Counties with a Medical Examiner include those having a population of 500,000 or more, and those that have chosen to have a Medical Examiner system.

State/ Territory	Type of System	Title	Deaths Investigated	Contact	Comment
Wyoming	County Coroner	County Coroner	<ul style="list-style-type: none"> <li>• Violent or criminal action.</li> <li>• Apparent suicide.</li> <li>• Accident.</li> <li>• Apparent drug or chemical overdose or toxicity.</li> <li>• The deceased was unattended or had not seen a physician within 6 months prior to death.</li> <li>• Apparent child abuse causes.</li> <li>• The deceased was a prisoner, trustee, inmate, or patient of any county or state corrections facility or state hospital.</li> <li>• If the cause is unknown.</li> </ul>	Donald B. Pierson Executive Director Wyoming Peace Officers Standards and Training Commission 1710 Pacific Avenue Cheyenne, WY 82002 (307) 777-7718 Fax: (307) 638-9706 Email: wpost@sisna.com James W. Thorpen, M.D. Chairman Wyoming Board of Coroner Standards County Building 200 North Center St, Suite 10 Casper, WY 82601-1949 (307) 235-9458 Fax: (307) 235-9608 Email: coroner@natrona. net	

SOURCE: all information was obtained from [http://www.cdc.gov/epo/dphsi/mecisp/death\\_investigation.htm](http://www.cdc.gov/epo/dphsi/mecisp/death_investigation.htm)

## ■ Appendix B: Niosh Firefighter Fatality Reports—Autopsy Information

**T**he NIOSH Fire Fighter Fatality Investigation and Prevention Program (FFFIPP) investigates firefighter line-of-duty fatalities. The purpose of this investigative program is, according to the FFFIPP Web site (<http://www.cdc.gov/niosh/fire/implweb.html>), threefold:

*"Better define the magnitude and characteristics of line-of-duty deaths among fire fighters"*

*"Develop recommendations for the prevention of deaths and injuries"*

*"Disseminate prevention strategies to the fire service"*

The FFFIPP reports include specific details about the circumstances surrounding the fatalities as well as medical information including cause of death and pertinent autopsy results, when available.




This summary concentrates on investigations completed in the years 2000 through 2006; a few of the year 2000 investigations related to incidents in 1998 and 1999. The following table includes for each investigation the NIOSH Report Number, Date of Incident, Title, and Cause of Death, and includes notations about whether an autopsy was performed and autopsy findings. A link to each report's PDF file, available online, is provided. When the death certificate and autopsy listed differing causes of death, both are included in the table.



Most reports specifically mention the autopsy (or lack thereof). However, about one-third of the reports did not mention the autopsy outright. For some of those cases, postmortem toxicological specimen analysis, typically for carboxyhemoglobin level, was noted; however, the specimen was not necessarily obtained as part of an autopsy.

Approximately 280 FFFIPP reports were reviewed for recommendations or comments related to autopsy procedures and protocols. The most common comment specific to autopsy protocols was the recommendation to "perform autopsies on all on-duty fire fighter fatalities." This was noted on about two dozen cases involving cardiovascular deaths. No other recommendations were made for specific protocols or procedures for the autopsy itself, or for the postautopsy storage of tissue samples, etc. However, carboxy-hemoglobin levels were mentioned numerous times with a comment that postmortem levels were artificially low in a case in which the victim had received oxygen therapy prior to death.




TABLE: SUMMARY OF FFFIPP REPORTS



NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2007-01	Dec 30, 2006	Career firefighter dies and chief is injured when struck by 130-foot awning that collapses during a commercial building fire—Texas	Blunt-force trauma	Not mentioned	None	F2007-01PDF
F2006-26	Aug 13, 2006	Career engineer dies and firefighter injured after falling through floor while conducting a primary search at a residential structure fire—Wisconsin	Smoke inhalation and thermal burns	Not mentioned	None	F2006-26PDF
F2006-22	Apr 8, 2006	Volunteer firefighter dies after being struck by a shackle on a recoiling tow rope—South Dakota	Blunt-force head trauma	Not mentioned	None	F2006-22PDF
F2006-19	May 14, 2006	Career lieutenant dies in residential structure fire—Colorado	Complications from hypoxic encephalopathy (lack of oxygen to the brain) due to apparent smoke inhalation	Not mentioned	None	F2006-19PDF
F2006-10	Mar 1, 2006	Volunteer firefighter is killed and another volunteer firefighter is injured at a wildland/urban interface fire—Oklahoma	Complications from the burns he received to over 45% of his body	Yes	None	F2006-10PDF
F2006-06	Nov 22, 2005	Volunteer firefighter dies in tanker rollover crash—Texas	Open skull fracture resulting from an automobile accident	Not mentioned	None	F2006-06PDF
F2005-28	Aug 6, 2005	One career firefighter dies and two are injured in apparatus crash—California	Multiple blunt-force trauma to the torso	Yes	None	F2005-28PDF





NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2006-25	Jul 26, 2006	Junior volunteer firefighter dies and three volunteer firefighters are injured in a tanker crash—Alabama	Blunt force trauma with head and chest injuries	Not mentioned	None	
F2006-21	Mar 09, 2006	Career lieutenant suffers sudden cardiac death at his home after finishing his shift—Tennessee	Hypertensive heart disease	Yes	<ul style="list-style-type: none"> <li>• Cardiomegaly (enlarged heart): heart weight of 441 grams (g) (normal weight is &lt;400 g)</li> <li>• LVH               <ul style="list-style-type: none"> <li>– left ventricle thickness was 1.5-2.0 centimeters (cm) (normal thickness is 0.6-1.1 cm)<sup>1</sup></li> </ul> </li> <li>• Myocardial perivascular and patchy interstitial fibrosis</li> <li>• Mild bilateral dilatation of left and right ventricles (no measurements were listed)</li> <li>• Moderate to severe coronary artery disease (CAD) with 75% narrowing of the left anterior descending (LAD) artery</li> <li>• Mild aortic sclerosis</li> <li>• No evidence of thrombosis (blood clots) in his coronary arteries</li> <li>• No evidence of a pulmonary embolus</li> </ul>	
F2006-20	Apr 16, 2006	Career airport fire apparatus operator suffers sudden cardiac death at his station after exercising—Georgia	Acute Respiratory Distress Syndrome due to an acute myocardial infarction (MI)	Yes	<ul style="list-style-type: none"> <li>• Acute Mlo Massive infarct of the left ventricle, extending from the apex to the base of the heart               <ul style="list-style-type: none"> <li>– Focal acute extension of the infarct</li> <li>– Stent in place, proximal left anterior descending coronary artery, with a luminal thrombus• Atherosclerotic CADo Moderate to severe atherosclerosis of distal left anterior descending artery                   <ul style="list-style-type: none"> <li>– Moderate atherosclerosis of right coronary artery</li> <li>– Moderate atherosclerosis of circumflex artery</li> </ul> </li> </ul> </li> <li>• Cardiomegaly (enlarged heart): heart weight of 600 grams (g) (the normal weight given in the autopsy records is 250-350 g)</li> <li>• No pulmonary embolus</li> </ul>	




NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2006-18	Mar 31, 2006	Firefighter/emergency medical technician (ff/emt) suffers sudden death while on-duty—South Carolina	Per death certificate: “probable cardiac arrhythmia,” due to “seizures,” due to “epilepsy.”  Per autopsy findings: “sudden unexplained ventricular arrhythmia or possible seizure.”	Yes	<ul style="list-style-type: none"> <li>• Normal sized heart, 350 grams (normal &lt; 400 grams)</li> <li>• No plaque, atherosclerosis, or blockages in any of the coronary arteries</li> <li>• Two coronary arteries (the left anterior descending and the right coronary artery) had “small diameters within their distal distribution”</li> <li>• No microscopic evidence of cardiomyopathy (a medical condition that is associated with an increased risk of sudden cardiac death)</li> <li>• No evidence of a pulmonary embolus (blood clot in the lung arteries)</li> <li>• No evidence of an intra-cranial hemorrhage (stroke)</li> <li>• Negative blood drug test for illegal</li> <li>• Positive blood drugs test for methobarbital and phenobarbital.</li> </ul> <p>The phenobarbital level of 8.9 micrograms per milliliter (µg/mL) was sub-therapeutic for a seizure disorder (10-30 µg/mL). A blood level for dilantin was not conducted. These autopsy findings did not point to a definitive cause of death, therefore the county coroner concluded the FF/EMT most likely died of a “sudden unexplained ventricular arrhythmia or possible seizure.”</p>	
F2006-17	May 03, 2006	Firefighter suffers heart attack during firefighting operation and dies 40 days later—Georgia	“Hemodynamic failure” due to “healing and remote myocardial infarctions (mis)” due to “atherosclerotic coronary artery disease (CAD)”	Yes	<ul style="list-style-type: none"> <li>• Atherosclerotic CAD <ul style="list-style-type: none"> <li>– Normal-sized heart at 400 grams</li> <li>– Old (healed) MI in the lateral portion of the left ventricle</li> <li>– Recent MI in the anteroseptal portion of the left ventricle</li> <li>– Atherosclerotic lesions (50%—60% blockage) in most of the coronary arteries</li> <li>– Recent plaque hemorrhage and rupture of the proximal portion of the LAD</li> </ul> </li> <li>• No valve abnormalities</li> <li>• No chamber dilation or hypertrophy</li> </ul>	









NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2006-16	Jul 07, 2005	Fire apparatus operator suffers sudden cardiac death after responding to 12 calls—Georgia	“Cardiac dysrhythmia due to atherosclerotic coronary artery disease (CAD)”	Yes	<ul style="list-style-type: none"> <li>• Atherosclerotic CAD               <ul style="list-style-type: none"> <li>– Variable calcific atherosclerosis of the left anterior descending coronary artery with a 90% blockage</li> <li>– Variable calcific atherosclerosis of the right coronary artery with a 40% blockage</li> <li>– Cardiomegaly (enlarged heart: heart weighed 660 grams</li> <li>– Left ventricular hypertrophy</li> </ul> </li> <li>• Microscopic examination of the left ventricle revealed “patchy transmural myocardial fibrosis.” “Similar but lesser changes were noted in the right ventricular myocardium, where fibrosis was primarily perivascular.”</li> <li>• No evidence of thromboemboli in the pulmonary arteries</li> <li>• Negative drug and alcohol tests</li> </ul>	
F2006-15	Apr 03, 2006	Assistant chief suffers a stroke during training and dies—Texas	Brain death due to brain aneurysm	No	Perform an autopsy on all duty-related firefighter fatalities	
F2006-13	Jan 14, 2006	Volunteer firefighter suffers sudden cardiac death about 50 minutes after fighting a grass fire—Kansas	Probable heritable cardiac arrhythmia (Brugada Syndrome)	Yes	<ul style="list-style-type: none"> <li>• Probable heritable cardiac arrhythmia (Brugada Syndrome)</li> <li>• Cardiomegaly (heart weighed 478 grams [g]; normal range is 261-455 g)</li> <li>• Coronary arteries free of significant atherosclerosis or thrombus</li> <li>• No pulmonary embolus</li> </ul>	




NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2006-12	Nov 15, 2004	Career battalion chief suffers sudden cardiac death at his desk—Kansas	Atherosclerotic cardiovascular disease (CVD)	Yes	<ul style="list-style-type: none"> <li>• Cardiomegaly (enlarged heart): heart weighed 534 grams</li> <li>• Left ventricular hypertrophy (LVH)</li> <li>• Essentially normal endocardium, myocardium, and epicardium tissue.</li> <li>• Two vessel coronary artery disease (CAD) with 50%-75% narrowing of the left anterior descending and right coronary arteries by atherosclerotic plaque</li> <li>• No evidence of thrombosis</li> <li>• Mild fibrous thickening of the cusps of the aortic valve</li> <li>• No evidence of a pulmonary embolus.</li> </ul>	
F2006-09	Jan 28, 2006	Firefighter dies after performing overhaul at a fire in a three-story dwelling—Pennsylvania	"Arteriosclerotic cardiovascular disease (CVD)" as the immediate cause of death and "hypertensive cardiomyopathy" as a significant condition	Yes	<ul style="list-style-type: none"> <li>• Cardiomegaly (heart weighing 450 grams [g]; normal weight is &lt;400 g)</li> <li>• Arteriosclerotic CAD</li> <li>• Mild concentric left ventricular hypertrophy with wall thickness being 1.9 centimeters [cm]; normal thickness is 0.6-1.1 cm</li> <li>• A discrete 2 cm x 1 cm scar in the subendocardial and deep myocardium of the left ventricular wall (proximal medial posterior) suggesting a remote (old) heart attack (myocardial infarction [MI])</li> <li>• No valvular disease</li> <li>• No sign of a pulmonary embolus (blood clot in the lung)</li> <li>• No evidence of smoke inhalation</li> <li>• Carboxyhemoglobin (COHb) level (measure of carbon monoxide in the blood) of 3.7% (normal for smokers)</li> </ul>	



NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2006-08	Nov 21, 2005	Firefighter/Emergency medical technician suffers an acute myocardial infarction and dies 3 days later—Pennsylvania	Per death certificate: “atherosclerotic heart disease” due to “acute myocardial infarction” as the cause of death. Perautopsy: “arterio-sclerotic cardiovascular disease (CVD) with acute myocardial infarction; pulmonary emboli” as the cause of death.	Yes	<ul style="list-style-type: none"> <li>• Arteriosclerotic CVD</li> <li>• Extensive left ventricular MI</li> <li>• Cardiomegaly (enlarged heart: heart weighed 550 grams [g])</li> <li>• Biventricular hypertrophy</li> <li>• Microscopic examination revealed an “early thrombus at the site of the ventricular infarction”</li> <li>• Microscopic evidence of thromboemboli in the pulmonary arteries with pulmonary infarction</li> </ul>	
F2006-07	Feb 21, 2006	Two volunteer firefighters die when struck by exterior wall collapse at a commercial building fire overhaul—Alabama	Multiple blunt-force trauma	Yes	None	
F2006-05	Nov 28, 2005	Career firefighter dies after engine he was driving collides with a tractor trailer—Alabama	Blunt-force injuries.	Not mentioned	None	
F2006-04	Oct 24, 2005	Career lieutenant suffers sudden cardiac death at his station after making multiple runs during the day—Tennessee	Cardiac arrhythmia as the immediate cause of death due to hypertensive cardiovascular disease	Yes	<ul style="list-style-type: none"> <li>• Cardiomegaly (enlarged heart) based on a weight of 700 grams</li> <li>• Left ventricular hypertrophy</li> <li>• Microscopic examination of the left ventricular myocardium (three sections) showed myocyte hypertrophy and small foci of subendocardial interstitial fibrosis (findings consistent with hypertensive heart disease)</li> <li>• Patent coronary arteries with mild atherosclerosis and no intracoronary thrombosis</li> <li>• Normal heart valves</li> <li>• No pulmonary embolus</li> </ul>	

NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2006-03	Nov 05, 2005	Firefighter suffers sudden cardiac death during fire fighting operations—California	Atherosclerotic cardiovascular disease (CVD)	Yes	<ul style="list-style-type: none"> <li>Atherosclerotic CVD with complete narrowing (100%) of the right coronary artery and severe narrowing (75%) of the left main coronary artery and the left anterior descending coronary artery; no evidence of an intra-coronary blood clot (thrombus), but thrombolytic medications were given in the ED</li> <li>Enlarged heart (cardiomegaly): heart weighed 450 grams (g)</li> <li>No evidence of a premortem pulmonary thromboemboli (i.e., blood clots in the lungs)</li> <li>Negative carboxyhemoglobin test</li> <li>Negative drug and alcohol tests</li> </ul>	
F2006-02	May 27, 2005	Lieutenant suffers sudden cardiac death after scba training—Florida	Atherosclerotic cardiovascular disease (CVD)	Yes	<ul style="list-style-type: none"> <li>Atherosclerotic CVD</li> <li>Moderate cardiomegaly (enlarged heart: heart weighed 430 grams)</li> <li>Microscopic examination of the coronary arteries revealed an “apparent thrombus material identified in the lumen” with “evidence of re-canalization” (suggestive of a remote [old] myocardial infarction))</li> <li>Acute pulmonary edema</li> <li>No evidence of thromboemboli in the pulmonary arteries</li> <li>Negative carboxyhemoglobin test</li> <li>Negative drug and alcohol tests</li> </ul>	
F2006-01	May 13, 2004	Fire chief suffers sudden death during training—Alabama	Accidental multiple drug intoxication	Yes	<ul style="list-style-type: none"> <li>Enlarged heart (cardiomegaly): heart weighed 520 grams (g)</li> <li>Mild atherosclerosis</li> <li>Moderate to marked pulmonary edema</li> <li>No evidence of thrombus in the coronary arteries</li> <li>No evidence of thrombo-emboli in the pulmonary arteries</li> <li>Positive blood tests for diazepam (Valium®), morphine (MS Contin®), venlafaxine (Effexor®) and methocarbamol (Robaxin®)</li> <li>Positive urine test for gabapentin (Neurontin®)</li> <li>No microscopic examinations were performed.</li> </ul>	




NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2005-35	Dec 02, 2005	Career captain dies and the driver/operator and a firefighter are severely injured in apparatus crash—Louisiana	Multiple blunt-force trauma and compressed asphyxiation	Yes	None	
F2005-34	Nov 07, 2005	Career firefighter killed while riding manlift to assess a silo fire—Missouri	Positional asphyxia due to entrapment between the manlift and floor access opening	Not mentioned	None	
F2005-33	Nov 04, 2005	Captain suffers pulmonary embolism during response to a medical call and later dies—New York	Pulmonary emboli (PE) due to probable deep vein thrombosis (DVT)	Yes	<ul style="list-style-type: none"> <li>• Evidence of diffuse PE in both lungs</li> <li>• Swollen right lower leg</li> <li>• Mild hypertensive CVD: <ul style="list-style-type: none"> <li>– No significant coronary artery atherosclerosis</li> <li>– Left ventricle walls slightly thickened/hypertrophied (1.6 centimeters [cm]) (normal is 0.6 cm–1.1 cm)<sup>1</sup></li> <li>– Right ventricle walls slightly thickened/hypertrophied (0.6 cm)</li> </ul> </li> <li>• Cardiomegaly (enlarged heart): heart weighed 540 grams (g) (normal is &lt;400 g)<sup>3</sup></li> <li>• No microscopic examination of the heart muscle was performed</li> <li>• Negative drug screen</li> </ul>	




NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2005-32	Mar 16, 2005	Sergeant suffers sudden cardiac death during training—Kentucky	Per death certificate: “acute myocardial infarction (MI)”  Per autopsy: “hypertensive/ischemic cardiovascular disease (CVD)” as the cause of death	Yes	<ul style="list-style-type: none"> <li>Hypertensive/ischemic CVD</li> <li>Enlarged heart (cardiomegaly): heart weighed 500 grams (g) (normal is &lt;400 g)<sup>1</sup></li> <li>Biventricular hypertrophy               <ul style="list-style-type: none"> <li>Right ventricle measured 1 centimeter (cm) (normal is 0.3-0.5 cm)<sup>2</sup></li> <li>Left ventricle measured 3 cm (normal is 0.76–0.88 cm)<sup>3</sup> (normal echocardiographic measurement is 0.6–1.1 cm)<sup>4</sup></li> </ul> </li> <li>Mitral valve showed thickening of chordae tendineae</li> <li>No evidence of thrombus</li> <li>No evidence of thrombo-emboli</li> <li>Negative drug and alcohol tests</li> </ul> <p>Microscopic examinations revealed the following:</p> <ul style="list-style-type: none"> <li>Diffuse myocardial fibrosis</li> <li>Old MI of lateral wall of left ventricular free wall, posterior aspect of left intraventricular septum</li> <li>Extensive old MI of left ventricular free wall</li> <li>Acute pulmonary congestion</li> </ul>	
F2005-30	May 31, 2005	Firefighter suffers sudden cardiac death during physical fitness training—New Jersey	“Calcific sclerosis of the aortic valve with aortic stenosis” as the cause of death, with “atherosclerotic coronary artery disease (CAD)” as a significant condition	Yes	<ul style="list-style-type: none"> <li>Calcific sclerosis of the aortic valve with aortic stenosis</li> <li>Enlarged heart (cardiomegaly): heart weighed 580 grams (g) (normal is &lt;400 g)<sup>1</sup></li> <li>Atherosclerotic CAD</li> <li>Severe narrowing (75%) of the left anterior descending coronary artery</li> <li>No evidence of a premortem pulmonary thromboemboli</li> </ul> <p>Negative drug and alcohol tests</p>	
F2005-29	Aug 27, 2005	Volunteer firefighter/rescue diver dies in training incident at a quarry—Pennsylvania	Drowning	Not mentioned	None	






NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2005-27	Jun 21, 2005	Volunteer fire chief dies from injuries sustained during a tanker rollover—Utah	Blunt force injuries to the head and torso	Not mentioned	None	
F2005-26	May 19, 2005	Recruit firefighter suffers heat stroke during physical fitness training and dies nine days later—Florida	Severe heat stroke with multisystem organ failure	No	None	
F2005-25	Feb 23, 2005	Fire chief suffers sudden cardiac death at home after performing apparatus maintenance and conducting training—Texas	Severe three vessel atherosclerotic coronary artery disease (CAD)	Yes	<ul style="list-style-type: none"> <li>• Atherosclerotic CAD:</li> <li>• Three vessel focal severe atherosclerotic CAD</li> <li>• Right ventricle chamber mildly dilated</li> <li>• Cardiomegaly (enlarged heart): heart weighed 460 grams (normal &lt; 400 grams)<sup>1</sup></li> <li>• No pulmonary embolism</li> <li>• No evidence of a dissecting aortic aneurysm</li> </ul>	






NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2005-24	Feb 06, 2005	Firefighter dies after responding to a call—New York	“Acute intoxication by the combined effects of propoxyphene (Darvon®) and cyclobenzaprine (Flexeril®)” as the cause of death and “hypertension” as another condition. The NIOSH investigator, like the medical examiner, concluded the FF died due to a drug intoxication, but cannot rule out the possibility of a cardiac arrhythmia associated with his hypertensive heart disease and subsequent left ventricular hypertrophy (LVH).	Yes	<ul style="list-style-type: none"> <li>• Acute intoxication by the combined effects of propoxyphene and cyclobenzaprine CAD: <ul style="list-style-type: none"> <li>– Propoxyphene (Darvon®) blood level of 3.3 micrograms per milliliter (mcg/mL) and Norpropoxyphene blood level of 9.0 mcg/mL</li> <li>– Cyclobenzaprine (Flexeril®) blood level of 90 nanograms per milliliter (ng/mL) and Norcyclobenzaprine with a positive blood level</li> </ul> </li> <li>• Hypertensive cardiovascular disease: <ul style="list-style-type: none"> <li>– Left ventricular hypertrophy (LVH)(left ventricle wall thickness 1.5 centimeters [cm]) [normal 0.6cm–1.1cm)]<sup>2</sup></li> <li>– Cardiomegaly (heart weight 500 grams [normal &lt; 400 grams])<sup>3</sup></li> </ul> </li> <li>• No evidence of atherosclerotic coronary artery disease (CAD)</li> <li>• No evidence of pulmonary embolus</li> </ul> <p>Microscopic examination of the heart revealed myocyte hypertrophy (consistent with mild hypertensive cardiomyopathy) but no infarcts or myocarditis. The autopsy did not mention “myocytes in disarray,” which is diagnostic of hypertrophic cardiomyopathy</p>	
F2005-23	Mar 29, 2005	Firefighter/paramedic suffers a dissection of his aorta while participating in physical fitness training—Texas	“Aortic dissection and its sequelae” with “Hypertensive cardiovascular disease” being another significant condition	Yes	<ul style="list-style-type: none"> <li>• Extent of the dissection: from proximal left and right coronary artery at the aortic root to the right common iliac artery</li> <li>• Cardiomegaly (a large heart)</li> <li>• Concentric left ventricular hypertrophy</li> <li>• No atherosclerotic coronary artery disease</li> <li>• Negative blood tests for illicit drugs or alcohol</li> </ul>	









NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2005-22	Jan 09, 2005	Volunteer firefighter suffers cardiac death the morning after emergency medical technician training—North Carolina	Mitral valve failure	Yes	<ul style="list-style-type: none"> <li>Mitral valve prolapse—undulating leaflets with obvious hooding and thin, elongated chordae tendineae consistent with prolapse</li> <li>Cardiomegaly—(530 grams, normal &lt; 400 grams) with mild left ventricular hypertrophy – left ventricle thickness 1.4 cm (normal 0.6 to 1.1 cm), interventricular septum 1.6 cm (normal 0.6 to 1.1 cm)</li> <li>Microscopic examination of the heart muscle showed widening of the individual myocytes and large, irregular, “boxcar” nuclei; focal increased interstitial fibrosis was present within the posterior left ventricle</li> <li>Widely patent coronary arteries without evidence of significant atherosclerosis or thrombosis</li> </ul>	
F2005-21	Feb 21, 2005	Wildland firefighter suffers sudden cardiac death after performing mop-up/overhaul operations at two wildland fires—Florida	Left anterior descending coronary artery thrombosis	Yes	<ul style="list-style-type: none"> <li>Attached thrombus (blood clot) with complete occlusion and focally a pinpoint lumen for about 1.5 cm in the proximal left anterior descending coronary artery</li> <li>Chronic myocardial ischemia <ul style="list-style-type: none"> <li>Fibrosis in the mid septum, just below the right aortic cusp, and near the apex of the heart (strongly suggestive of a remote heart attack)</li> <li>Heart weight 450 grams (normal &lt; 400 grams)</li> <li>Left ventricular walls measure 1.4 centimeters (cm) in thickness (normal is 0.6 to 1.1 cm)</li> </ul> </li> </ul>	
F2005-20	Jun 23, 2005	Firefighter/Emergency medical technician dies during the night at fire station—Arizona	“Oxycodone intoxication” as the cause of death with “mild thickening of the mitral valve” and “mild diffuse nephrosclerosis” as other conditions.	Yes	<ul style="list-style-type: none"> <li>Oxycodone intoxication (blood level of 0.85 milligrams per liter [mg/L])(therapeutic blood levels are less than 0.1 mg/L)<sup>2</sup></li> <li>Mild thickening of the mitral valve</li> </ul>	




NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2005-19	Jun 19, 2004	Reserve firefighter suffers sudden cardiac death while working on a fuel reduction crew—Arizona	Atherosclerotic heart disease	Yes	<ul style="list-style-type: none"> <li>• Atherosclerotic heart disease: <ul style="list-style-type: none"> <li>– 99% occlusion of left anterior descending coronary artery</li> <li>– 99% occlusion of right coronary artery</li> <li>– Left ventricular hypertrophy (wall thickness 1.4 centimeters [cm] [normal 0.6cm–1.1cm])<sup>1</sup></li> </ul> </li> <li>• Chronic pyelonephritis, left kidney</li> <li>• Negative drug and alcohol tests</li> </ul>	
F2005-18	Aug 16, 2004	Airport firefighter suffers sudden cardiac death while on duty—South Carolina	Acute myocardial ischemia secondary to a cardiac arrhythmia of unknown etiology	Yes	<ul style="list-style-type: none"> <li>• Enlarged heart (cardiomegaly) weighing 460 grams (normal &lt; 400 grams) <ul style="list-style-type: none"> <li>– Left ventricular hypertrophy (wall thickness 1.3 centimeters [cm] [normal 0.6 cm–1.1 cm])</li> <li>– Interventricular septum hypertrophy (wall thickness 1.5 cm [normal 0.6 cm–1.1 cm])</li> </ul> </li> <li>• Right coronary artery bridging</li> <li>• Right ventricle mildly dilated</li> <li>• Microscopic findings <ul style="list-style-type: none"> <li>– Histological signs of ischemia</li> <li>– Scattered myocytes indicative of hypertrophy</li> </ul> </li> </ul>	
F2005-17	Apr 20, 2005	Driver/operator dies due to a stroke while driving a fire engine to an alarm—Tennessee	“Acute subarachnoid hemorrhage” due to “rupture of sacular cerebral aneurysm” as the cause of death with “focal coronary artery atherosclerosis” as a significant condition	Yes	<ul style="list-style-type: none"> <li>• Sacular aneurysm with rupture, basilar artery <ul style="list-style-type: none"> <li>– Acute subarachnoid hemorrhage, large amount, base of brain</li> </ul> </li> <li>• Coronary artery atherosclerosis, focal and severe <ul style="list-style-type: none"> <li>– Severe narrowing (90%) of the left anterior descending coronary artery</li> </ul> </li> <li>• Negative drug and alcohol tests</li> </ul>	





NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2005-16	Jan 21, 2004	Captain suffers an acute aortic dissection after responding to two alarms and subsequently dies due to hemopericardium—Pennsylvania	“Hemopericardium” due to an “aortic rupture” and “aortic dissection.”	Yes	<ul style="list-style-type: none"> <li>• Hemopericardium with 575 milliliters (mL) of primarily unclotted blood in pericardium</li> <li>• Rupture of the intrapericardial portion of the ascending thoracic aorta</li> <li>• Thoracoabdominal aortic dissection extending from the ascending aorta to the distal abdominal aorta (4 cm above the iliac bifurcation)</li> <li>• History of hypertension               <ul style="list-style-type: none"> <li>– Cardiomegaly, heart weighing 560 grams (normal &lt; 400 grams)                   <ul style="list-style-type: none"> <li>▪ Moderate cardiac left ventricular hypertrophy</li> </ul> </li> </ul> </li> <li>• Minimal coronary artery disease (25% stenosis of the left anterior descending and right coronary arteries)</li> <li>• No evidence of infection in his left or right lung fields (pneumonia), although there were bilateral serous-ginuous pleural effusions (200 mL on the left, 150 mL on the right)</li> <li>• Morbid obesity, with a body mass index of 51.9 kilograms/meters<sup>2</sup></li> </ul>	
F2005-15	Apr 23, 2005	Career firefighter fatally injured in fall from apparatus—Texas	Blunt-force head injuries	Yes	None	
F2005-14	Apr 22, 2004	Lieutenant suffers sudden cardiac death at the scene of a structure fire—South Carolina	“Acute myocardial infarction” due to “viral endocarditis”	No	Perform an autopsy on all on-duty firefighter fatalities	
F2005-13	Apr 18, 2005	A volunteer firefighter and volunteer assistant lieutenant die after a smoke explosion at a townhouse complex—Wyoming	Smoke inhalation and thermal burns to over 50% of their bodies	Not mentioned	None	
F2005-12	Aug 23, 2004	Career firefighter/EMT dies in ambulance crash—Florida	Blunt-force head trauma	Not mentioned	None	

NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2005-11	Dec 13, 2004	Fire chief suffers sudden cardiac death while returning to the fire station after a structure fire—Georgia	"cardiorespiratory arrest" due to "ASCVD" (atherosclerotic cardiovascular disease)	No	Perform an autopsy on all on-duty firefighter fatalities	
F2005-10	Feb 15, 2005	Lieutenant suffers a heart attack while driving a squad truck and dies four days later—Georgia	"Anoxic encephalopathy" due to "sudden cardiac arrest" due to "atherosclerotic cardiovascular disease" as the cause of death	Yes	<ul style="list-style-type: none"> <li>• Enlarged heart (cardiomegaly): heart weighed 450 grams</li> <li>• Ischemic heart disease: <ul style="list-style-type: none"> <li>– Moderate narrowing (40%-50%) of the right coronary artery</li> <li>– Mild narrowing (30%-40%) of the left anterior descending coronary artery</li> </ul> </li> <li>• No evidence of pulmonary thromboemboli</li> <li>• Negative drug and alcohol tests</li> </ul>	
F2005-09	Feb 19, 2005	Career fire captain dies when trapped by partial roof collapse in a vacant house fire – Texas	Smoke inhalation and thermal injuries	Not mentioned, but postmortem carboxyhemoglobin was reported at 26%	None	
F2005-08	Oct 20, 2004	Fire chief suffers sudden cardiac death after responding to a motor vehicle crash—Texas	"arrhythmia" as the cause of death due to "coronary artery disease" (CAD) with "atrial fibrillation and sleep apnea" as other significant conditions	No	Perform an autopsy on all on-duty firefighter fatalities	
F2005-07	Feb 13, 2005	Career captain electrocuted at the scene of a residential structure fire—California	Electrocution	Not mentioned	None	
F2005-06	Jan 07, 2005	Fire equipment operator suffers a heart attack at the scene of a medical call and dies in the hospital thirteen days later—South Carolina	"Myocardial infarction" due to "renal failure" due to "stroke"	No	Perform an autopsy on all on-duty firefighter fatalities	
F2005-05	Jan 20, 2005	Career captain dies after running out of air at a residential structure fire—Michigan	Smoke and soot inhalation with a carboxyhemoglobin level of 22.7%	Not mentioned	None	




NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2005-04	Jan 23, 2005	Career firefighter dies while exiting residential basement fire—New York	Smoke inhalation and burns of the head, torso and upper extremities	Yes	Note: Carboxyhemoglobin level was 24% saturation; third degree burns on approximately 63% of body surface area	
F2005-03	Jan 23, 2005	Career lieutenant and career firefighter die and four career firefighters are seriously injured during a three alarm apartment fire—New York	Mass trauma of the head, torso and extremities with multiple contusions of the extremities.	Not mentioned	None	
F2005-02	Dec 20, 2004	One probationary career firefighter dies and four career firefighters are injured at a two-alarm residential structure fire—Texas	Thermal injuries and smoke inhalation	Not mentioned	None	
F2005-01	Aug 14, 2004	Career firefighter dies after falling from tailboard and being backed over by engine—California	Multiple blunt-force injuries	Not mentioned	None	



NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2004-46	Feb 23, 2004	Firefighter collapses and dies while assisting with fire suppression efforts at a residential fire—Ohio	“Arteriosclerotic and hypertensive heart disease” as the immediate cause of death with “morbid obesity” as a contributory condition	Yes	<ul style="list-style-type: none"> <li>Coronary artery disease (CAD)                             <ul style="list-style-type: none"> <li>Atherosclerotic occlusions of the native coronary arteries (remote)</li> <li>Two vessel coronary artery bypass graft procedure (remote)</li> <li>Occlusion of the lower coronary artery bypass graft (remote)</li> <li>Open upper coronary artery bypass graft but with moderate calcific atherosclerosis</li> <li>Myocardial infarct (heart attack) involving the anterior left ventricle and interventricular septum (remote)</li> </ul> </li> <li>Cardiomegaly (enlarged heart) weighing 780 grams (normal &lt; 400 grams)</li> <li>Mild narrowing of the arteries leading to the kidneys (arteriolonephrosclerosis), which is consistent with the diagnosis of hypertension</li> <li>Morbid obesity; at 72 inches tall, the FF weighed 300 pounds for a body mass index (BMI) of 40.7.</li> <li>A carboxyhemoglobin (COHb) measurement of &lt;5% saturation. (Since the FF did not regain a heartbeat during resuscitation efforts, the 100% oxygen delivered via the endotracheal tube was unlikely to have significantly reduced the half-time of his COHb level. Thus, a level of &lt;5% is unlikely to have contributed to his sudden death.)</li> <li>Negative urine drug screen</li> <li>Skull fractures</li> </ul>	
F2004-45	Feb 04, 2004	Firefighter suffers sudden cardiac death after repacking a hose load on a fire engine—New Jersey	Arteriosclerotic cardiovascular disease(CAD)	No	Perform an autopsy on all on-duty firefighter fatalities	



NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2004-43	Apr 27, 2004	One part-time firefighter dies and another is seriously injured when two fire engines collide at an intersection while responding to a fire—Illinois	Craniocerebral injuries with aspiration of blood within the lungs	Yes	None	
F2004-42	Sep 26, 2004	Assistant chief suffers sudden cardiac death during response to boat fire—Wisconsin	Per death certificate, "severe arteriosclerotic cardiovascular disease" as the cause of death and "previous myocardial infarction" as other significant condition.  Perautopsy: "severe coronary artery disease due to arteriosclerotic cardiovascular disease" as the cause of death	Yes	<ul style="list-style-type: none"> <li>• Ischemic heart disease</li> <li>• Heavily calcified coronary arteries with severe atherosclerotic plaquing</li> <li>• Total occlusion of the mid right coronary artery</li> <li>• Significant narrowing (60%-95%) of the left anterior descending coronary artery</li> <li>• Mild plaquing in the left circumflex coronary artery</li> <li>• Cardiomegaly (enlarged heart) – heart weighing 450 grams (normal less than 400 grams)</li> <li>• A large area of white fibrosis with thinning of the posterior wall of the left ventricle</li> <li>• Severe dilatation of the heart chambers</li> <li>• No evidence of pulmonary thromboemboli</li> <li>• Negative drug and alcohol tests</li> <li>• Carboxyhemoglobin (carbon monoxide) test was not performed</li> </ul>	
F2004-41	Jun 08, 2004	Assistant chief suffers heart attack and dies after completing a walk test—Montana	"Sudden arrhythmia" as the immediate cause of death and "acute coronary artery thrombosis" as a contributing factor	Yes	<ul style="list-style-type: none"> <li>• Enlarged heart (cardiomegaly): heart weighed 470 grams (normal &lt; 400 grams) Ischemic heart disease: <ul style="list-style-type: none"> <li>– Thrombus causing total occlusion in the right coronary artery</li> <li>– Significant narrowing (80% to 90%) of the left anterior descending coronary artery</li> <li>– Minor atherosclerosis in the circumflex artery</li> </ul> </li> <li>• No evidence of pulmonary thromboemboli</li> <li>• Negative drug and alcohol tests</li> </ul>	



NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2004-40	Sep 12, 2004	Career helitack firefighter dies in burnover during an initial attack at a wildland fire operation—California	Inhalation of products of combustion	Yes	None	
F2004-38	Mar 13, 2004	Probationary firefighter suffers sudden cardiac death during maze drill—Connecticut	Sudden death associated with rheumatic heart disease	Yes	<p>Valvular heart disease:</p> <ul style="list-style-type: none"> <li>• Mitral valves thickened and fusion of the chordae tendineae” (strong cords of fibrous tissue fused together resulting in thickening and shortening of the mitral valve cusps)</li> <li>• Aortic valve fusion of the right and left cusps</li> </ul> <p>Normal heart size (380 grams), yet mild left atrial enlargement and dilatation</p> <ul style="list-style-type: none"> <li>• No significant coronary artery disease and no recent or remote evidence of a heart attack</li> <li>• Drug, alcohol, and carbon monoxide tests were negative</li> </ul>	
F2004-37	Apr 08, 2004	Volunteer chief dies and two firefighters are injured by a collapsing church facade—Tennessee	Multiple blunt-force trauma and thermal injuries	Not mentioned	None	
F2004-36	Mar 11, 2004	Career firefighter drowns while conducting training dive—New Hampshire	Drowning	Not mentioned	None	







NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2004-35	Jun 17, 2004	Firefighter suffers sudden cardiac death at his fire station—Georgia	"Cardiac dysrhythmia" as the immediate cause of death due to "massive cardiomegaly" due to "hypertensive heart disease."	Yes	<ul style="list-style-type: none"> <li>Hypertensive heart disease                             <ul style="list-style-type: none"> <li>Severely enlarged heart (cardiomegaly) weighing 840 grams (normal &lt; 400 grams), which is in the 95th percentile for body</li> <li>Markedly severely thickened left wall of the heart (concentric hypertrophy of the left ventricle)</li> <li>Moderate hardening of the kidney due to high blood pressure in the small arteries of the kidneys (arterionephrosclerosis)</li> </ul> </li> <li>Mild to moderate heart disease (atherosclerotic plaque blockage of three coronary arteries)                             <ul style="list-style-type: none"> <li>Approximately 40%–50% blockages (stenosis) in each of the left anterior descending, circumflex, and right coronary arteries.</li> </ul> </li> <li>Mild thickening (myocytic hypertrophy) and mild to moderate scarring of the heart muscle (interstitial fibrosis), but no evidence of heart attack (acute or remote infarct)</li> <li>Microscopic examination of the kidney showed kidney cancer (papillary renal cell carcinoma)</li> </ul> <p>His blood carboxyhemoglobin level (a test of carbon monoxide exposure) was not checked due to no exposure to fire smoke during his shift. No drug screen was performed</p>	
F2004-32	May 13, 2004	Volunteer firefighter suffers cardiac arrest while battling a structure fire—New York	Acute myocardial infarction (heart attack) with physical exertion in a hot, humid environment listed as a contributing cause	No	Perform an autopsy on all on-duty firefighter fatalities	
F2004-31	Aug 27, 2003	Volunteer firefighter suffers heart attack while battling structure fire and dies 6 days later—New York	Acute myocardial infarction	No	Perform an autopsy on all on-duty firefighter fatalities	



NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2004-30	Mar 25, 2004	Firefighter collapses and suffers sudden cardiac death after responding to a vehicle fire—Kentucky	A cardiac event (arrhythmia) due to hypertensive and atherosclerotic cardio- vascular disease	Yes	<ul style="list-style-type: none"> <li>• Cardiomegaly (an enlarged heart) weighing 560 grams (normal is less than 400 grams)<sup>1</sup></li> <li>• Dilated right ventricle</li> <li>• Scar of white fibrous tissue interlacing with brown myocardium (evidence of a remote [old] myocardial infarction [heart attack])</li> <li>• Moderate to severe coronary artery atherosclerosis (left and right)</li> <li>• Possible thrombus in the right coronary artery</li> </ul>	
F2004-28	May 31, 2002	Firefighter suffers sud- den cardiac death while performing work capacity test—California	Coronary atherosclerosis	Yes	<ul style="list-style-type: none"> <li>• Atherosclerotic coronary artery disease (CAD)</li> <li>• Ischemic heart disease: <ul style="list-style-type: none"> <li>– Near complete occlusion of the most proximal branch of the left anterior descending coronary artery</li> <li>– 90% stenosis in the left circumflex coronary artery</li> <li>– 70% stenosis in the right coronary artery</li> <li>– No superimposed acute thromboses or recent hemorrhages</li> </ul> </li> <li>– Enlarged heart (cardiomegaly) weighing 510 grams (normal &lt; 400 grams)</li> <li>– Left ventricular hypertrophy (wall thickness 1.7 centimeters [cm] [normal 0.6cm-1.1cm])</li> <li>– Interventricular septum hypertrophy (wall thickness 1.9cm [normal 0.6cm-1.1cm])</li> <li>• Mild to moderate perivascular fibrosis of the heart muscle on microscopic examination</li> <li>• No evidence of a pulmonary embolus</li> <li>• Vitreous (eye) chemistries showed elevations in sodium and chlorine consistent with dehydration</li> <li>• Negative drug and alcohol tests</li> </ul>	






NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2004-26	Feb 01, 2003	Firefighter-engineer suffers sudden cardiac death while performing strenuous fire station maintenance—California	"Atherosclerotic coronary artery disease" as the immediate cause of death with "hypertension"	Yes	<ul style="list-style-type: none"> <li>• Cardiomegaly (an enlarged heart) weighing 510 grams (upper limit of normal is 400 grams)</li> <li>• Moderate biventricular dilatation (LV—4 centimeters (cm) internal diameter; RV- 4.0 X 4.5 cm internal diameter)</li> <li>• Atherosclerotic coronary artery disease               <ul style="list-style-type: none"> <li>– 75% stenosis of the right coronary artery with a right dominant coronary artery system</li> <li>– 75% stenosis in the left main artery</li> <li>– 90% stenosis in the left anterior descending artery</li> <li>– 90% stenosis in the left circumflex artery</li> <li>– No coronary artery thrombus (blood clot)</li> </ul> </li> <li>• No pulmonary emboli (blood clot in the lung vasculature)</li> <li>• Negative drug screen</li> </ul>	
F2004-25	Mar 22, 2003	Volunteer firefighter suffers sudden cardiac death during fire suppression at a structural fire—Indiana	Acute, occlusive thrombosis of the left circumflex coronary artery secondary to coronary artery atherosclerosis	Yes	<ul style="list-style-type: none"> <li>• Moderate to severe coronary atherosclerosis as detailed below:               <ul style="list-style-type: none"> <li>– Acute occlusive thrombus present within the mid to distal portion of the left circumflex coronary artery</li> <li>– 80%-95% stenosis of the distal left anterior descending coronary artery and the right posterior descending coronary artery</li> <li>– Intraplaque hemorrhage at the mid portion of the left anterior descending coronary artery</li> <li>– 40%-60% stenosis of the mid portions of left anterior, left circumflex, and right coronary arteries</li> <li>– Cardiomegaly (enlarged heart weighing 550 grams, normal is less than 400 grams)</li> <li>– Extensive biventricular dilatation</li> <li>– Concentric left ventricular hypertrophy (LVH)</li> </ul> </li> <li>• Negative drug and alcohol test results</li> <li>• Carboxyhemoglobin level (a measure of carbon monoxide exposure) of 2.2% (10 hours after the initiation of oxygen). The normal lab value for moderate to heavy smokers is 4-15%. The FF did have a history of smoking.</li> </ul>	

NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2004-24	Apr 15, 2004	Acting fire chief suffers heart attack after shift and dies—Alaska	Cardiac event	No	Perform an autopsy on all on-duty firefighter fatalities	
F2004-23	May 06, 2002	Firefighter suffers unwit- nessed sudden cardiac death after responding to mobile home fire—South Carolina	"Cardiac arrhythmia" as the immediate cause of death due to "stress of fighting fire" and "cardiomegaly with dilatation" as contribut- ing factors	Yes	<ul style="list-style-type: none"> <li>• Cardiomegaly (enlarged heart)—weighing 576 grams (normal less than 400 grams)</li> <li>• Mild atherosclerotic cardiovascular disease               <ul style="list-style-type: none"> <li>– 50% occlusion in the right coronary artery</li> <li>– 50% occlusion in the left anterior descending artery</li> </ul> </li> <li>• Biventricular hypertrophy with dilatation (left ventricle thickness of 1.5 cm at the anterior papillary muscle)</li> <li>• Biventricular hypertrophy with dilatation (left ventricle thickness of 1.5 cm at the anterior papillary muscle)</li> <li>• No evidence of thrombi, emboli, or fibrosis on gross pathology</li> <li>• Drug and alcohol tests were negative</li> <li>• Carboxyhemoglobin (carbon monoxide) test was negative (less than 10%)</li> <li>• Hepatosplenomegaly</li> </ul>	






NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2004-22	Apr 10, 2004	Career firefighter/Emergency medical technician suffers sudden death 5 hours after participating in emergency response—South Carolina	Per death certificate: “atherosclerotic coronary artery disease”  Per autopsy: “acute cocaine intoxication” as the immediate cause of death with hypertension and atherosclerotic coronary heart disease as contributing factors.	Yes	<ul style="list-style-type: none"> <li>• Extensive atherosclerotic coronary artery disease with near total occlusion of three coronary arteries (left anterior descending, first diagonal, and right coronary artery)</li> <li>• Acute thrombus (“acute organizing occlusive fibrin thrombi”)</li> <li>• Old myocardial infarction of the posterior left ventricle</li> <li>• Cardiomyopathy                             <ul style="list-style-type: none"> <li>– Cardiomegaly (an enlarged heart) weighing 680 grams (upper limit of normal is 400 grams)</li> <li>– Hypertensive cardiovascular disease</li> <li>– Biventricular dilatation</li> </ul> </li> <li>• Acute Cocaine Intoxication                             <ul style="list-style-type: none"> <li>– Cocaine, Blood: 0.48 mg/L</li> <li>– Ecgonine methyl ester, blood: 0.67 mg/L</li> <li>– Benzoyllecgonine, blood: 0/76 mg/L</li> <li>– Benzoyllecgonine, urine: 4.9 mg/L</li> </ul> </li> </ul>	










NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2004-21	Apr 18, 2004	District chief suffers sudden cardiac death at home after experiencing symptoms consistent with heart disease at his station—Illinois	"Cardiac arrhythmia" as the cause of death due to "ischemic heart disease."	Yes	<ul style="list-style-type: none"> <li>• Marked atherosclerosis with               <ul style="list-style-type: none"> <li>– 60% narrowing of the right coronary artery</li> <li>– 60% narrowing of the left main coronary artery</li> <li>– 90% narrowing of the left anterior descending coronary artery</li> <li>– 90% narrowing of the circumflex coronary artery</li> </ul> </li> <li>• Recent thrombus in the circumflex coronary artery, resulting in total occlusion</li> <li>• No evidence of remote myocardial infarction or myocardial fibrosis</li> <li>• Mild left ventricle hypertrophy with:               <ul style="list-style-type: none"> <li>– Left ventricle thickness 1.6 cm (normal is 0.76-0.88 cm)</li> <li>– Interventricular septum thickness 1.5 cm (normal echographic measurement is 0.6-1.1 cm)</li> </ul> </li> <li>• Cardiomegaly (enlarged heart) weighing 420 grams (normal is less than 400 grams)</li> </ul>	
F2004-20	Dec 25, 2003	Assistant chief dies after suffering aortic dissection during a fire alarm response—Connecticut	"Multi-organ system dysfunction" due to "cardiac arrest" as the immediate cause of death with "aortic dissection" as a significant condition	No	Perform an autopsy on all on-duty firefighter fatalities	
F2004-19	Apr 30, 2004	Career firefighter dies from injuries sustained in fall from apparatus—Massachusetts	Blunt-force head trauma	Not mentioned	None	






NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2004-18	Jan 14, 2004	Volunteer firefighter suffers sudden cardiac death after participating in emergency responses—Maryland	Acute myocardial infarction	Yes	<ul style="list-style-type: none"> <li>• Cardiomegaly (an enlarged heart) weighing 670 grams (upper limit of normal is 400 grams)</li> <li>• Four chamber dilatation</li> <li>• Biventricular hypertrophy</li> <li>• Atherosclerotic CAD</li> <li>• Acute plaque rupture and thrombosis, left obtuse marginal artery (recent heart attack)</li> <li>• Total occlusion of mid left circumflex artery by healed plaque rupture with organized and recanalized thrombus (old, healed heart attack)</li> <li>• Healed transmural infarction, posterolateral left ventricle at base</li> <li>• Diffuse 50%-90% narrowing of coronary arteries</li> <li>• Penetrating organized thrombus, right atrium; undetermined etiology</li> </ul>	
F2004-17	Mar 13, 2004	Career battalion chief and career master firefighter die and 29 career firefighters are injured during a five alarm church fire—Pennsylvania	<p>Victim #1: asphyxiation due to compression of the body by building debris; blunt-force trauma of the head, neck, pelvis, and extremities were contributory causes of death.</p> <p>Victim #2: asphyxiation due to compression of the body by building debris with blunt force trauma of the head and extremities.</p>	Not mentioned	None	

NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2004-16	Dec 18, 2003	Firefighter dies at home after shift—Maryland	Arteriosclerotic cardio-vascular disease	Yes	<p>The carboxyhemoglobin level (a measure of exposure to carbon monoxide) was not measured</p> <ul style="list-style-type: none"> <li>• Severe arteriosclerotic cardiovascular disease</li> <li>• Old subendocardial infarct of left ventricle</li> <li>• Biventricular dilatation</li> <li>• Cardiomegaly (heart weighing 550 grams with normal less than 400 grams<sup>4</sup>)</li> <li>• Aortic atherosclerosis</li> <li>• Cardiac valves were unremarkable</li> <li>• No thrombi were found</li> <li>• Drug and alcohol tests were negative</li> </ul>	
F2004-15	Mar 03, 2004	Forest ranger/Firefighter drowned after catastrophic blow-out of right front tire—Florida	Drowning with no evidence of trauma-related injuries	Not mentioned	Posttrash blood alcohol content (BAC) and drug screening tests were negative	
F2004-14	Apr 04, 2004	Career firefighter dies and two career captains are injured while fighting night club arson fire—Texas	High thermal exposure	Yes	None	
F2004-13	Apr 18, 2003	Firefighters suffers fatal pulmonary embolism after knee surgery for a work-related injury—North Carolina	Massive pulmonary embolism (PE) due to a deep vein thrombus (DVT) due to knee injury that was treated surgically	Yes	<ul style="list-style-type: none"> <li>• Acute pulmonary embolus</li> <li>• Remote pulmonary emboli (at least two weeks old)</li> <li>• Deep vein thrombosis in the right leg</li> <li>• Evidence of hypertensive cardiovascular disease</li> <li>• Severe focal atherosclerotic coronary artery disease</li> <li>• No ethanol (alcohol) or salicylates (aspirin) detected</li> </ul>	
F2004-12	Jan 27, 2004	Firefighter/Paramedic dies after performing physical fitness training—Florida	Aortic valve stenosis	Yes	<ul style="list-style-type: none"> <li>• Aortic valve stenosis</li> <li>• Cardiomegaly (heart weighing 440 grams with normal less than 400 grams)</li> <li>• Mild, patchy, interstitial fibrosis [as determined by microscopic examination]</li> <li>• No evidence of thromboemboli</li> <li>• No evidence of atherosclerosis</li> </ul>	









NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2004-11	Feb 13, 2004	Career lieutenant killed and firefighter injured by gunfire while responding to medical assistance call—Kentucky	Multiple gunshot wounds	Not mentioned	None	
F2004-10	Feb 18, 2004	Career firefighter dies searching for fire in a restaurant/lounge—Missouri	Smoke inhalation	Not mentioned	An independent toxicology report listed the victim's carbon monoxide level at 51% saturation. There was no notable trauma	
F2004-09	Apr 02, 2001	Firefighter/Driver/Engineer suffers heart attack and dies at the end of his 24-hour shift—Hawaii	Acute myocardial infarction and coronary artery thrombosis due to atherosclerotic cardiovascular disease	Yes	<ul style="list-style-type: none"> <li>Blood clot (thrombus) in one of the coronary arteries (mid-left anterior descending artery)</li> <li>Moderate to severe coronary atherosclerosis</li> <li>A large heart weighing 470 grams (normal &lt; 400 grams)</li> <li>Thickened left wall of the heart (left ventricular hypertrophy)</li> <li>A negative drug screen</li> </ul>	
F2004-08	Jan 21, 2004	Firefighter suffers sudden cardiac death after emergency recall—Massachusetts	"Acute sudden cardiac death syndrome" due to "acute myocardial infarction" as the immediate cause of death and "obesity" as another significant condition	No	Perform an autopsy on all on-duty firefighter fatalities	
F2004-07	Nov 18, 2002	Fire chief dies after performing service call—Connecticut	"ASCVD" (atherosclerotic coronary vascular disease) as the immediate cause of death, with hyperlipidemia and smoking as contributing factors	Yes	<ul style="list-style-type: none"> <li>Arteriosclerosis, with 95% occlusion of the left main coronary artery and 90% occlusion of the right coronary artery</li> <li>No CO level taken</li> </ul>	








NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2004-06	Nov 17, 2003	Firefighter/Paramedic suffers sudden cardiac death while performing physical fitness training—Washington	Occlusive atherosclerotic cardiovascular disease	Yes	<ul style="list-style-type: none"> <li>Heart weighing 400 grams</li> <li>Atherosclerotic cardiovascular disease</li> <li>0.7 centimeter area of increased consistency which is slightly grayer than adjacent areas in the posterior lateral aspect of the left ventricular wall in the apical third</li> <li>No thrombi or emboli</li> <li>No fibrosis</li> <li>Drug and alcohol tests were negative</li> </ul>	
F2004-05	Jan 09, 2004	Residential basement fire claims the life of career lieutenant—Pennsylvania	Smoke and soot inhalation and thermal burns	Not mentioned	None	
F2004-04	Dec 16, 2003	Career firefighter dies of carbon monoxide poisoning after becoming lost while searching for the seat of a fire in warehouse—New York	Smoke inhalation with a carboxyhemoglobin (cohb) level of 74.8% in the emergency department	Yes	None	
F2004-03	Nov 17, 2003	Career captain/safety officer dies in a single motor vehicle crash while responding to a call—Kansas	Probable positional asphyxia	Not mentioned	None	
F2004-02	Nov 29, 2003	Basement fire claims the life of volunteer firefighter – Massachusetts	Smoke and soot inhalation	Not mentioned	None	
F2004-01	Oct 24, 2003	District chief dies after suffering a heart attack—Texas	Myocardial infarction	No	Perform an autopsy on all on-duty firefighter fatalities	
F2003-41	Oct 17, 2003	Live-fire exercise in mobile flashover training simulator injures five career firefighters—Maine	No deaths		None	
F2003-40	Feb 26, 2003	Airport firefighter suffers sudden cardiac death at fire station—Arkansas	Myocardial infarction	No	Perform an autopsy on all on-duty firefighter fatalities	
F2003-39	Jul 21, 2003	Firefighter suffers sudden cardiac death in parking lot of fire station—Tennessee	Myocardial infarction	No	Perform an autopsy on all on-duty firefighter fatalities	







NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2003-38	Oct 07, 2003	Firefighter dies after performing ventilation at a fire in a two-story dwelling—Pennsylvania	"Ischemic heart disease" as the immediate cause of death and "smoke inhalation" as a significant condition	Yes	<ul style="list-style-type: none"> <li>• Cardiomegaly (heart weighing 552 grams, with normal less than 400 grams)</li> <li>• Mild atherosclerotic coronary artery disease involving the left main coronary artery</li> <li>• Remote (old) myocardial infarction involving the apex and left posterior ventricular wall</li> <li>• Fibrosis within the apex and left posterior ventricular wall (as determined by microscopic examination)</li> <li>• Evidence of smoke inhalation (moderate amount of soot in the trachea and large airways of both lungs)</li> <li>• Carboxyhemoglobin (measure of carbon monoxide in the blood) level negative</li> </ul>	
F2003-37	Oct 27, 2003	Volunteer assistant chief is struck and killed at road construction site—Minnesota	Craniocerebral injuries and closed head trauma	Yes	None	
F2003-36	Oct 29, 2003	A career firefighter was killed and a career captain was severely injured during a wildland/urban interface operation—California	Thermal injuries	Yes	Extensive burns over the entire body, no evidence of underlying cardiovascular or pulmonary disease, and a carboxyhemoglobin level of 27% (confirming significant exposure to carbon monoxide prior to his death)	
F2003-35	Sep 27, 2003	Firefighter suffers a heart attack after responding to a rubbish fire at a two-story apartment building—New York	"Acute myocardial infarction" as the immediate cause of death and "diabetes mellitus" and "hypertension" as other significant conditions	No	None	
F2003-34	Jul 10, 2003	Volunteer firefighter/fire service products salesman dies after being struck by dislodged rescue airbag—South Dakota	Closed head wound	Not mentioned	None	

NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2003-33	Aug 06, 2003	Career firefighter/emergency medical technician dies and paramedic is injured in a three-vehicle collision—Nebraska	Blunt-force trauma due to a motor vehicle accident	Not mentioned	None	<a href="#">PDF</a>
F2003-32	Oct 01, 2003	Two firefighters die and eight firefighters are injured from a silo explosion at a lumber company—Ohio	Multiple blunt-force injuries	Not mentioned	None	<a href="#">PDF</a>
F2003-31	Apr 14, 2003	Lieutenant suffers sudden cardiac death after performing forcible entry requiring heavy physical exertion—Georgia	"Cardiac dysrhythmia" due to "atherosclerotic coronary artery disease" as the immediate cause of death and "superimposed physical exertion" as a contributing factor	Yes	<ul style="list-style-type: none"> <li>• Cardiomegaly (heart weighing 530 grams, with normal less than 400 grams<sup>1</sup>)</li> <li>• Atherosclerotic coronary artery disease</li> <li>• Left ventricular hypertrophy (15 millimeters (mm) thick; normal between 7.6-8.8 mm)</li> <li>• Interventricular septal hypertrophy (16mm thick; normal is 6 to 11 mm)</li> <li>• No thromboemboli are recovered from the main, right, or left pulmonary arteries or their segmental branches</li> <li>• No obvious soot in the nares or oral cavity</li> <li>• Microscopic sections of the right ventricle, left ventricle, and interventricular septum do not reveal significant myocardial inflammation, infarct, hemorrhage, fibrosis, or neoplasia</li> <li>• Drug and alcohol tests were negative</li> </ul>	<a href="#">PDF</a>
F2003-30	Jul 28, 2003	One volunteer lieutenant dies and a volunteer firefighter is seriously injured in a motor vehicle rollover incident while enroute to a trailer fire—North Carolina	Acute intracranial injuries	Not mentioned	None	<a href="#">PDF</a>


NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2003-29	Dec 15, 2002	Firefighter suffers heart attack at the scene of a structure fire and dies 2 months later—Indiana	"Acute myocardial infarction" due to "atherosclerotic cardiovascular disease" as the immediate cause of death and "chronic obstructive pulmonary disease (COPD)" as a contributing factor	No	Perform an autopsy on all on-duty firefighter fatalities	
F2003-28	Aug 08, 2003	Live-fire training exercise claims the life of one recruit firefighter and injures four others—Florida	Atherosclerotic cardiovascular disease" due to "COPD"	No	Perform an autopsy on all on-duty firefighter fatalities	
F2003-27	Jan 25, 2003	Fire captain suffers sudden cardiac death during a live-fire training exercise—North Carolina	"Acute myocardial infarction" (heart attack) as the cause of death due to "coronary atherosclerosis" with a "prior myocardial infarction" being a significant contributing factor	Yes	<p>Severe atherosclerotic coronary artery disease</p> <ul style="list-style-type: none"> <li>• 100% blockage of the right coronary artery, the circumflex coronary artery, and the first diagonal coronary artery in the area of the stent</li> <li>• A seven centimeter scar (due to his heart attack in 1999) in the posterior and lateral left ventricular wall</li> <li>• A two centimeter hyperemic area near the first diagonal coronary artery which probably represented the early signs of a recent (acute) heart attack (myocardial infarction)</li> </ul> <p>Carboxyhemoglobin level was less than 5% suggesting carbon monoxide exposure was not a significant factor in the Captain's sudden death</p>	




NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2003-26	Feb 20, 2003	Firefighter suffers sudden cardiac death at his fire station—Oregon	Per death certificate: “ischemic heart disease” as the immediate cause of death due to “atherosclerotic coronary heart disease.” Per autopsy: “arteriosclerotic cardiovascular disease” as the cause of death	Yes	<ul style="list-style-type: none"> <li>Moderate calcification and atherosclerotic narrowing of the coronary arteries</li> <li>Softening and dark discoloration of the left ventricle, more toward the apex” [a finding suggestive of a recent myocardial infarct (MI) (otherwise known as a heart attack)]</li> <li>No scars suggestive of old/remote heart attacks</li> <li>No evidence of a blood clot (embolus) in the pulmonary arteries</li> <li>Microscopic examination of the heart muscle showed no inflammation, necrosis, or scarring</li> <li>Blood carboxyhemoglobin level (a test of carbon monoxide exposure) was not checked due to no exposure to fire smoke during his shift, and no drug screen was performed</li> </ul>	
F2003-25	May 14, 2003	Career Federal firefighter dies from injuries sustained at prescribed burn—Arizona	Adult Respiratory Distress Syndrome secondary to severe inhalation injury with cardiovascular compromise.	None mentioned	Note: Thirty-six % of the victim’s body surface area had second- and third-degree burn injuries and he had a significant inhalation injury	
F2003-24	Jan 21, 2003	Firefighter suffers fatal heart attack while performing physical fitness training—Missouri	Per death certificate: “acute myocardial infarction” due to “atherosclerotic coronary artery disease” Per autopsy: “coronary atherosclerosis” followed by “stenosis, thrombosis, chronic myocardial infarct, subacute myocardial infarcts, acute myocardial infarct, and acute ischemic change” as the cause(s) of death.	Yes	<ul style="list-style-type: none"> <li>A large heart (435 grams with normal less than 400 grams)</li> <li>Significant coronary atherosclerosis</li> <li>Stent placement in three coronary arteries [left anterior descending (LAD), left circumflex, right coronary artery]</li> <li>Evidence of old heart attacks (myocardial infarcts or MIs)</li> <li>Subacute MIs</li> <li>Acute (recent) MI in the interventricular septum and left ventricular free wall</li> </ul> <p>Since the captain was not involved in any fire suppression duties that day, a carboxyhemoglobin level (a measure of exposure to carbon monoxide) was not checked</p>	






NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2003-23	Jun 26, 2003	Volunteer assistant chief dies in tanker rollover—New Mexico	Multiple injuries con- sistent with a rollover motor vehicle crash	Not mentioned	None	
F2003-22	Dec 13, 2002	Volunteer firefighter suffers sudden cardiac death after completing emergency medi- cal technician (emt) written examination—Texas	Acute myocardial infarction	No	Perform autopsies on all on-duty firefighter fatalities	
F2003-21	Feb 12, 2003	Firefighter recruit suffers sudden cardiac death during physical ability training—Texas	Cardiac hypertrophy, “biventricular dilatation and cardiomegaly	Yes	<ul style="list-style-type: none"> <li>• Cardiac hypertrophy</li> <li>• Biventricular and right atrial dilatation</li> <li>• Cardiomegaly (an enlarged heart) weighing 440 grams</li> <li>• The coronary arteries are free of atherosclerosis</li> <li>• The cardiac valves are unremarkable</li> <li>• No blood clots in the pulmonary vessels, therefore no evidence of a pulmonary embolus</li> </ul>	
F2003-20	May 22, 2003	Junior volunteer firefighter is killed while responding to a brush fire with an intoxicated driver—Wyoming	Massive trauma	Not mentioned	None	
F2003-19	Jun 16, 2003	Volunteer firefighter killed after his privately owned vehicle hydroplaned and struck a billboard signpost—Kentucky	Massive head and chest trauma	Not mentioned	None	
F2003-18	Jun 15, 2003	Partial roof collapse in commercial structure fire claims the lives of two career firefighters—Tennessee	Victim #1: thermal burns. Victim #2: thermal inhalation injury	Not mentioned	None	
F2003-17	May 18, 2003	Volunteer training/Safety officer dies from injuries received in fall from pick- up truck following training exercise—Tennessee	Blunt-force injury to the head	Not mentioned	None	




NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2003-16	Feb 23, 2003	Volunteer fire police captain dies from injury-related complications after being struck by motor vehicle while directing traffic—New Jersey	Severe pneumonia as a consequence of complications due to a pedestrian motor vehicle accident	Not mentioned	None	
F2003-15	Apr 03, 2003	Volunteer firefighter dies in tanker rollover—Ohio	Compressive asphyxia	Not mentioned	None	
F2003-14	Mar 19, 2003	Volunteer captain killed in fire apparatus crash while responding to a training exercise—Oregon	Positional asphyxiation	Not mentioned	None	
F2003-13	Mar 18, 2003	Volunteer firefighter killed while walking across an interstate highway responding to a motor vehicle incident—Texas	Severe craniocerebral injuries	Yes	None	
F2003-12	Mar 31, 2003	Career firefighter dies and two career firefighters injured in a flashover during a house fire—Ohio	Severe third degree burns	Not mentioned	None	
F2003-11	Feb 07, 2001	Firefighter collapses and dies at the scene of residential fire—Florida	Hypertensive and arteriosclerotic heart disease	Yes	<ul style="list-style-type: none"> <li>• Enlarged heart (concentric left ventricular hypertrophy)</li> <li>• Coronary atherosclerosis</li> <li>• Four-vessel bypass</li> <li>• Pulmonary edema</li> <li>• Cerebral edema</li> </ul> His blood carboxyhemoglobin level was not checked	







NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2003-10	May 22, 2002	Firefighter suffers sud- den cardiac death during a medical emergency response—California	Complication of hyper- trophic cardiomyopathy	Yes	<ul style="list-style-type: none"> <li>• An enlarged heart weighing 565 grams (normal less than 400 grams)</li> <li>• Thickened left ventricle of 2.0 centimeters (cm) in diameter (normal &lt;1.3)</li> <li>• Thickened right ventricle of 1.0 centimeters (cm) in diameter (normal &lt;0.8)</li> <li>• Minimal atherosclerosis in the coronary arteries</li> <li>• surgical patch and scar at the apex of the heart's left ventricle consistent with a well healed surgical repair of an old knife wound to the chest</li> <li>• Bilateral fibrous pleural adhesions and pericardial sac adhesions also consistent with his old knife wound to the chest</li> <li>• No evidence of a blood clot (embolus) in the pulmonary arteries</li> <li>• A negative drug screen of illicit drugs (e.g. cocaine)</li> <li>• Histology (microscopic) examination of the heart tissue was not performed</li> </ul>	










NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2003-09	Jan 14, 2003	Firefighter suffers fatal heart arrhythmia at structure fire—Illinois	"Cardiac arrhythmia" due to "heart disease" as the immediate cause of death and "exertion while fighting a house fire" as a contributing factor	Yes	<ul style="list-style-type: none"> <li>• Atherosclerotic cardiovascular disease</li> <li>• Coronary artery atherosclerosis</li> <li>• Remote myocardial infarct (heart attack), posterior/inferior wall of left ventricle with moderate thinning of the wall</li> <li>• Diffuse mild and focal moderate aortic atherosclerosis</li> <li>• Clinical history of hypercholesterolemia</li> <li>• Hypertensive cardiovascular disease</li> <li>• Cardiac hypertrophy (490 grams)</li> <li>• Clinical history of hypertension</li> <li>• Tobacco pneumonitis with early pulmonary emphysema and chronic bronchitis</li> <li>• History of cigarette smoking</li> <li>• No ethanol or illicit drugs were detected</li> </ul> <p>Carboxyhemoglobin level was 2.2%, indicating the captain had inhaled some but not an excessive amount of carbon monoxide; possibly due to his cigarette smoking</p>	
F2003-08	Nov 12, 2002	Sudden cardiac death due to myocardial sarcoidosis claims the life of an on-duty firefighter—Connecticut	Myocardial sarcoidosis	Yes	<ul style="list-style-type: none"> <li>• Myocardial sarcoidosis (noncaseating granulomas) of the heart, lung, lymph nodes, and liver</li> <li>• The right heart ventricle revealed lymphocytic infiltrates and noncaseating granulomas that are confluent, with dense fibrosis between the granulomas. There is also some nodule involvement of the papillary muscles and interventricular septum (all findings consistent with sarcoidosis involving the heart)</li> <li>• Cardiomegaly (an enlarged heart) weighing 640 grams</li> <li>• No atherosclerotic disease of the coronary arteries</li> </ul>	
F2003-07	Jan 13, 2003	Career firefighter/emergency medical technician dies from injuries sustained in fall from apparatus—California	Multiple traumatic injuries	Not mentioned	None	








NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2003-06	Sep 19, 2002	Firefighter dies from progressive respiratory failure—Massachusetts	Progressive respira- tory failure and clinical history of adult respiratory distress syndrome due to inhalational injuries		<ul style="list-style-type: none"> <li>• Pulmonary congestion</li> <li>• Tracheobronchial tree is diffusely obstructed by mucoid- type material</li> <li>• Areas of squamous metaplasia in the midtrachea</li> <li>• Chronic inflammatory infiltrate within the mucosa and submucosa of the lungs</li> <li>• Diffuse alveolar damage in the reparative phase</li> <li>• Interstitial fibrosis of the lungs</li> <li>• No significant narrowing of the coronary arteries</li> <li>• Cardiomegaly (enlarged heart) (466 grams)</li> </ul>	
F2003-05	Jan 19, 2003	Career firefighter/emergency medical technician dies in ambulance crash—Texas	Blunt-force injuries	Not mentioned	None	
F2003-04	Jan 20, 2003	Career firefighter dies from injuries received during a chimney and structural collapse after a house fire—Pennsylvania	Compressional asphyxia as a result of being trapped from falling debris	Not mentioned	None	
F2003-03	Jan 19, 2003	Volunteer firefighter dies fol- lowing nitrous oxide cylinder explosion while fighting a commercial structure fire—Texas	Thermal injuries, with smoke inhalation and blast effect	Yes	Preliminary autopsy findings indicated that he had received significant blast injuries, i.e., both eardrums were ruptured and there was concussive damage to his lungs	
F2003-02	Dec 05, 2002	Firefighter suffers fatal heart attack at two-alarm structure fire—Texas	Atherosclerotic and hypertensive cardio- vascular disease	Yes	<ul style="list-style-type: none"> <li>• Severe occlusive coronary artery disease</li> <li>• Remote infarct of the posterior wall of the left ventricle and the posterior aspect of the interventricular septum</li> <li>• Cardiomegaly (an enlarged heart) weighing 560 grams (normal is less than 400 grams)</li> <li>• Concentric left ventricular hypertrophy (free wall width 1.5 centimeters thick)</li> </ul> <p>Carboxyhemoglobin level was less than one percent, indicating inhaled carbon monoxide was not a factor in his death</p>	

NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2003-01	May 29, 2002	Firefighter dies during night at fire station—Mississippi	"Sudden cardiac death" secondary to hyper- tensive heart disease and coronary artery disease	Yes	<ul style="list-style-type: none"> <li>• Coronary artery disease (CAD)</li> <li>• An enlarged heart (460 grams).</li> <li>• Histologic and visual inspection of the heart failed to reveal evidence of acute or remote infarction</li> <li>• Microscopic analysis reveals ischemic change manifested by nuclear hyperchromatism, nuclear outline irregularity, and nuclear enlargement of the nuclei of the individual rhabdomyocytes</li> </ul>	
F2002-50	Nov 25, 2002	Structural collapse at an auto parts store fire claims the lives of one career lieutenant and two volunteer firefighters—Oregon	Asphyxiation	Not mentioned	None	
F2002-49	Nov 01, 2002	Volunteer lieutenant dies following structure col- lapse at residential house fire—Pennsylvania	Traumatic compres- sional asphyxia	Not mentioned	None	




NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2002-48	Aug 28, 2001	Firefighter suffers sudden cardiac death at a structural fire—New York	"Hypertrophic cardio- myopathy with myocal- dial arteriolarsclerosis" as the immediate cause of death with a "myxomatous mitral value"	Yes	<ul style="list-style-type: none"> <li>• Widely patent (open) coronary arteries</li> <li>• An enlarged heart weighing 440 grams</li> <li>• Slightly thickened left ventricle of 1.4 centimeters (cm) in diameter</li> <li>• Microscopic changes of the heart muscle</li> <li>• Myocyte bundles arranged in a sinusoidal and other irregular patterns</li> <li>• Focal myocyte hypertrophy with occasional multipolarity</li> <li>• Widened interstitium with fibrosis in irregular patterns</li> <li>• Arterioles with thickened intima</li> <li>• No inflammatory infiltrates, contraction banding, or hyper eosinophilia</li> <li>• Marked billowing of both leaflets of the mitral valve</li> <li>• No evidence of a blood clot (embolus) in the pulmonary arteries</li> <li>• Blood carboxyhemoglobin level was less than 3%, suggesting the victim was not exposed to excessive carbon monoxide levels</li> </ul>	

NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2002-47	Jan 13, 2001	Firefighter suffers a heart attack and dies after performing "ventilation-entry-search" activities in a five-story apartment building fire—New York	"Hypertensive and arteriosclerotic heart disease" as the immediate cause of death and "smoke inhalation" as an other significant condition	Yes	<ul style="list-style-type: none"> <li>Hypertensive and arteriosclerotic cardiovascular disease</li> <li>60% calcific atherosclerotic stenosis in left main stem coronary artery</li> <li>30% stenosis in proximal right coronary artery</li> <li>Valves have focal atherosclerosis</li> <li>Cardiomegaly (heart weighed 560 grams) with concentric left ventricular hypertrophy</li> <li>Coronary arteriosclerosis, multifocal, moderate, with superimposed coronary thrombosis in the left main stem and right coronary artery</li> <li>Generalized visceral congestion with pulmonary edema</li> <li>Smoke inhalation</li> <li>Scant soot in nares</li> <li>Soot in upper airway</li> <li>Blood carboxyhemoglobin level was less than 3%, suggesting the victim was not exposed to excessive carbon monoxide levels</li> </ul>	
F2002-46	Jan 04, 2001	Firefighter suffers a heart attack and dies while exercising in firehouse—New York	Atherosclerotic cardiovascular disease	Yes	<ul style="list-style-type: none"> <li>Atherosclerotic cardiovascular disease</li> <li>Coronary artery with marked atherosclerotic stenosis (80%) of the proximal left anterior descending artery</li> <li>Myocardial infarct, remote (at least 3 months old), septum (microscopic), focal fibrosis of septum adjacent to conduction fibers</li> <li>Myxoid mitral valve</li> <li>No evidence of a blood clot (embolus)</li> </ul>	
F2002-44	Sep 30, 2002	Parapet wall collapse at auto body shop claims life of career captain and injures career lieutenant and emergency medical technician—Indiana	Extensive blunt-force trauma	Yes	None	








NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2002-43	Oct 09, 2002	Firefighter dies after col- lapse at apartment building fire—Kentucky	Ventricular tachyarrhythmia	No	Perform an autopsy on all on-duty firefighter fatalities	
F2002-42	Jun 13, 2002	Emergency medical techni- cian killed in single-vehicle crash while responding to structure fire—North Carolina	Blunt-force trauma to the head and neck	Not mentioned	None	
F2002-41	Sep 23, 2002	Career firefighter dies in tanker rollover—North Carolina	Fractured neck due to motor-vehicle incident	Not mentioned	None	
F2002-40	Sep 14, 2002	Career firefighter dies after roof collapse following roof ventilation—Iowa	Smoke inhalation, intra-alveolar hemor- rhage, and carbon monoxide intoxication	Yes	Carboxyhemoglobin level, 30.3%	
F2002-39	Sep 05, 2002	Junior volunteer fire- fighter dies in tanker rollover—Tennessee	Massive head and chest trauma	Not mentioned	None	
F2002-38	Jul 01, 2002	Volunteer captain killed, two firefighters and police officer injured when struck by motor vehicle at highway incident—Minnesota	Multiple blunt-force trauma	Not mentioned	None	
F2002-37	Aug 01, 2002	Volunteer firefighter dies during wildland fire suppres- sion—South Dakota	Second- and third- degree burns over 70 percent of the body	Not mentioned	None	
F2002-36	Aug 08, 2002	Volunteer firefighter dies after being run over by brush truck during grass fire attack—Texas	Craniofacial crush inju- ries due to a fall from moving vehicle with a secondary run-over	Not mentioned	None	
F2002-35	Jun 08, 2002	Off-duty career firefighter dies and another off-duty career firefighter is injured after being struck by a truck while assisting at a highway traffic incident—Florida	Multiple blunt-force injuries with compound fractures of the skull	Not mentioned	None	





NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2002-34	Jul 30, 2002	Career lieutenant and firefighter die in a flashover during a live-fire training evolution—Florida	Smoke inhalation and thermal injuries	Not mentioned	None	
F2002-33	Jan 31, 2002	Firefighter dies during night at fire station—North Carolina	Ischemic heart disease	Yes	<ul style="list-style-type: none"> <li>• Severe three-vessel atherosclerotic disease</li> <li>• Microscopic examination of one section of the heart reveals multiple small areas of fibrosis. But there is otherwise no evidence of acute or old infarction</li> <li>• A normal sized heart</li> </ul>	
F2002-32	Jul 04, 2002	Structural collapse at residential fire claims lives of two volunteer fire chiefs and one career firefighter—New Jersey	Fixed compression	Yes	None	
F2002-31	Jul 05, 2002	Volunteer firefighter dies due to inadvertent fireworks discharge—North Dakota	Blunt-force injuries of the chest and left upper extremity due to fireworks discharge	Not mentioned	None	
F2002-30	Jan 21, 2002	Firefighter suffers probable heart attack at condominium fire—South Carolina	Arteriosclerotic cardiovascular disease	Yes	<ul style="list-style-type: none"> <li>• Ischemic fibrosis with scarring, consistent with an remote, healed heart attack (infarct)</li> <li>• Coronary atherosclerosis</li> <li>• Aortic atherosclerosis with ulcerating plaques</li> <li>• A large heart (500 grams)</li> </ul>	
F2002-28	Apr 27, 2002	Firefighter dies after leaving fire station—Pennsylvania	Sudden cardiac death	No	Perform autopsies on all on-duty firefighter fatalities	
F2002-27	May 16, 2001	Firefighter dies during the night at fire station—Missouri	Asphyxiation due to probable seizure	No	Perform an autopsy on all deceased firefighters	















NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2002-24	Nov 02, 2001	Firefighter suffers fatal heart attack at fire scene—Wisconsin	Per autopsy: acute coronary thrombosis with ischemic arrhythmia  Per death certificate: "cardiac arrhythmia" as the immediate cause of death and "CAD" (coronary artery disease) as the underlying cause	Yes	<ul style="list-style-type: none"> <li>Severe three-vessel coronary atherosclerosis</li> <li>Multiple 90-98% stenosis of LAD [left anterior descending] and left circumflex [coronary arteries]</li> <li>Acute thrombosis, left circumflex artery</li> <li>Interstitial and perivascular fibrosis, myocardium</li> <li>Cardiomegaly due to left ventricular hypertrophy</li> <li>A blood specimen obtained at autopsy contained "&lt;1%" COHb</li> </ul>	
F2002-23	Mar 11, 2001	Firefighter suffers fatal heart attack during training—New Mexico	Per autopsy: "myocardial infarction" with "severe hypoxic brain injury" resulting from the cardiac arrest.  Per death certificate: "cardiac arrest" as the immediate cause of death, due to "myocardial infarction," with "coronary artery disease" as the underlying cause	Yes	<ul style="list-style-type: none"> <li>Acute myocardial infarction, extensive, left ventricle and intraventricular [sic] septum with cardiac arrest and resuscitation</li> <li>Coronary artery stenosis, bilateral, 95% left coronary and 90% right coronary</li> <li>Brain death secondary to cardiac arrest (The last finding was based on the hospital record; the autopsy did not include an examination of the brain.)</li> </ul>	
F2002-22	Sep 26, 2001	Firefighter suffers fatal heart attack at fire at his residence—Florida	"Acute thrombosis of coronary artery" due to "arteriosclerotic cardiovascular disease"	Yes	<p>Atherosclerotic cardiovascular disease to include</p> <ul style="list-style-type: none"> <li>Cardiomegaly (445 grams) with left and right ventricular hypertrophy</li> <li>Mild to severe calcific atherosclerosis of the coronary arteries</li> <li>Acute thrombosis of the left anterior descending coronary artery</li> </ul> <p>Carboxyhemoglobin (COHb) concentration (a measure of carbon monoxide exposure) in blood obtained at autopsy was 1.4% (a medically insignificant level). There was no soot in the lungs</p>	




NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2002-21	May 04, 2002	Junior firefighter killed while responding to fire alarm on his bicycle—Pennsylvania	Multiple injuries	Not mentioned	None	<a href="#">PDF</a>
F2002-20	May 03, 2002	Two career firefighters die in four-alarm fire at two-story brick structure—Missouri	Smoke inhalation	Not mentioned	Note: The carbon monoxide level in the blood was noted to be less than 10% in Victim #1, and 47.9% in Victim #2. Victim #1 had third-degree thermal injury over 40% of his body, and Victim #2 had third-degree thermal injury over 18% of his body surface area. <ul style="list-style-type: none"> <li>• Carboxyhemoglobin level was measured at less than 5%.</li> <li>• Severe coronary atherosclerosis of the left anterior descending and right coronary arteries</li> <li>• Proximal to mid left anterior descending diffuse lesions causing a pinpoint lumen</li> <li>• 80% stenosis of right coronary alternating to minimal throughout length of lumen</li> <li>• Obesity (height of 67 inches and weight of 195 pounds) (Body Mass Index of 30.5 kilograms per square meter (kg/m<sup>2</sup>))</li> </ul>	<a href="#">PDF</a>
F2002-19	Apr 10, 2002	Firefighter dies during live fire training—North Carolina	Per death certificate: "ischemic heart disease due to coronary artery disease"  Per autopsy: "probable cardiac arrhythmia secondary to ischemic heart disease caused by severe coronary artery atherosclerosis"	Yes		<a href="#">PDF</a>
F2002-18	Apr 11, 2002	Career fire chief dies after being struck by a fire truck at a motor-vehicle incident—Kansas	Chest, abdomen, and skull trauma	Not mentioned	None	<a href="#">PDF</a>
F2002-17	Apr 05, 2002	Firefighter dies during the night at fire station—Kansas	Cardiac arrhythmia due to mitral valve prolapse	Yes	<ul style="list-style-type: none"> <li>• Carboxyhemoglobin level was less than 10%, suggesting that carbon monoxide poisoning was not responsible for his demise</li> <li>• Urine and blood drug screen was negative for illicit drugs and alcohol</li> <li>• Normal sized heart of 360 grams</li> <li>• Moderate myxomatous degeneration, mitral valve with endocardial friction lesions</li> <li>• Foci of myofiber bundle disorder and myocyte disarray of the left ventricle on microscopic examination</li> <li>• Normal coronary arteries</li> <li>• Possible acutely dilated right ventricle</li> </ul>	<a href="#">PDF</a>





NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2002-16	Apr 07, 2002	Volunteer firefighter dies and two are injured in engine rollover—Alabama	Mechanical asphyxia due to blunt head trauma	Not mentioned	None	
F2002-15	Jun 14, 2002	Career firefighter drowns during final dive of training course—Indiana	Drowning	Yes	None	
F2002-14	Jan 10, 2002	Civilian jumps from fourth-story window of burning apartment building and strikes career firefighter—Michigan	County medical examiner listed the cause of death as natural due to a ruptured berry aneurysm; independent review concluded that the firefighter's death was work-related	Yes	The independent review concluded that the firefighter's death was work-related. The report described the cause of death as "...job related, caused by stress and exertion in the performance of his duties. The timeliness of the events on January 10, 2002, and subsequent developments are unquestionably the direct result of the victim's blood pressure which brought on leakage from a pre-existing aneurysm, (sentinel bleed) and ultimately the rupture of the aneurysm, profuse subarachnoid hemorrhage, brain swelling, coma, and death."	
F2002-13	Mar 20, 2002	Volunteer firefighter dies after being struck by motor vehicle on interstate highway—Mississippi	Craniocerebral trauma	Not mentioned	None	
F2002-12	Mar 01, 2002	Volunteer firefighter killed and career chief injured during residential house fire—Tennessee	Asphyxiation	Not mentioned	Carboxyhemoglobin level was listed at 31.8%	
F2002-11	Mar 04, 2002	One career firefighter dies and a captain is hospitalized after floor collapses in residential fire—North Carolina	Multiorgan failure; 80% total body surface burns	Not mentioned	None	
F2002-10	Mar 02, 2002	Volunteer firefighter dies after tanker truck is struck by freight train—Kentucky	Multiple blunt-force injuries	Not mentioned	None	

NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2002-09	Aug 29, 2001	Firefighter dies while exercising—Florida	Arteriosclerotic and hypertensive heart disease	Yes	<ul style="list-style-type: none"> <li>• Cardiomegaly (an enlarged heart weighing 700 grams)</li> <li>• Biventricular dilatation</li> <li>• Left ventricular hypertrophy with patchy fibrosis</li> <li>• Scarring consistent with a remote (old) heart attack (myocardial infarction)</li> <li>• Moderate to severe occlusive coronary artery disease (CAD)</li> <li>• Moderate obesity (Body Mass Index of 43 kilograms per square meter [kg/m<sup>2</sup>])</li> </ul>	
F2002-08	Aug 09, 2000	Firefighter dies at kitchen fire—North Carolina	Hypoxia due to pulmonary edema due to cardiomyopathy	Yes	<ul style="list-style-type: none"> <li>• Dilated cardiomyopathy</li> <li>• Status postmitral valve replacement</li> <li>• Severe pulmonary edema</li> <li>• History of rheumatic heart disease</li> <li>• Cardiomegaly (an enlarged heart weighing 475 grams)</li> <li>• Evidence of chronic ischemia</li> <li>• Morbid obesity (Body Mass Index of 43 kg/m<sup>2</sup>)</li> <li>• Mild occlusive coronary artery disease (CAD)</li> </ul>	
F2002-07	Feb 11, 2002	One career firefighter dies and another is injured after partial structural collapse—Texas	Multiple blunt-force injuries	Not mentioned	None	
F2002-06	Mar 07, 2002	First-floor collapse dur- ing residential basement fire claims the lives of two firefighters (career and vol- unteer) and injures a career firefighter captain—New York	Asphyxia due to the inhalation of smoke and soot	Not mentioned	None	



NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2002-05	Dec 14, 2001	Firefighter suffers sudden cardiac death and crashes tanker while responding to a chimney fire—Colorado	Heart failure as the immediate cause of death due to arteriosclerotic heart disease	Yes	<ul style="list-style-type: none"> <li>• Cardiomegaly</li> <li>• Old healed myocardial infarct [heart attack] involving the interventricular septum and the anterior wall left ventricle</li> <li>• Atherosclerotic coronary artery disease, severe poststent replacement coronary arteries</li> <li>• Atherosclerotic degeneration abdominal portion of the aorta</li> <li>• Small old infarct right cerebral hemisphere [stroke], internal capsule, brain</li> <li>• No evidence for any of the following: epidural, subdural, or subarachnoid [skull] hemorrhage, recent stroke, pulmonary embolus</li> <li>• Blood screen for illicit drug use or alcohol was negative</li> </ul>	
F2002-04	Jan 21, 2002	Motor-vehicle incident claims life of volunteer firefighter—Ohio	Laceration of the brain secondary to blunt impacts to the head	Not mentioned	None	
F2002-03	Dec 24, 2001	Firefighter suffers cardiac arrest while responding to a structure fire—Texas	Arteriosclerotic cardiovascular disease	Yes	<ul style="list-style-type: none"> <li>• Atherosclerosis of the coronary arteries</li> <li>• Cardiomegaly (enlarged heart weighing 600 grams)</li> <li>• Old posterolateral myocardial infarction (prior heart attack)</li> <li>• Bilateral ventricular dilatation</li> <li>• Drug screen was negative for alcohol, illicit drug use, and carbon monoxide</li> </ul>	
F2002-02	Dec 15, 2001	Firefighter dies during fire department standby—Arizona	"Probable acute myocardial ischemia" due to "coronary atherosclerosis" due to "diabetes mellitus" as the immediate cause of death and a "history of previous myocardial infarction" as an other significant contributing condition	No	Perform an autopsy on all on-duty firefighter fatalities	





NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2001-40	Mar 06, 2000	Firefighter suffers cardiac arrest at structure fire—Illinois	Cardiac arrhythmia	Yes	<ul style="list-style-type: none"> <li>• Atherosclerosis of the coronary arteries</li> <li>• 50% to 75% narrowing of the proximal left anterior descending coronary artery</li> <li>• Cardiomegaly due to left ventricular hypertrophy</li> <li>• Ischemic heart disease</li> </ul>	
F2001-39	Nov 19, 2001	Volunteer firefighter killed and an assistant chief injured in tanker truck crash—west Virginia	Blunt-force traumatic head injury	Not mentioned	None	
F2001-38	Sep 25, 2001	Volunteer firefighter dies and two others are injured during live-burn training—New York	Asphyxia due to smoke inhalation	Not mentioned	None	
F2001-37	Jun 18, 2001	Firefighter suffers heart arrhythmia and dies at wildland fire—Washington	Probable cardiac dysrhythmia due to fibrosis of the conduction system of the heart	Yes	<ul style="list-style-type: none"> <li>• Fibrosis of the conduction system of the heart</li> <li>• Focal moderate to severe atherosclerosis of the proximate left anterior descending (LAD) coronary artery</li> <li>• Mild perivascular fibrosis with adjacent areas of myocyte hypertrophy of the left ventricle and interventricular septum</li> <li>• Possible dilated right ventricle</li> </ul>	
F2001-36	Aug 19, 2001	Volunteer firefighter dies when tanker crashes into boulder and tree—Oregon	Blunt-force head trauma	Not mentioned	None	
F2001-35	Oct 13, 2001	Volunteer firefighter drowns during multiagency dive-rescue exercise – Illinois	Drowning	Not mentioned	None	
F2001-34	Aug 12, 2000	Firefighter suffers probable heart attack at fire station—kentucky	Acute myocardial infarction	No	Perform an autopsy on all firefighters who were fatally injured while on duty	
F2001-33	Oct 13, 2001	High-rise apartment fire claims the life of one career firefighter (captain) and injures another career firefighter (captain)—Texas	Asphyxia due to a lack of oxygen.	Not mentioned	The victim's blood level of carboxyhemoglobin measured 18% saturation	








NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2001-32	Aug 13, 2001	Firefighter dies at three-alarm structure fire—New York	Hypertrophic and arteriosclerotic cardiac disease	Yes	<ul style="list-style-type: none"> <li>• A carboxyhemoglobin level (to assess the victim's carbon monoxide exposure) was not performed.</li> <li>• "To assist the investigation of fire-related deaths, we [NIOSH] recommend performing carboxyhemoglobin levels to rule out carbon monoxide poisoning."</li> <li>• Borderline cardiomegaly (an enlarged heart weighing 400 grams)</li> <li>• Dilated cardiac chambers</li> <li>• Pulmonary congestion and edema</li> <li>• Fatty liver</li> <li>• Hepatosplenomegaly</li> </ul>	
F2001-31	Apr 23, 2001	Firefighter suffers a fatal heart attack during a training exercise—Michigan	"Acute myocardial infarction" as the immediate cause of death and "arterio-sclerotic cardiovascular disease" as the underlying cause	Yes	<ul style="list-style-type: none"> <li>• Acute myocardial infarction due to arteriosclerotic cardiovascular disease with acute subepicardial antero-lateral myocardial infarction</li> <li>• Coronary atherocalcinosis with maximal manifestation and 75% luminal stenosis in left mid descending coronary artery</li> <li>• Cardiomegaly with dilated cardiomegaly and left ventricular hypertrophy</li> </ul>	
F2001-30	Apr 02, 2001	Firefighter suffers fatal heart attack after returning home from fire—Iowa	"Acute myocardial infarction" as the immediate cause of death and "severe arteriosclerotic coronary vascular disease—right coronary artery" as the underlying cause	Yes	<ul style="list-style-type: none"> <li>• Severe atherosclerotic coronary artery disease—distal right coronary artery</li> <li>• Remote myocardial infarctions. . . . One probably occurred months ago, and another is at least 7 days in age</li> <li>• Respiratory congestion and edema, severe</li> <li>• The result of a blood test for carboxyhemoglobin (an indicator of carbon monoxide exposure) was reported as "0.0%," but the blood was drawn almost 2 hours after Engine 1 departed the fire scene and after 50 minutes of oxygen (which accelerates the clearing of carboxyhemoglobin) administered via endotracheal tube. (At autopsy, the result of another carboxyhemoglobin test was also reported as "0.0%.")</li> </ul>	






NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2001-29	Feb 12, 2001	Firefighter dies of complications of heart failure suffered at fire scene—Wisconsin	Hypoxia/Ischemia, Acute [of the brain and spinal cord] as the immediate cause of death, various autopsy findings as intermediate causes, and "Overexertion from responding to a fire call with Fire Dept" as the underlying cause	Yes	<ul style="list-style-type: none"> <li>• Congestive heart failure</li> <li>• Arteriosclerotic coronary artery disease with luminal occlusion of over 95% in the proximal circumflex which arises aberrantly from the right sinus of Valsalva [and] up to 50% occlusion in anterior interventricular artery, distal circumflex, and posterior intraventricular artery, heart</li> <li>• Anomalous coronary artery distribution</li> <li>• Bronchopneumonia, focal, mild, acute, lungs</li> <li>• Hypoxia/ischemia, acute, varying severity, semiglobal, (cerebral, cerebellar, and spinal cord)</li> <li>• Infarct, acute/recent, middle and inferior temporal gyrus and occipital lobes, bilateral)</li> <li>• Atherosclerosis, moderate to severe, right vertebral artery, basilar artery, temporal branch of right middle cerebral artery</li> <li>• Status postcardiac arrest (pulseless time 6-8 minutes)</li> </ul>	
F2001-28	Dec 23, 1995	Firefighter receives severe electrical shock causing cardiac complications, forcing his retirement, and eventually causing his death—Massachusetts	"Arteriosclerotic coronary heart disease" as the immediate cause of death, with "hypertensive heart disease" as a contributing, but not an underlying, cause of death	Yes	<ul style="list-style-type: none"> <li>• An enlarged heart (cardiomegaly) of 500 grams</li> <li>• All four chambers of the heart were dilated</li> <li>• Thickened left ventricle wall of 1.8 centimeters (normal &lt;1.2 centimeters)</li> <li>• Severe arteriosclerosis with diffuse calcification</li> <li>• Contusion and laceration on the left side of the head without internal injury</li> </ul>	
F2001-27	Jun 16, 2001	Career firefighter dies after single-family-residence house fire—South Carolina	Complications due to second- and third-degree burns	Not mentioned	None	
F2001-26	Jul 26, 2001	Career firefighter dies from injuries when stationary fill tank becomes over-pressurized and suffers catastrophic failure—California	Head injury due to blunt impact	Not mentioned	None	














NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2001-25	Jun 15, 2001	Firefighter dies after completing job task evaluation—Alabama	Per death certificate: “cardiac arrest” as the immediate cause of death. Per autopsy: “cardiac arrhythmia” due to “myocardial ischemia” due to “coro- nary artery disease”	Yes	<ul style="list-style-type: none"> <li>Moderate coronary atherosclerosis with 50% narrowing of the right coronary artery and the left main artery; 75% narrowing of the left circumflex; 80% narrowing of the left anterior descending coronary artery; left anterior descending coronary artery thrombosis</li> <li>Acute myocardial ischemia</li> <li>Severe concentric left ventricular hypertrophy</li> </ul>	
F2001-24	Feb 05, 2001	Firefighter suffers sud- den cardiac death while exercising during his shift—California	Cardiac dysrhythmia associated with exertion due to dilated cardiomyopathy	Yes	<ul style="list-style-type: none"> <li>The heart had a rounded “globoid” configuration rather than the normal pyramidal shape</li> <li>The heart was enlarged (weighing 480 grams)</li> <li>All four chambers of the heart were moderately dilated (enlarged)</li> <li>Both heart ventricles were hypertrophied (thick).</li> <li>No evidence indicated old or recent myocardial infarctions (heart attacks)</li> <li>No atherosclerotic changes were evident in the coronary arteries (no blockage in the coronary arteries)</li> <li>Microscopic examination of the left ventricle, the right ventricle, and the interventricular tissue showed myocyte hypertrophy (muscle cell thickening) characterized by enlarged “box car” nuclei and some patchy interstitial fibrosis (scar tissue between some of the muscle cells)</li> <li>There was no evidence of vasculitis, myocarditis, sarcoidosis, Fabry’s disease, amyloidosis, or hemochromatosis</li> <li>No illicit drugs, alcohol, or steroids were found</li> <li>Blood lead level, the urine arsenic level, and the urine mercury level were below the laboratory’s level of detection (&lt;3 micrograms (mcg) per deciliter, &lt;15 mcg per liter (mcg/l), &lt;5 mcg/l, respectively). The urine lead level was elevated at 76 mcg/l and when corrected for urine creatinine was 165 mcg per gram creatinine (reference range &lt;50)</li> </ul>	




NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2001-23	Jun 17, 2001	Hardware store explosion claims the lives of three career firefighters—New York	Victims #1 & #3: mas- sive blunt force trauma Victim #2: Asphyxia due to smoke inhalation.	Not mentioned	None	
F2001-22	Mar 10, 2001	Firefighter dies while on duty—Texas	Hypertensive and arteriosclerotic cardio- vascular disease	Yes	<ul style="list-style-type: none"> <li>• Severe occlusive coronary artery disease with 75% narrowing of the right coronary artery and the diagonal branch; 50% narrowing of the left anterior descending coronary artery and the left circumflex</li> <li>• Cardiomegaly (enlarged heart)</li> <li>• Left ventricular hypertrophy</li> <li>• Pulmonary congestion and edema</li> </ul>	
F2001-21	Jan 18, 2001	Firefighter dies in sleep dur- ing his work shift—Michigan	Arteriosclerotic cardio- vascular disease	Yes	<ul style="list-style-type: none"> <li>• Significant occlusive coronary artery disease with 85% narrowing of the left main coronary artery, 60% narrow- ing of the left anterior descending coronary artery, 30% narrowing of the left circumflex, and 25% narrowing of the right coronary artery</li> <li>• Enlarged heart</li> <li>• Left ventricular hypertrophy</li> <li>• Pulmonary congestion and edema</li> </ul>	
F2001-20	Dec 02, 1998	Firefighter has sudden cardiac death during training—Texas	Atherosclerotic cardio- vascular disease	Yes	<ul style="list-style-type: none"> <li>• Carboxyhemoglobin level was 1%, suggesting the firefighter was not exposed to excessive concentrations of carbon monoxide (CO).</li> <li>• Atherosclerotic cardiovascular disease</li> <li>• Moderate to severe narrowing of the coronary arteries</li> <li>• Mild to moderate narrowing of the aorta</li> <li>• Mild narrowing of the cerebral arteries</li> <li>• Remote myocardial infarction, multiple, left ventricle</li> </ul>	




NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2001-19	Feb 19, 2000	Firefighter dies after assisting an injured person—Ohio	Severe occlusive coronary artery disease	Yes	<ul style="list-style-type: none"> <li>• Severe occlusive coronary artery disease with calcification; 70-80% narrowing of the left anterior descending coronary artery and the right coronary artery; Recent thrombus right coronary artery</li> <li>• Left ventricular hypertrophy</li> <li>• Pulmonary congestion and edema</li> <li>• Congestion of viscera</li> </ul>	
F2001-18	May 09, 2001	Career firefighter dies after becoming trapped by fire in apartment building—New Jersey	Asphyxiation	Not mentioned	None	
F2001-17	Mar 06, 2001	Motor-vehicle incident claims the life of a volunteer assistant chief—Alaska	Multiple blunt-force injuries	Not mentioned	None	
F2001-16	Mar 08, 2001	Career firefighter dies after falling through the floor fighting a structure fire at a local residence—Ohio	Complications of thermal burns to 60% of total body surface	Not mentioned	None	
F2001-15	Mar 18, 2001	Residential fire claims the lives of two volunteer firefighters and seriously injures an assistant chief—Missouri	Asphyxiation due to smoke inhalation	Not mentioned	None	
F2001-14; Grant Number R43-OH-004173	Feb 18, 2001	Firefighter dies after returning from mutual-aid fire call—Connecticut	“Cardiac arrest” is listed as the immediate cause of death, and “hyperlipidemia” and “diabetes mellitus” are listed as contributing factors	No	None	
F2001-13	Mar 14, 2001	Supermarket fire claims the life of one career firefighter and critically injures another career firefighter—Arizona	Thermal burns and smoke inhalation	Not mentioned	The victim’s carboxyhemoglobin level was listed at 61% at the time of death	

NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2001-11	Nov 16, 2000	Driver/Operator suffers a cardiac arrest during a wildland fire exercise—Georgia	Per death certificate: atherosclerotic cardiovascular disease  Per autopsy: “heart rhythm disturbance (arrhythmia)” as the cause of death and atherosclerotic cardiovascular disease as the contributing factor.	Yes	<ul style="list-style-type: none"> <li>Atherosclerotic cardiovascular disease with 70% stenosis, left main coronary artery; 70-90% stenosis, multifocal, left anterior descending coronary artery; complete occlusion, circumflex coronary artery</li> <li>Vascular congestion, all internal organs</li> </ul>	
F2001-10; Purchase Order 0000136411	Dec 23, 2000	Firefighter dies at house fire—New Hampshire	Atherosclerotic and hypertensive cardiovascular disease with cardiac arrhythmia following stress and exertion during firefighting	Yes	<ul style="list-style-type: none"> <li>A nontoxic carbon monoxide level</li> <li>Detectable blood ethyl alcohol</li> <li>Pulmonary emphysema</li> <li>Atherosclerosis of the coronary arteries. Specifically, the artery supplying the anterior wall of the heart was focally occluded, and two other major arteries were 40-50% occluded</li> <li>Acute thrombi (blood clots) were noted</li> </ul>	
F2001-09	Feb 25, 2001	Volunteer firefighter dies and another firefighter is injured during wall collapse at fire at local business—Wisconsin	Anoxic encephalopathy and chest compression asphyxia	Not mentioned	None	
F2001-08	Feb 17, 2001	Two volunteer firefighters die fighting a basement fire—Illinois	Asphyxiation caused by inhalation of products of combustion	Yes	None	
F2001-07	Jan 09, 2001	A volunteer firefighter died after being struck by a motor vehicle while directing traffic—New York	Multiple injuries consisting of a massive closed head injury, pulmonary contusion, and chest injury	Not mentioned	None	





NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2001-06	Jan 12, 2001	Firefighter dies after the tanker truck he was driving strikes a utility pole and overturns while responding to a grass fire—kentucky	Blunt-force injuries	Not mentioned	None	
F2001-05	Oct 13, 2000	Driver/Operator dies at his station after responding to three emergency incidents—Massachusetts	Cerebral event as the immediate cause of death, due to cerebral hypoperfusion and coronary artery disease	No	Autopsies should be performed on all on-duty firefighters whose death may be cardiovascular-related	
F2001-04	Jan 11, 2001	Volunteer firefighter (lieutenant) killed and one firefighter injured during mobile home fire—Pennsylvania	Asphyxiation	Not mentioned	None	
F2001-03	Dec 28, 2000	Roof collapse injures four career firefighters at a church fire—Arkansas	No deaths	NA	NA	
F2001-02	Aug 17, 2000	A firefighter drowns after attempting to rescue a civilian stranded in flood water—Colorado	Apparent drowning	Not mentioned	None	
F2001-01	Nov 16, 2000	Volunteer firefighter dies and junior firefighter is injured after tanker rollover during water shuttle training exercise—kentucky	Massive internal injuries	Not mentioned	None	
F2000-45	Jun 23, 2000	Firefighter suffers a heart attack after expressing symptoms while on duty—New Jersey	Arteriosclerotic cardiovascular disease	Yes	<ul style="list-style-type: none"> <li>• Three arteries are calcified with 10% to 50% obstruction multifocally</li> <li>• Nonadherent thrombus in the right coronary artery</li> <li>• Mild atherosclerosis of the mitral and aortic valves</li> <li>• A 1 cm scar in the posterior wall of the left ventricle, inferiorly</li> </ul>	
F2000-44	Nov 25, 2000	Residential house fire claims the life of one career firefighter—Florida	Asphyxia due to smoke inhalation and carbon monoxide poisoning	Yes	Positive carbon monoxide reading of 69.5% was recorded	









NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2000-43	Oct 29, 2000	A volunteer assistant chief was seriously injured and two volunteer firefighters were injured while fighting a townhouse fire—Delaware	No deaths	NA	NA	
F2000-42	Feb 13, 2000	Lieutenant suffers a cardiac arrest during a structural drill—kentucky	"Hypertensive atherosclerotic cardiovascular disease" as the cause of death and "diabetes, hyperlipidemia, tobacco use, and hypertension" as contributing factors	Yes	<ul style="list-style-type: none"> <li>• Hypertensive atherosclerotic cardiovascular disease</li> <li>• Cardiomegaly</li> <li>• High-grade stenosis (80%) of the circumflex and proximal left anterior descending arteries</li> <li>• Total occlusion of the mid-left anterior descending artery</li> <li>• Stent within the right coronary artery</li> <li>• Acute thrombus of the right coronary artery</li> <li>• Circumferential scarring of the left ventricular free wall and septum</li> <li>• Peripheral vascular disease of the abdominal aorta</li> <li>• Nephrosclerosis</li> <li>• Diabetes mellitus</li> <li>• Hyperlipidemia</li> <li>• Documented history of inferior wall infarction in 1997</li> <li>• "Documented history of tobacco use"</li> <li>• "Documented history of hypertension"</li> </ul>	
F2000-41	Sep 27, 2000	Firefighter dies after being run over by ladder truck while attempting to board—Alabama	Multiple blunt-force injuries	Not mentioned	None	




NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2000-40	Aug 06, 2000	Firefighter collapses and dies during exercise training at his fire station—Missouri	Arteriosclerotic heart disease	Yes	<ul style="list-style-type: none"> <li>• No weight taken at the time of his autopsy</li> <li>• An enlarged heart weighing 570 grams</li> <li>• Left and right ventricular dilatation</li> <li>• Scar formation in the left ventricle (superior aspect of the posterior wall)</li> <li>• Arteriosclerotic heart disease</li> <li>• Fresh clot (thrombus) in the right coronary artery 2 cm from its origin                             <ul style="list-style-type: none"> <li>–80% narrowing of the distal right coronary artery</li> <li>–60% narrowing of the circumflex artery</li> <li>–80% narrowing of the left anterior descending artery</li> </ul> </li> <li>• Illicit drug and alcohol tests were negative</li> <li>• Presence of a prescription heart medication (Papaverine)</li> <li>• Large white layer of lipid (fat) material [suggesting a recent meal or a lipid disorder]</li> </ul>	
F2000-39	Apr 29, 2000	A lieutenant dies and three firefighters of a career department were injured when the truck they were responding in was struck by another vehicle—Illinois	Multiple injuries sustained due to a motor-vehicle crash	Not mentioned	None	
F2000-38	Aug 13, 2000	Firefighter/scuba diver dies during training evolution—Indiana	[Pulmonary] barotrauma	Yes	<ul style="list-style-type: none"> <li>• Extensive air emboli (air bubbles in lung, brain, and heart blood vessels)</li> <li>• Subcutaneous emphysema (air under the skin) and alveolar hemorrhage, as well as pulmonary edema with pink foam in the airways</li> <li>• No pneumothorax.</li> <li>• Toxicology reports listed no finding which contributed to his death</li> </ul>	







NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2000-37	Jul 18, 2000	Arson investigator dies from injuries sustained from a fall during an arson investigation—Illinois	"Multiple organ system failure" due to, or as a consequence of, (b) "peritonitis with severe hypotension, ischemic necrosis of the liver and kidneys" due to, or as a consequence of, (c) "blunt force trauma of the left chest wall with splenic hemato- mas and a perforated stress ulcer."	Yes -two	<p>"Blunt force trauma of the left chest wall resulted in a massive intrasplenic hematoma and the development of a stress ulcer. The spleen was not ruptured. The stress ulcer perforated, releasing bowel contents into the peritoneal cavity, which resulted in fibrinous peritonitis. Hypotensive episodes secondary to the peritonitis led to multiple organ system failure, specifically generalized ischemic necrosis of the liver (superimposed upon hepatitis C-induced micronodular cirrhosis), acute tubular necrosis of the kidneys and infarction of the rectosigmoid colon. The combination of liver failure and renal failure constitutes so-called 'multiple organ system failure' and was the immediate cause of death. The underlying cause of death was blunt-force trauma of the left chest wall."</p> <p>Two days later, a second autopsy was performed by a forensic pathologist hired by the victim's widow. This autopsy essentially confirmed the findings of the first autopsy with two additional points mentioned. A left-arm contusion (bruise), a left-trunk contusion, and a left-10th-rib fracture were noted, suggesting the initial fall on July 18 was quite severe. A second point in this autopsy was that postinjury medications, in addition to chronic hepatitis C virus (HCV) infection and cirrhosis due to HCV, contributed to his liver failure</p>	
F2000-36	Jul 23, 1998	Captain suffers a heart attack at a structure fire and dies 12 days later—Illinois	Myocardial infarction (otherwise known as a heart attack) as the immediate cause of death, due to severe atherosclerotic cardio- vascular disease	Yes	<ul style="list-style-type: none"> <li>• A large heart (cardiomegaly) weighing 535 grams</li> <li>• An old posterior MI</li> <li>• A recent anterior septal MI</li> <li>• Severe coronary artery disease (CAD)</li> <li>• Stent in the LAD with 60-75% focal occlusion proximally</li> <li>• 70-80% occlusion proximally of the circumflex artery</li> <li>• 50-60% occlusion of the right coronary artery</li> </ul>	
F2000-35	Jul 02, 2000	Junior firefighter killed responding to call in his privately owned vehicle (pov)—Pennsylvania	Blunt-force trauma to the head and trunk	Not mentioned	None	













NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2000-34	Apr 26, 2000	Lieutenant dies at a fire in a one-and-one-half story dwelling—west Virginia	Atherosclerotic coronary disease	No	A visual inspection, rather than an autopsy, was also completed by the Assistant Medical Examiner. Based on this inspection, the following “pathologic diagnosis” was listed: <ul style="list-style-type: none"> <li>• “Myocardial infarct (based on circumstances, EKG changes, and serologic testing)”</li> <li>• “Mild chronic obstructive pulmonary disease and hepatitis per history.”</li> </ul>	
F2000-33	May 27, 2000	Pumper truck rollover claims the life of a volunteer firefighter—Missouri	Cerebral laceration, due to an open skull fracture	Not mentioned	None	
F2000-32	Apr 29, 1998	Driver/Operator/Firefighter suffers a heart attack and dies while supporting fire suppression activities—New York	Hypertensive and atherosclerotic cardiovascular disease	Yes	<ul style="list-style-type: none"> <li>• Marked coronary artery atherosclerosis <ul style="list-style-type: none"> <li>– Near occlusive mid-right CAD</li> <li>– Near occlusive proximal left anterior descending CAD</li> </ul> </li> <li>• Small circumscribed area (0.5 by 1.2 by 1.0 centimeter) of subepicardial fibrosis in the mid-posterior left ventricular wall (nontransmural). This finding is consistent with a remote (at least 3 months) heart attack in the distribution of the right coronary artery lesion mentioned previously</li> <li>• Left ventricular hypertrophy</li> <li>• No evidence of a blood clot (embolus) in the pulmonary arteries;</li> <li>• His blood carboxyhemoglobin level was less than 3%, suggesting the victim was not exposed to excessive carbon monoxide levels</li> </ul>	
F2000-31	Nov 16, 1999	Firefighter collapses at the fire house and subsequently dies due to heart arrhythmia secondary to myocardial sarcoidosis—New Jersey	Granulomatous myocarditis due to sarcoidosis, generalized	Yes	<ul style="list-style-type: none"> <li>• Cardiac hypertrophy and cardiomegaly (a large heart)</li> <li>• No significant atherosclerotic disease of the coronary arteries</li> <li>• Sarcoidosis (noncaseating granulomas) of the heart, lung, lymph nodes, liver, and spleen</li> </ul>	



NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2000-30	Sep 28, 1998	District chief dies of a stroke after serving as the Incident Commander at a structure fire—Tennessee	Intracerebral hemorrhage due to hypertension, essential (otherwise known as a “stroke”)	No	Perform an autopsy on all on-duty firefighter fatalities	
F2000-29	Jan 12, 2000	Firefighter dies as a result of a cardiac arrest at the scene of a structure fire—Maine	Cardiac arrest	Yes	An autopsy was performed; however, medical records were not available to NIOSH personnel at the time of this report	
F2000-28	Aug 20, 1998	Firefighter dies on duty—Tennessee	“acute myocardial infarction due to coronary artery disease” as the immediate cause of death and “diabetes mellitus Type II and renal failure” as other significant conditions	No	Perform an autopsy on all on-duty firefighter fatalities	
F2000-27	Apr 30, 2000	Volunteer assistant chief dies during a controlled-burn training evolution—Delaware	Asphyxiation and thermal burns	Not mentioned	Carbon monoxide level was listed at 41%	
F2000-26	Apr 20, 2000	Residential structure fire claims the life of one career firefighter—Alabama	Thermal injuries (full-thickness burns to roughly one-third of body surface area)	Not mentioned	None	
F2000-25	Apr 07, 2000	A volunteer firefighter died and a second was seriously injured after fuel tank explosion—Iowa	Multiple blunt-force injuries to the head, neck, torso, and extremities	Yes	None	
F2000-24	Apr 11, 2000	Firefighter dies during search-and-rescue training—Ohio	Cardiomegaly—acute cardiac arrhythmia	Yes	<ul style="list-style-type: none"> <li>• Cardiomegaly (enlarged heart)               <ul style="list-style-type: none"> <li>– A weight of 690 grams</li> </ul> </li> <li>• Moderate coronary atherosclerosis</li> <li>• 50-60% blockage of the midpoint of his left anterior descending coronary artery</li> <li>• Chronic and acute lung congestion</li> </ul>	
F2000-23	Mar 31, 2000	Career firefighter dies and three are injured in a residential garage fire—Utah	Smoke and soot inhalation and acute carbon monoxide intoxication	Not mentioned	<ul style="list-style-type: none"> <li>• CO levels were at 25% saturation but may not accurately reflect his level due to intubation and resuscitation efforts)</li> </ul>	

NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2000-22	Mar 15, 2000	Wildland fire claims the life of one volunteer firefighter and injures another firefighter—South Dakota	Sepsis as a result of extensive thermal burns due to a grass fire	Not mentioned	None	
F2000-21	Jun 02, 1998	On-duty driver/operator dies in sleep—Indiana	Probable arrhythmia due to hypertrophic cardiomyopathy, fibrosis of sinoatrial node	Yes	<ul style="list-style-type: none"> <li>• Since the driver/operator was not engaged in fire suppression activities, his blood was not tested for carbon monoxide poisoning (carboxyhemoglobin levels)</li> <li>• Moderate coronary artery disease               <ul style="list-style-type: none"> <li>– Up to 50% stenosis of the proximal circumflex artery</li> <li>– Up to 50% stenosis of the mid left anterior descending coronary artery</li> <li>– Intramyocardial tunneling of coronary artery</li> <li>– Fibrosis of the sinoatrial node</li> </ul> </li> <li>• Concentric hypertrophic cardiomyopathy               <ul style="list-style-type: none"> <li>– Diminished left ventricular cavity</li> <li>– Dilated right ventricle</li> </ul> </li> <li>– Significant myocyte hypertrophy with nuclear enlargement and fiber disarray involving the septum of both ventricles</li> <li>• Biventricular and ventricular septum hypertrophy</li> <li>• Severely congested lungs bilaterally with edema</li> <li>• Hepatosplenomegaly with passive congestion</li> <li>• Hashimoto's thyroiditis</li> </ul>	
F2000-20	Feb 10, 1998	Driver/Operator dies at a motor vehicle fire—Wisconsin	"Myocardial infarction" as the immediate cause of death, due to "severe atherosclerotic cardiovascular disease."	Yes	<ul style="list-style-type: none"> <li>• Severe arteriosclerotic heart disease               <ul style="list-style-type: none"> <li>– High-grade atheromatous plaques of up to 100% occlusion of the left anterior descending and the right coronary arteries</li> </ul> </li> <li>• Large remote myocardial infarct in the lateral wall of the left ventricle</li> <li>• Three graft vessels</li> <li>• Cardiomegaly (enlarged heart) (750 gms)</li> </ul>	

NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2000-19	Mar 17, 2000	Motor-vehicle incident involving amtrak train claims life of career firefighter/engineer—North Carolina	Multiple blunt-force injury from the fire truck/train collision	Not mentioned	None	
F2000-18	Jan 17, 2000	Tanker rollover claims life of volunteer fire chief—Missouri	Massive neck trauma and upper chest trauma	Not mentioned	None	
F2000-17	Feb 11, 2000	A volunteer firefighter/driver was killed and another volunteer firefighter was injured while responding to a motor vehicle incident with injuries—California	Adult respiratory distress syndrome [lung failure]/ischemia and encephalopathy due to motor vehicle crash	Not mentioned	None	
F2000-16	Mar 03, 2000	Arson fire claims the life of one volunteer firefighter and one civilian and severely injures another volunteer firefighter—Michigan	Asphyxiation	Not mentioned	None	
F2000-15	Oct 15, 1997	Battalion chief suffers a heart attack and eventually dies while participating in a fitness program—California	Cardiogenic shock due to enterobacter sepsis due to multiorgan failure due to ischemic cardiomyopathy	No	Perform autopsies on all on-duty firefighter fatalities	
F2000-14	Feb 06, 2000	Firefighter dies at a single-family dwelling fire—Iowa	"Occlusive coronary artery disease" as the immediate cause of death due to "atherosclerotic vascular disease"	Yes	<ul style="list-style-type: none"> <li>• Atherosclerotic vascular disease               <ul style="list-style-type: none"> <li>– Severe coronary artery disease</li> <li>– Right coronary artery, 75% stenotic</li> <li>– Left circumflex artery, 80% stenotic</li> <li>– Left anterior descending artery unavailable due to organ harvesting for donation</li> </ul> </li> <li>• Focal contraction band necrosis in the right ventricle</li> <li>• Acute pulmonary congestion, agonal</li> <li>• Pulmonary anthracosis without emphysema</li> <li>• Carbon monoxide level of 4%</li> </ul>	

NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2000-13	Feb 14, 2000	Restaurant fire claims the life of two career firefighters—Texas	Asphyxia due to smoke inhalation	Yes	None	
F2000-12	Jan 17, 2000	Sector captain suffers fatal heart attack—Texas	"Myocardial infarction" (heart attack) as the immediate cause of death, and "diabe- tes" as a significant condition	No	None	
F2000-11	Jan 15, 2000	Volunteer firefighter drowns during dry-suit training dive— North Carolina	Severe metabolic acidosis as the result of near drowning	Not mentioned	None	
F2000-10	Oct 28, 1999	A captain and a firefighter die from injuries in a tanker rollover—Indiana	Victim #1: Cardiac arrhythmia Victim #2: Sepsis	Not mentioned	None	
F2000-09	Jan 27, 2000	Volunteer firefighter dies fighting a structure fire at a local residence—Texas	Smoke inhalation	Yes	None	
F2000-07	Jan 17, 2000	Volunteer firefighter dies after 9-foot fall from ladder—Pennsylvania	Blunt-force trauma to the head	Not mentioned	None	
F2000-06	Nov 14, 1999	Tanker rollover results in the death of one volunteer firefighter—Texas	Blunt trauma	Yes	None	

NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2000-05	Dec 13, 1999	Firefighter dies at a barn fire—Ohio	“Fatal cardiac arrhythmia” as the immediate cause of death due to “acute thrombotic occlusion of the right coronary artery” (heart attack), “80-90% narrowing of the left anterior descending coronary artery, and severe coronary atherosclerosis.”	Yes	<ul style="list-style-type: none"> <li>• Coronary artery disease               <ul style="list-style-type: none"> <li>– Severe coronary atherosclerosis</li> <li>– Complete acute thrombotic occlusion of the right coronary artery</li> <li>– Narrowing of the left coronary artery</li> <li>– Proximal and middle left anterior descending branch, near complete occlusion</li> <li>– Generalized moderate atherosclerosis</li> </ul> </li> <li>• Hypertrophy and dilatation of the heart</li> <li>• Acute and chronic marked congestion of the lungs</li> <li>• Splenomegaly</li> </ul> <p>The victim’s blood was not tested for carbon monoxide poisoning (carboxyhemoglobin levels) although the department requested this be done</p>	
F2000-04	Dec 22, 1999	Structure fire claims the lives of three career firefighters and three children—Iowa	<p>Victim #1: Smoke inhalation and sudden exposure to intense heat</p> <p>Victim #2: Smoke inhalation and sudden exposure to an extremely hot environment</p> <p>Victim #3: Sudden exposure to intense heat</p>	Not mentioned	<p>Victim #1: 15% Carboxyhemoglobin level</p> <p>Victim #2: 25% Carboxyhemoglobin level</p> <p>Victim #3: 1.0% Carboxyhemoglobin level</p>	
F2000-03	Jul 04, 1999	Captain dies as a result of a cardiac arrest at the scene of a structure fire—Alabama	Myocardial infarction	No	<p>Note: No blood was sent for laboratory analysis during resuscitative efforts. According to post-mortem toxicology forensic specimen analysis, the victim’s carboxyhemoglobin level was “negative.” An autopsy was not performed</p> <p>Perform an autopsy on all on-duty firefighter fatalities</p>	

NIOSH REP. #	DATE OF INCIDENT	Title	CAUSE OF DEATH	AUTOPSY	AUTOPSY COMMENTS	PDF LINK
F2000-02	Jul 06, 1998	Forestry worker dies while bulldozing a fire line at a wildland fire—Alabama	Per death certificate: “cardiac arrest” as the immediate cause of death and “respiratory failure” as the underlying cause  Per autopsy: “acute myocardial infarction” (heart attack)	Yes	<ul style="list-style-type: none"> <li>• Atherosclerotic cardiovascular disease, trivessel, very severe (Ninety-% occlusion of each of the following arteries: left anterior descending, right, and circumflex arteries)</li> <li>• Myocardial infarctions, old, remote, multiple</li> <li>• Myocardial infarction, recent, acute</li> </ul> <p>Toxicological analysis reported a 10-percent carboxyhemoglobin level. In an interview, the head of the Toxicology Section who performed this analysis communicated that the victim’s actual carboxyhemoglobin range was within 5 to 10 percent, a range he considered indicative of carbon monoxide exposure during this fire suppression but not indicative of a toxic exposure</p>	
F2000-01	Dec 18, 1999	Motor-vehicle incident claims the life of a volunteer firefighter and injures a volunteer chief—Virginia	Atlanto-occipital dis- location (severe neck spinal cord damage) resulting from motor- vehicle violence	Not mentioned	None	

## ■ Appendix C: Examination of Personal Protective Equipment

**I**n some cases, performance of protective clothing and equipment will be a factor in the incident outcome. The condition of all protective clothing and equipment must be properly documented as part of the investigation and can have an impact on a determination for the cause of death during an autopsy. The impounded equipment should be examined at the scene if possible, and again after it has been secured. While at the scene, it is important to note the condition of the equipment in addition to its operational status. Closer examination of equipment may be done following impoundment.

Each item of protective clothing and equipment should be examined carefully. The clothing and equipment always should be photographed. Begin the series of photographs with an overview picture of the item (both front and back). Additional pictures should be taken of every significant component or feature of the clothing and equipment. Pay particular attention to valves, knobs, buttons, and hoses of self-contained breathing apparatus (SCBA) and interface areas for clothing, such as the front closure and collar of pants, ear covers, and visor or goggles of helmets. Table C-1 provides a list of photographs that should be taken for each item of protective clothing and equipment.

Areas of damage or charring also should be photographed. Schematic drawings of protective clothing and equipment should indicate location and extent of the damage. Investigators should take detailed and descriptive notes of all observations. It is as important to note that something was functional or in good condition as it is to note failure or damage. Most performance tests of clothing is destructive. Therefore, it is important to document the condition of the clothing and equipment properly through a detailed written description and photographs/video before any testing is conducted. Note testing always must be authorized by the department before the testing is conducted. Any testing should be identified in advance by:

- the type of test;
- the laboratory where the test will be conducted;
- a description of any samples or specimens removed from the clothing or equipment;
- the purpose of the test; and
- the deposition of any samples that are tested.

Evaluation of SCBA is critical to the investigation. Do not make any adjustments to the SCBA unless absolutely necessary. The positions of straps and knobs should be photographed, and then marked with an indelible marker or grease pencil. Valves should not be opened or shut under any circumstances. If the investigators wish to test breathing air, a SCBA that was filled from the same source at approximately the same time should be used. Several observations should be made at the incident scene:



- Was the victim wearing SCBA?
- If not, where was SCBA found in relation to the victim?
- Was the face piece intact and in place on the victim?
- Was there pressure remaining in the air cylinder?
- If so, what were the gauge readings?
- Did all gauge readings agree?
- Were valves and regulators in their proper positions?
- Were support straps and apparatus in their proper configuration, and were they attached as would be expected for normal use?
- Was there any visible damage to the SCBA (tank, hoses, straps, regulators, mask)?
- Was there any signs of icing on the regulator (or freeze burns on the face or respiratory tract of the firefighter)?
- Was any recent maintenance done on the unit?
- What maintenance records are available on the unit?
- What were the qualifications of the technician completing the necessary repairs or modifications?
- Were there any reported problems with this specific unit or with the model?
- Did the SCBA meet the NFPA 1981 standard in effect at the time of its manufacture?

If investigators have any concerns that the SCBA may have been a factor in the death or injury of firefighters, then the SCBA should be sent to the National Institute for Occupational Safety and Health (NIOSH), in Morgantown, West Virginia. Upon written request, NIOSH investigators will conduct an independent inspection and evaluation of the SCBA. This letter should be sent to NIOSH along with the SCBA to be inspected.

Each member of the fire department who is involved in fire suppression activities is required to have and activate a personal alert safety system (PASS) before entering the hazard area. In some cases, PASS may be integrated with the SCBA and will be activated automatically when the SCBA is worn and used. Investigators should include the following in their observations.

- Was the victim wearing a PASS device when he or she entered the hazard area?
- Was it turned on?
- Is the device capable of being activated with a single gloved hand?
- Was it functioning when the victim was found?
- How did the audible alert signal strength compare with a new PASS device with a new battery?
- Was the victim carrying any other communications equipment (e.g., radio)?
- Was there any visible damage to the PASS device?
- Where was it found in relation to the victim?
- Is it possible that the PASS may have been submerged in water or had the seals to the interior compartment compromised to cause leakage?
- Was the PASS functional immediately after the incident?
- When were the PASS batteries last changed?

- When was the PASS last tested?
- Was any recent maintenance done on the unit?
- Did a certified technician complete the necessary repairs or modifications?
- Were there any previously reported problems with this specific unit or with the model?
- Did the PASS device meet the NFPA 1982 Standard in effect at the time of its manufacture?

Before beginning the inspection of protective clothing it is important to note the presence and position of the clothing. The following questions, after such documentation, should be addressed:

- What items of protective clothing was the firefighter wearing (e.g., turnout coat, turnout pants, helmet, gloves, boots, hood, goggles/face shield)?
- Were all items of protective clothing donned properly?
- Had the protective clothing been removed?
  - Purposely, by firefighter?
  - Accidentally (knocked off)?
  - If so, where was the garment found in relation to the firefighter's body?
- Were any items of protective clothing removed during rescue efforts?
- Were any rips, cuts, or tears made during rescue efforts?
- Did protective clothing meet the appropriate NFPA standard at the time it was manufactured?
- Every item of protective clothing should be inspected for the following types of wear or damage:
  - Cleanliness, or lack thereof, indicates smoke or chemical exposure.
  - Char, heat damage, and burned areas indicate exposure to excessive heat and/or flame. Areas of damage may cause loss of fabric strength or protective properties. It is particularly important to check all layers of the protective garment.
  - The garment also should be checked for worn or abraded areas, rips, tears, cuts, and fraying. All seams should be checked for broken or missing stitching indicative of seam failure. Signs of discoloration or dye loss also may indicate heat or chemical exposure. Reflective trim should be inspected with a flashlight to ensure that it has not lost its reflective properties.
- If injuries have occurred, it is especially important to match injury areas on the victim with the areas of the clothing under which the injuries occurred.

Important areas for examination include the following:

- any gaps in the liner system under the outer shell;
- types of reinforcements over any injury area; and
- overall integrity of clothing when worn.

It is important also to ascertain the configuration of clothing as worn (e.g., fastening of closures, position of collar, ear covers, etc.) and whether parts of the ensemble were wet when worn (including wet from an earlier response). It is useful to compare how the clothing was worn by the deceased firefighter during the fatal event, if possible. The sizing of protective clothing and equipment should also be noted in the investigation of personal protective equipment (PPE) performance. Investigation of possible clothing failures must account for differences in clothing performance that occur through wear. It may be useful to compare clothing performance with new or unused items.

Investigation of personal protective clothing and equipment should include the following assessments (as listed by each item):

### **Protective Helmets**

- helmet outer shell:
  - bubbling of shell material,
  - delamination of material or soft spots,
  - dents, cracks, nicks, gouges, or flaking, and
  - loss of surface gloss;
- helmet inner shell and impact liner:
  - warping,
  - wear (excessive or unusual),
  - broken or missing components, and
  - improper installation/attachment of components;
- suspension system:
  - cracked or missing suspension system components,
  - torn head band or size-adjustment slots,
  - stripped size adjustment ratchet knob,
  - signs of excessive wear;
- crown straps and ear covers:
  - improper installation and fit, and
  - signs of wear, damage, and excessive heat;
- damaged chin straps fasteners, slides, and closures; and
- faceshield/goggles:
  - signs of wear, damage, and excessive heat,
  - deformation, scratches obscuring vision, and
  - damaged fasteners, straps, and closures.

### **Protective Hoods**

- hood integrity;
- signs of shrinkage;
- loss of elasticity;
- seam integrity; and
- signs of wear, damage, and charring.

### **Protective Garments (Coat and Pants)**

- outer shell
  - signs of wear, damage, excessive heat, discoloration, or char on fabric,

- seam integrity,
- reinforcement integrity,
- closure system integrity,
- condition of hardware, and
- damage to pockets; items in pockets and their respective condition;
- moisture barrier and thermal barrier:
  - delamination of seams or seals,
  - seam integrity/quilt stitching,
  - attachment system to the outer shell, and
  - signs of wear, damage, excessive heat, discoloration, or char on fabric? (In many cases, it may be necessary to open the liner to determine the condition of the film or coated side of the moisture barrier.);
- reflective trim
  - signs of wear, damage, excessive heat, melt, discoloration, or char on trim,
  - seam/stitching integrity, and
  - loss of reflectivity; fluorescence;
- reinforcements (shoulders, elbows, knees, sleeve ends, pant cuffs):
  - signs of wear, damage, excessive heat, melt, discoloration, or char on exterior or interior layers,
  - seam/stitching and attachment integrity integrity,
  - permanent compression;
- protective wristlets:
  - shrinkage,
  - loss of elasticity,
  - seam integrity, and
  - thumbhole elongation;
- suspenders:
  - melting or other heat damage,
  - shrinkage,
  - loss of elasticity,
  - seam integrity, and
  - condition of hardware;

## **Protective Gloves**

- glove integrity;
- shrinkage;
- loss of elasticity/flexibility;
- seam integrity;

- liner pullout; and
- signs of wear, damage, excessive heat, discoloration, or char on leather/fabric (both exterior and interior).

### **Protective Footwear (Rubber)**

- loss of elasticity;
- delamination of seam seals;
- material damage;
- steel toe or shank damage;
- sole tread wear; and
- loss of liquid-tight integrity (waterproofness).

### **Protective Footwear (Leather)**

- seam integrity;
- material damage (rips, tears, holes);
- steel toe or shank damage;
- sole tread wear;
- loss of liquid-tight integrity (waterproofness);
- closure system;
- uniform integrity;
- seam integrity;
- material damage (rips, tears, holes);
- closure system; and
- signs of wear, damage, excessive heat, discoloration, or char on fabric.

Protective clothing and equipment experts may be required. On occasion, certain garments and equipment may need to be sent out to testing labs for verification that it meets the current set of applicable standards to which the item was certified; however, judgment must be applied if the specific property being measured would be a contributory factor to the firefighter fatality. Other reasons for testing would be to determine whether the item in question was operating properly and, if not, whether it contributed to the incident.

Once the items have been impounded by the investigation team and their condition documented, outside assistance should be requested. All issues involving SCBA testing should be handled by NIOSH. Other protective clothing and equipment testing may be conducted by appropriately qualified experts or independent testing laboratories. Impounded items should be transferred to the testing laboratory following strict chain-of-custody procedures. The testing laboratory should be asked to compare the item performance at the time of the incident with the performance requirements of the appropriate NFPA standard. The independent expert or laboratory may be asked further to determine the range of heat and temperature conditions to which the item may have been exposed. The testing laboratory's report should be summarized in the body of the investigation report and attached as an appendix to the report.

Manufacturer's technical experts may have useful information and should be invited to examine the item in the presence of investigation team members. The manufacturer's written comments should be requested for inclusion in the report. At no time should a manufacturer's representative be given custody of an impounded item or left alone with impounded items.

**Table C-1 Recommended Photographs of Protective Clothing and Equipment**

Clothing or Equipment Item	Minimum Recommended Photographs
Self-contained breathing apparatus (SCBA)	<ul style="list-style-type: none"> <li>• Complete SCBA resting on back plate with cylinder shown in front and facepiece off to side</li> <li>• Complete SCBA show harness side</li> <li>• Base of cylinder showing cylinder valve and position</li> <li>• Closeup of manufacturer product label and certification mark</li> <li>• Closeup of cylinder valve and first-stage regulator</li> <li>• Closeup of pressure gauge</li> <li>• Closeup of second-stage regulator</li> <li>• Front of facepiece</li> <li>• Interior of facepiece</li> <li>• Closeup of facepiece exhalation valve</li> <li>• Integrated PASS (if present)</li> <li>• Any specific areas of damage to valves, harness, backplate, hoses, facepiece straps, or accessory items</li> </ul>
Personal alert safety system (PASS)	<ul style="list-style-type: none"> <li>• Complete PASS (top view)</li> <li>• Complete PASS (bottom view)</li> <li>• Closeup of manufacturer product label and certification mark</li> <li>• Closeup of battery panel</li> <li>• Any specific area of damage, particularly for condition of seals in PASS case (if PASS can be opened, the condition of interior components, if warranted by investigation)</li> </ul>
Protective helmet	<ul style="list-style-type: none"> <li>• Front top of helmet (showing shield and emblem)</li> <li>• Left top of helmet</li> <li>• Right top of helmet</li> <li>• Back top of helmet</li> <li>• Interior of helmet showing ear covers (two photographs may be needed to adequately show both sides)</li> <li>• Closeup of product label and certification mark (if possible)</li> <li>• Any specific area of damage such as shell, edge beading, straps, suspension, and ear covers)</li> </ul>

Clothing or Equipment Item	Minimum Recommended Photographs
Protective hood	<ul style="list-style-type: none"><li>• Left side of hood (lying flat)</li><li>• Right side of hood (lying flat)</li><li>• Closeup of product label and certification mark</li><li>• Any specific area of damage to material or face opening</li></ul>
Protective garments	<ul style="list-style-type: none"><li>• Front of garment with closures secured</li><li>• Back of garment with closures secured</li><li>• Interior of garment shell (liner removed and shell turned inside out)—both front and back</li><li>• Removed liner—moisture barrier side—both front and back</li><li>• Removed liner, turned inside out—thermal barrier side—both front and back</li><li>• Closeups of all product labels and certification marks on both shell and liner</li><li>• Any specific area of damage to shell, liner, hardware, trim, reinforcements, and other items on garments (where damage occurs on one side, attempt to photograph other, especially in case of thermal damage)</li></ul>
Protective gloves	<ul style="list-style-type: none"><li>• Back side of gloves</li><li>• Palm side of gloves</li><li>• Closeup of product label and certification mark</li><li>• Any specific areas of damage to glove exterior, lining, gauntlet, or wristlet</li></ul>
Protective footwear	<ul style="list-style-type: none"><li>• Left side of footwear (standing upright)</li><li>• Right side of footwear (standing upright)</li><li>• Footwear soles</li><li>• Closeup of product label and certification mark (if possible)</li><li>• Any specific areas of damage to exterior, lining, sole, hardware, or other features of footwear</li></ul>

# Funeral Procedures for Firefighters

NATIONAL VOLUNTEER FIRE COUNCIL





# Table of contents

<b>Introduction</b>	<b>3</b>	<b>Description of Funeral Options</b>	<b>18</b>
<b>Fire Department Funerals</b>	<b>4</b>	Honor Guards	
Circumstances that Entitle a Fire Department Funeral		Pallbearers	
<b>Types of Funeral Services</b>	<b>5</b>	Transportation	
Formal Funeral Service		Meals	
Semi-Formal Funeral Service		Child Care	
Non-Formal Funeral Service		Procession	
Private Service		Flower Apparatus	
<b>Preparations</b>	<b>6</b>	Last Alarm Service	
Personal Information Sheets		Musical Arrangements	
Photographs		Readings	
Resumes		Eulogy	
Department Identification Cards		Crossed Aerial Ladders	
Employee Benefits		Static Equipment Display of Outside Equipment	
Uniform for Burial		Burial in Uniform	
Inventory of Necessary Equipment for Funeral		Closed Casket	
Funeral Director		Walk Through	
Florists		Refreshments or Post Services Reception	
National Fallen Firefighters Foundation's Local Assistance State Team		Bunting	
<b>Job Responsibilities</b>	<b>8</b>	Half Staff Flag Protocol	
Chaplain		Badge Shrouding	
Survivor Action Officer		<b>Appendix A</b>	<b>21</b>
Family Liaison Officer		Sample Personal Information Sheet	
Funeral Officer		<b>Appendix B</b>	<b>22</b>
Honor Guard		Public Safety Officers' Benefits (PSOB) Program	
Honorary Pallbearers		<b>Appendix C</b>	<b>23</b>
Active Pallbearers		Military Standards and Flag Folding Procedures	
Funeral Detail		<b>Appendix D</b>	<b>27</b>
Procession Officer		Sample Readings for Funeral Services	
Service Officer		<b>Appendix E</b>	<b>32</b>
Cemetery Officer		Preparing a Eulogy	
Transportation Officer		<b>Appendix F</b>	<b>33</b>
<b>Initial Actions</b>	<b>15</b>	Suggested Funeral Formations	
Initial Roles of Personnel		<b>Appendix G</b>	<b>37</b>
Procedures for Notification		Involving Your Fire Corps Team or Auxiliary	
		<b>Appendix H</b>	<b>38</b>
		Additional Resources	

# Introduction

Firefighting continues to be one of the nation's most hazardous professions. Approximately 100 firefighters die in the line-of-duty each year in the United States. It is only fitting, given the heroic efforts of fire service personnel that they be given the final respect they deserve.

Many volunteer fire departments do not have funeral procedures in place due to time restrictions. When a death occurs, departments are often unprepared to navigate the complexities of a fire service funeral. This manual not only addresses the funeral itself, but also other activities in connection with a firefighter fatality, e g., investigation of the death, the state and federal fire agencies to notify, and how to navigate the process of collecting benefits.

This resource manual is intended as a guide, and while the basic procedures probably are acceptable for all types of firefighters, some ideas will

need to be altered or omitted depending on the department's particular situation and size. In addition, the member's ethnic or religious affiliation may dictate certain customs. It is important that the organizer of the funeral be sensitive to the particular situation and to the wishes of the family or household involved.

This manual is arranged in accordance with the sequence of a funeral's events and describes in detail the job responsibilities of each person assigned to handle particular aspects of the funeral. After a department reviews this manual and decides which tasks and assignments it wants to include in its own formal funeral procedures, it can adopt or adapt the relevant guidelines here as a checklist to follow in the event of a member's death.

The NVFC would like to thank the National Fallen Firefighters Foundation; The Federation of Fire Service Chaplains; and the Kentucky Firefighters Association for their assistance in the revision of this guide.



# Fire Department Funerals

## Circumstances that Entitle a Fire Department Funeral

There are six circumstances that generally entitle a fire department member or an individual affiliated with a department to receive a fire service funeral.

The circumstance categories are used by the department to decide whom it wishes to honor with a department funeral and the type of funeral appropriate. The six categories are:

### > Type 1 - Line-of-Duty Death

Any on-duty fire personnel who suffers a trauma or series of events that causes rapid deterioration from a healthy state to death.

### > Type 2 - Line-of-Duty Death

Any on-duty fire personnel who suffers a series of events causing a gradual deterioration from a healthy state to death.

### > Type 3 - Off-Duty Incident Death

Any off-duty incident involving a trauma or a series of events to fire personnel that causes a rapid or gradual deterioration from a healthy state to death.

The following categories are optional and should be decided by department policy:

### > Type 4 - Current or Past Member's Death

A member or honorary member of the department or volunteer association who is currently active or who has retired in good standing and suffers an event or series of events that results in his or her death.

### > Type 5 - Affiliate of the Department

An individual who has served in some capacity with the department, such as a Commissioner, Chief, Dispatcher, or other job function and does not meet any of the above criteria, but suffers an event or series of events that results in his or her death.

### > Type 6 - Non-Fire Fighting Individual Honored by the Department

A non-firefighting individual who through employment, volunteer association, professional or emotional ties suffers an event or series of events that results in his or her death. This may be applied to an individual the department or volunteer association wishes to pay a special tribute to for their contribution to the department and/or fire service. This may also be used when an immediate relative of a department member dies.





## Types of Funeral Services

Generally, there are four types of funeral services, as described below. These descriptions should serve as general guidelines only and may be adapted to fit each individual situation. It is most important to follow the family's wishes and give full respect to their expressed concerns.

### Formal Funeral Service

This type of service includes the use of apparatus, pallbearers, a color guard (optional), and a funeral detail composed of fire personnel in Class A uniforms. Other options include: badge shrouds, bagpipers, a bell service, a bugler, crossed ladders, a fire engine caisson, an honor guard, and station/vehicle bunting. This type of honor is usually reserved for a line-of-duty death. *(Circumstance Types 1 and 2)*

### Semi-Formal Service

This type of service includes the use of pallbearers, color guard (optional), and a funeral detail composed of fire personnel in Class A uniforms. Other options include: badge shrouds, a bell service, an honor guard, and station/vehicle bunting. This type of honor is usually reserved for an off-duty death of a current member or an affiliate. *(Circumstance Types 3, 4, and 5)*

### Non-Formal Service

This type of service includes the use of a funeral detail of fire personnel in Class A uniforms. Other options include: badge shrouds, a bell service, an honor guard, and station bunting. This type of honor is usually reserved for any non-firefighting personnel, a retired member or affiliate of the department or Volunteer Association or an immediate relative of a department member. Also included in this category would be an individual the department or volunteer association wishes to recognize for their contributions. *(Circumstance Type 6)*

### Private Service

This is a service closed to any outside participation with the exception of the immediate family. Usually this type of service is at the request of the family.



## Preparations

Being prepared for a funeral in the event of a death of a member or affiliate of the department can provide the members of the department as well as the surviving family members with emotional support by making it possible to smoothly and successfully handle the numerous details that will arise. In addition to having selected an overall procedure for funerals (such as described here), the following are suggested as preparations that can be made at any time and are recommended by the departments who use them.

### Personal Information Sheets

It is suggested that each member of the department complete a preplan or personal information sheet for use in case of death. This is an inventory of information designed to organize the member's personal affairs. See Appendix A. Annual updates are encouraged. This information will help the surviving family and the department to be aware of the individual's desires and the location of important documents. Each member should keep this information in a semi-private place where it is readily available and notify loved ones that it exists and where it will be kept. A sealed copy should be kept in the member's fire department personnel file, to be opened only in the event of death. Members should also be encouraged to have an updated living will prepared by a competent attorney. See Appendix H.

### Photographs

The department should maintain a current set of photographs of its members for media use. The release of the photos will be at the expressed desire of the surviving family.

### Resumes

A current resume should be maintained describing educational background, work experience, professional affiliations, and awards received. This can be kept in your department personnel file and will be helpful in the event of death to write an obituary, eulogy, or aid in the selection of readings.

### Department Identification Cards

These cards should be provided to all members of the department as a means of identification.



### Employee Benefits

Every department should be familiar with items that need to be closed out in the event of a death. The surviving spouse may look to the department for assistance with these matters. Some of these items are: 1) autopsy report; 2) final paycheck; 3) outstanding debts; 4) insurance policies; 5) Social Security (survivor's benefits); 6) special benefits (vacation pay, holiday/personal days' pay); 7) Association benefits; 8) Federal death benefits (Public Safety Officers' Benefits (PSOB); see Appendix B); and 9) continuation of medical coverage for the surviving spouse and dependents.

### Uniform for Burial

Many departments will provide a uniform for burial. Whether a person wishes to be buried in uniform should be clearly expressed in the personal information sheet or by the surviving family. See Appendix H.

### Inventory of Necessary Equipment for Funeral

The following is a list of supplies that may be needed during a funeral service and/or mourning period. These may be kept on hand in the fire department stockroom:

- > Color guard standards.
- > Flag for casket (Some states have passed a Firefighters' Memorial Flag Act to honor firefighters who have died in the line-of-duty and have issued a directive prescribing standards and requirements for the use, display, distribution, and return of the Firefighters' Memorial Flag. Consult your state firefighter's association or local officials to see if this applies in your jurisdiction).
- > Black 3/4" plastic tape or elastic bands; and round-tipped scissors.
- > Black bunting.
- > White gloves.
- > Signs that read "Fire Department Courtesy Car" (approximately 6 should be inventoried).
- > Black ascots (local option).
- > Black berets (local option).

The above supplies may be obtained from the following sources:

- > Flags: City Hall, or identify closest supplier.
- > Color Guards: American Legion or VFW.
- > Additional white gloves: Army and Navy Store or identify closest supplier.
- > Additional vehicles: City, borough, township, police department, car dealers, members of the department.
- > Signs: Identify a local printer.
- > Black bunting: Identify a local supplier.

If a band is desired, it may be obtained from a school or other local group.

### Funeral Directors

Local Funeral Directors play a major role in the funeral-planning process. They should be made aware of the existence of any established departmental funeral policies or traditional guidelines. It is important for departments to remember their job is to assist the funeral director, not assume their role.

### Florists

Florists should be informed of special arrangements they may be called upon to develop for a firefighter funeral. Some suggestions are:

- > Maltese cross.
- > Member department's logo/patch.
- > Broken rung ladder.
- > Crossed pike pole and axe.
- > Helmet.

### National Fallen Firefighters Foundation's Local Assistance State Team

If a line-of-duty death occurs in your department the National Fallen Firefighter Foundation's Local Assistance State Team (LAST) can provide support and assistance. The Team can provide assistance in the following areas:

- > Expertise regarding the Public Safety Officers' Benefits program.



- > Honor Guard and Ceremonial Support.
- > Chaplain services.
- > Support from a fire service survivor.
- > Provide a behavioral specialist for the department and the family.
- > Offer information and access to various Federal, State, and local benefits.

Visit [www.firehero.org](http://www.firehero.org) for more information or call 1-866-736-5868 if assistance is needed.

## Job Responsibilities

The following describes the roles of the various job assignments involved in carrying out the funeral procedures: the Survivor Action Officer, the Family Liaison Officer, the Funeral Officer, the Funeral Detail, the Procession Officer, the Service Officer, the Cemetery Officer, and the Transportation Officer. If the department is small or is playing a lesser role in the family's funeral plans, one department member may take on the responsibilities of more than one of these positions.

### Chaplain

All departments are encouraged to have an active Chaplain program. The amount of involvement the Chaplain has will depend upon the family's wishes and/or religion. One option that can be proposed is a shared responsibility between the clergy of the family's choice and the department Chaplain. Here again, the family's wishes prevail.

Areas handled by the Chaplain will be:

- > Initial notification of next of kin, with the Chief or his/her designee.
- > Comfort and counseling of surviving family members.
- > Prayer service in the home.
- > Church services.
- > Cemetery interment.
- > Follow-up counseling for the surviving family members.

### Survivor Action Officer

It is recommended that the Chief assume or delegate the position of the Survivor Action Officer to oversee liaison to the next of kin and all funeral-related activities. Typically, the Survivor Action Officer is a special staff assignment. As a direct representative of the Fire Chief, the Survivor Action Officer should receive the full cooperation of the entire department.

The Survivor Action Officer coordinates the activities of a number of personnel assigned to handle specific aspects of the funeral arrangements and to assist the surviving family. His/her principal concern is the ongoing welfare of the next of kin. It is his/her responsibility to ensure whatever assistance is necessary is provided

to support the family throughout the crisis, conduct the funeral, and help settle the affairs of the deceased member.

Additional duties of the Survivor Action Officer are as follows:

- > Confirm that the next of kin has been notified by the Chief or Chaplain.
- > Notify all department personnel of the death.
- > Confirm the notification of all outside agencies and vacationing personnel.
- > Arrange to have flags lowered to half mast and bunting placed on station(s) as appropriate.
- > Ensure that the Emergency Command Center has been notified.
- > Follow up with contacts when funeral arrangements have been determined.
- > Personally collect all of the deceased's personal items from the station and deliver in person to the Family Liaison Officer.
- > Conduct a coordination meeting with the "task force" of officers as soon as possible to ensure all roles are being filled and all needs are being met.
- > Be a key contact person for outside agencies, news media and other departments in relation to the death and subsequent ceremony. Note: the Public Information Officer (PIO) might play this role instead of or in addition to the Survivor Action Officer.
- > Make appropriate arrangements for a post funeral meal and facility to handle a large group of people with the family's approval through the Liaison Officer.
- > Call a final meeting of the "task force" to establish the department's participation in the funeral services based upon the family's wishes.
- > Establish a timetable or schedule of events.
- > Identify times and places for group gatherings in accordance with ceremonies.
- > Contact all appropriate people and agencies with the schedule, meeting places, and any special instructions.





- > Contact support agencies as appropriate to arrange their assistance through the appropriate key person for bands, honor guards, firing squads, bugler.
- > Contact appropriate department personnel to arrange for finalization of required paperwork, forms, etc.
- > Obtain copies of the death certificate and provide to the department's human resources division.
- > Contact outside agencies for support during the funeral.
- > Establish milestones for future family follow up by the Family Liaison Officer, such as recognizing the anniversary of death each year, etc.

### Family Liaison Officer

The Family Liaison Officer reports directly to the Survivor Action Officer and is responsible for maintaining a communication link between the family and the department. The Family Liaison Officer provides the logistical support to the family throughout the funeral process and should have a department vehicle assigned to him/her throughout the process. The duties are as follows:

- > Along with the Chaplain, provide reassurance and support to the family after the official death notification.
- > Discuss all aspects of the funeral process and its ceremonies with the family and the Funeral Director. The Family Liaison Officer must be able to relay information to the department as to what level of involvement the department will have in the funeral process in accordance with the family's wishes.
- > Inform the family as to the various traditional fire service funeral options that can be included in a service. This is accomplished with the cooperation of the Funeral Director. These might include readings, music, honor guards, apparatus displays, and military formations. All of the requests made by the surviving family must be relayed to the Survivor Action Officer for delegation to the "task force" of officers.

The Family Liaison Officer may assist the family in determining:

- > Type of interment.
- > Which funeral home will be used.
- > Which church/large assembly area will be used.

- > Which clergy will be used, including the department chaplain.
- > Which cemetery will be used.
- > If the deceased will be buried in uniform.
- > Number of primary pallbearers and whether honorary pallbearers will be used.
- > The length of the wake (if any) and a tentative schedule.
- > The length of church service, as well as:
  - Readers of the Scripture.
  - What Scripture will be read.
  - Music at the church.
  - Who will deliver the sermon, eulogy, etc.
  - If there will be a last alarm bell service.
- > Graveside ceremony options include:
  - Presentation of the flag.
  - Firing squad.
  - Readings and who will perform them (see Appendix D for sample readings).
  - Eulogy and who will deliver it (see Appendix E for guidelines on preparing a eulogy).
  - Taps.
- > Items to Consider for the Procession:
  - Will a pumper be used as a caisson or will a conventional hearse be used instead? In some departments the engine from the deceased member's most recent duty station is taken out of service and used as the hearse, with minor modifications made to accommodate the casket.
  - Will a pumper or ladder truck be used as a flower car?
  - Will personnel walk alongside the caisson or drive in the procession?

The Family Liaison Officer also should:

- > Obtain all articles of clothing that the deceased will wear (except shoes) and deliver them to the Funeral Director/officer.
- > Identify and determine any other special considerations on behalf of the family and the special requests per the individual's personal information sheet.



- > Maintain 24 hour contact with the family for their assistance and the same contact with the Survivor Action Officer.
- > Obtain a recent photograph of the deceased for the Funeral Director.

The Family Liaison Officer may also be asked to address the following items by the family and the Survivor Action Officer:

- > Autopsy reports, birth certificates, marriage certificates, death certificates (Workers' Compensation) veteran or military records.
- > Check the individual's retirement plan - survivor benefits.
- > Veteran widow and children benefits and burial benefits.
- > Social Security - survivor benefits.
- > Insurance policies:
  - Continue medical plan for the family.
  - Life insurance
  - AD&D Insurance
  - Optional insurance
  - Widows and orphans funds
- > W-2 form.
- > Final paycheck, including sick leave and vacation time.
- > Income tax report.
- > Outstanding loans.
- > Transfer of ownership of property and vehicles to survivors.
- > Review all outstanding bills. Include the last medical and funeral expenses. Determine what is covered by insurance.
- > Advise survivors not to loan money.
- > Investigate possibility of college scholarships for dependents.
- > Mortgage insurance.
- > Workers' compensation.
- > Public Safety Officers Benefits (PSOB).

### Funeral Officer

The Funeral Officer's duties include the primary responsibility of ensuring that the wishes of the family and the special requests of the individual are coordinated with the Funeral Director and Chaplain. He/she provides coordination and interaction with the Funeral Director and the church and the cemetery, and arranges and directs the funeral procession. The Funeral Officer reports directly to the Survivor Action Officer and keeps him well informed during the planning process.

Duties include the following:

- > Establish a tentative schedule of events and the length of time for the mourning and burial process.
- > Determine which fire department vehicles will be used as caissons or flower vehicles.
- > Make arrangements for the surviving family to get from the funeral home to the cemetery.
- > Establish an honor guard schedule for the viewing at the funeral home.
- > Arrange for honorary and active pallbearers. Secure the bugler, color guard(s), band, and firing squad.
- > Obtain an American flag. (The Funeral Director secures a flag for veterans only).
- > Coordinate a formal walk-through of uniformed personnel during the viewing, with the agencies and Funeral Director, if desired. This includes seating arrangements.
- > Coordinate any prayer services to be conducted at the funeral home.
- > Develop a schedule and a brief set of instructions for uniformed personnel the day of the funeral. Be sure to coordinate with the funeral home. This includes:
  - Arrival time of uniformed personnel with specific instructions as to where to gather
  - Briefing and development of formations that will be used when the casket is removed
  - Briefing of proper protocols for entering and leaving the funeral home (see Appendix C for Military Standards)
  - Arrange with the department's photographer to record the entire funeral
  - Arrange with the PIO to establish guidelines for TV and press:

- At the church inside and/or outside
- Funeral home inside and/or outside
- Cemetery - general photo coverage and/or coverage of the immediate grave
- > Coordinate the vehicle staging with the Procession Officer and include the vehicle assignments for the department.
- > Obtain white gloves for the pallbearers and black bunting for the station(s) and apparatus.

### Honor Guard

- > At least four honor guards are required.
- > One member of the honor guard shall be designated as the Officer of the Guard. He or she shall be responsible for obtaining the necessary equipment and scheduling of the honor guard members.
- > Two honor guards, one for the head and one for the foot of the casket, shall be scheduled for 15 minute shifts.
- > Honor guard uniforms shall be dress uniform or dark suits, white gloves and black 3/4" tape on official badges.
- > Honor guards shall stand at attention at their assigned positions for the duration of the 15 minute shift.
- > Honor guards may be used during viewing and prior to the service as custom dictates.

### Honorary Pallbearers

- > Personnel designated as honorary pallbearers, usually retirees or members of the deceased's company, shall at all times move ahead of the casket as it is moved.
- > The honorary pallbearers shall sit together in a designated area in the church during the service.
- > Dress for honorary pallbearers:
  - Retirees will normally wear civilian clothes.
  - Active members shall be in dress uniform.

### Active Pallbearers

- > The active pallbearer detail shall consist of six pallbearers plus an officer.
- > The officer of the detail shall contact the Funeral Officer for details.

- > The pallbearers will remain covered at all times while acting in that capacity and will wear white gloves.
- > The pallbearers will not salute while acting in this capacity.
- > The flag shall be placed over the casket with the blue field at the head over the deceased's left shoulder.
- > If the casket arrives at the church from the funeral home, then the active pallbearer detail shall position themselves to receive the casket in front of the church.
- > During the service the pallbearers will sit together in a designated area in the church with the funeral detail.
- > At the cemetery, after placing the casket over the grave site and upon the officer's command, the detail shall raise the flag to waist high over the casket and hold it there during the committal service. After the committal service is read, Taps may be sounded. The flag is then folded upon the officer's command in the prescribed military manner (see Appendix C) and presented to the widow (and mother) by the officer of the detail.
- > The detail, on orders of the officer, shall take a place with the funeral detail.
- > During the graveside service, where the flag is not draped over the casket, the pallbearers, after placing the casket over the grave site, on orders of the officer shall step back with the funeral detail and follow the procedures for the funeral detail.

### Funeral Detail

All members of the department not otherwise detailed will act as the funeral detail, in dress uniform, no gloves required.

- > The funeral detail will arrive as a group from the staging area prior to the arrival of the funeral coach at the church and take a position in front of the church on the right hand side as indicated in the diagrams in Appendix F, Funeral Formations.
- > For formal and semi-formal funerals the funeral detail will take a position in front of the church in two facing ranks with senior officers closest to the church.
- > As the active pallbearers move the casket from the coach the funeral detail will be called to attention by the Officer-In-Charge (OIC). If the casket is draped with the flag the OIC will order a hand salute as the casket passes. The command shall be "Present Arms!"

The command to end the salute shall be “Order Arms!”

- > After the casket passes the OIC will order “at ease” and the funeral detail will file into the church according to rank and sit in a designated area of the church. Head covering is removed upon entering the church.
- > After the service the funeral detail, on order of the OIC will file out of the church and in the case of a formal funeral take a position on the right of the entry as indicated in the diagram.
- > If the services are semi-formal, the funeral detail will form facing ranks on both sides of the entry with senior officers closest to the hearse.
- > As the flag-draped casket is brought out of the church, the detail is brought to attention and a hand salute is executed on order of the OIC.
- > The funeral detail rides as a group in designated cars to the cemetery and also between the funeral home and the church.
- > The funeral detail at the cemetery again forms two ranks according to rank from the location of the hearse to the grave site, with officers closest to the grave.
- > As the flag-draped casket is removed from the hearse by the active pallbearers, the funeral detail executes a hand salute on order of the OIC, “Present Arms.” If the casket is not covered by the flag they stand at attention.
- > After the casket is placed over the grave the funeral detail forms rank in front of the grave, highest rank on the right.
- > If Taps is sounded, uniformed members should execute hand salute on order of the OIC.
- > During religious graveside services all personnel will bow their heads at the words, “Let us pray.”
- > All personnel except the active pallbearers while holding the flag will follow the example of the officiating clergy. If he/she uncovers they will uncover. If he remains covered, they will remain covered.

### Procession Officer

The Procession Officer has the primary responsibility of coordinating the transportation arrangements and funeral procession from the funeral home to the church

and then finally to the cemetery. The following duties fall within his/her responsibility:

Attend the coordination meeting and determine the following:

- > Names and locations of the funeral home, church, and cemetery.
- > Decide if a pumper or other fire department vehicle will be used as a caisson.
- > Develop tentative time schedule of events.
- > Decide if the procession will involve walking personnel such as an honor guard, band, and/or pallbearers.
- > Establish a simple systematic scheme for staging and coordinating vehicles in each location. The scheme should include areas large enough to accommodate large numbers of emergency vehicles. The staging areas should be within a block or two of the funeral home or church preferably at a fire station, school, or park where ample parking and assembly areas are available. This group can then “march” as a unit to the church or funeral home to act as a Funeral Detail.
- > Obtain sufficient rolls of black plastic tape along with small round-tipped scissors that can be carried in a pocket and made available in the assembly areas for all uniformed personnel to place a horizontal black band over their badges.
- > Determine any special considerations the procession may need to consider by contacting the Family Liaison Officer. These include:
  - Will the procession drive past the deceased’s home, fire station, or other locations?
  - Will a special line-up of equipment be needed at any point in the procession for purposes of showing respect?
  - Will crossed aerial equipment be used over the cemetery entrance for the procession to drive under? If so, the request for the equipment should be forwarded to the Survivor Action Officer. The actual coordination of the aerals is done by the Procession Officer.
  - Coordinate the vehicle staging at the church and cemetery with the “task force.”
- > Upon completion of the above tasks, make contact with the appropriate agency (Sheriff’s office, police

department, etc.) to determine a route and appropriate traffic control.

- > Create maps that indicate the route and any other specific instructions to be distributed at the briefing prior to the funeral service. The maps should include locations of: the fire department(s); the funeral home; the church; the Chief Officer and dignitary assembly area; firefighter's assembly area; auxiliary parking areas; motels for out-of-town guests (including phone numbers); vehicles for the funeral procession; the cemetery and grave; and food service areas. It should also map out the route of the funeral procession. On this map or on a separate sheet include a copy of a diagram showing the proper arrangement and movement of personnel to the various sites. Sufficient quantities of the map should be reproduced for anticipated guests.

The protocol for aligning the proper sequence of vehicles in a procession is basically as follows from first to last:

- > Lead car (Sheriff's patrol car, police department car, etc.).
- > Flower caisson or car.
- > Hearse or pumper.
- > Immediate family limousines or cars.
- > Pallbearers and honor guard in cars.
- > Fire Chief's car.
- > Other department vehicles.
- > Sheriff's office, police department (or other appropriate agency) detail.
- > Local government officials in cars.
- > Neighboring and visiting staff vehicles.
- > Neighboring and visiting apparatus.
- > Other municipal vehicles.
- > Friends of the family private vehicles.
- > Rear car (Sheriff's patrol car, police department car, etc.).

With extremely large funerals, line up the vehicles two across.

If appropriate, contact the Survivor Action Officer to determine which apparatus will be used as a caisson

and/or flower vehicle(s). Once this has been determined the Procession Officer must assure the following items are taken care of:

- > Apparatus are thoroughly cleaned and hose beds stripped.
- > Bunting placed on the appropriate apparatus.
- > The hose bed adapted to allow for the placement and removal of the casket.

### Service Officer

The Service Officer has the primary responsibility of coordinating all of the activities and ceremonies at the church if a religious funeral has been requested by the family. Additional duties include:

- > Attending the coordinating meeting and determining the following from the Survivor Action Officer and the Family Liaison Officer:
  - Tentative scheduling
  - Location of the church
  - Clergy to be used, including the Chaplain(s)
  - Scripture to be read and readers
  - Type and length of the service
  - What ceremonial items are being requested by the family (e.g., last alarm bell service – see Appendix D)
  - Musical arrangements to be used (such as bag pipes or Amazing Grace)
  - Special musical arrangements
  - Who will deliver the eulogy
  - Contacting the Procession Officer and coordinating the vehicle staging for the procession
- > Making seating arrangements for those attending the church service. Dedicated seating should be provided for the following:
  - Family
  - Pallbearers
  - Honor guard
  - Uniformed personnel
- > Considering formations and coordinating the same during the arrival and removal of the casket from the church. Reviewing military commands for the formations and issuing them where appropriate. See Appendix F for Funeral Formations.

- > Ensuring that specifically assigned medical personnel be provided at the cemetery for the family should they require immediate medical assistance.
- > Upon dismissal of the formation, giving instructions as to the location of the post-funeral meal (determined by the Survivor Action Officer and Family Liaison Officer).

### **Cemetery Officer**

The Cemetery Officer is primarily responsible for the coordination and preparation of the events from the time the procession vehicles are stopped at the cemetery and the people exit their vehicles. He or she is also the liaison to the cemetery staff. Additional duties include the following:

Attending the coordination meetings and determining from the Survivor Action Officer and Family Liaison Office the following information:

- > What type of interment will be used:
  - Burial
  - Crypt
  - Cremation
- > If the family wishes to have:
  - Taps played
  - Firing squad
  - Scripture read and who will read it
  - A band

Upon receipt of this information, the Cemetery Officer should be responsible for the following:

- > Scheduling and coordinating the sequence of events for the family. This includes coordinating the requests for special items.
- > Ensuring that the pallbearers are familiar with and understand the process of folding and presenting the flag(s) to the widow (and mother if present).
- > Managing the formation of personnel (see Appendix F) and issuing of orders as appropriate and consistent with the Military Standards (see Appendix C).
- > Ensuring that the cemetery takes care of all the necessary items such as:
  - Overhead protection for the immediate family at the burial site

- A public address system if one is required

### **Transportation Officer**

The Transportation Officer will be responsible for arranging the transportation of all visiting out-of-town guests to and from the airports and funeral service. This includes but is not limited to the following:

- > Airports.
- > Hotels, motels.
- > Funeral services.
- > Cemetery.
- > Food service areas.

*Note: Where there are insufficient fire department cars, consider the use of other municipal cars, surplus sheriff patrol cars, and private vehicles. Provide signs for these vehicles approximately 18 inches long by 6 inches high to read "Fire Department Courtesy Car."*

Also included in the Transportation Officer's duties is arranging for housing as necessary for any overnight guests. This will include arrangements for transportation to the food service areas for visiting chief officers, dignitaries, and firefighters.

If the funeral will be attended by several dignitaries, it is suggested that a member of the department be appointed to specifically handle their arrangements. Responsibilities of a dignitary coordinator may include, but is not limited to:

- > Contacting the staff point of contact for each dignitary to be aware of any special arrangements or requests and provide them with a detailed summary of events.
- > Arranging transportation for dignitaries, if needed.
- > Designing a seating plan.
- > Consult with the family to decide if dignitaries will participate in the service.
- > Designing a plan for the procession if dignitaries will be included.
- > Arrange a private meeting between dignitaries and the family where private condolences can be expressed. Be sure to have the family's permission before setting up a meeting.



## Initial Actions

Any of a wide variety of scenarios can directly or indirectly cause the death of a firefighter. The death may occur at a variety of locations and a variety of times. The department may have to react to one of the following situations:

- > Death at the scene.
- > Dead on arrival at the hospital.
- > Alive upon arrival at the hospital, but expires later.
- > Injuries or distress not detected at the scene and the individual dies later.

In all cases, a series of steps must be taken to ensure that the cause of death is accurately reported and investigated. These need to be implemented by the on-scene Incident Commander as soon as possible. The immediate steps include the following:

- > Secure the scene if necessary.
- > DO NOT make statements to the media about the individual's name or personal information until the next of kin has been notified.
- > Notify the following individuals by telephone, to insure confidentiality:
  - Chief and Chaplain(s)
  - Direct supervisor (if applicable)
  - Investigation team (Department investigator, law enforcement officer, safety officer)
  - Department photographer

*NOTE: All radio traffic relating to the incident should be kept to a minimum. This will help to insure that the next of kin is not notified by an unofficial source, but rather by the Chief or his designee and the department's Chaplain.*

- > Activate an investigation team.
- > Appoint a liaison to the hospital (if appropriate).
- > Assign the ranking officer available and the department's Chaplain to obtain the individual's Personal Information Sheet, review it, and follow any specific directions in notifying the next of kin.
- > Assign the PIO to obtain from the investigative team the information needed to draft a preliminary news release concerning the incident. Remind the PIO to have the information approved by the Incident Com-



mander and ensure that the notification of next of kin has occurred before releasing any information about the victim to the news media.

- > Activate a Critical Incident Stress Debriefing Team, if appropriate. The death of a firefighter is psychologically traumatic for the members of the department. Reaction to such emotional stress can affect each individual differently. It has been demonstrated that psychological counseling shortly after a traumatic incident can be extremely beneficial. The debriefing is primarily an educational session, emphasizing that unusual dreams or emotions are probably normal reactions to abnormal situations.
- > Initiate any appropriate measures necessary to activate all Federal (PSOB), State (Workmen's Compensation), and departmental (insurance) death benefit payments. Additionally, membership organizations

that offer benefits in the event of injury or death should be contacted to file a claim. For example, members of the National Volunteer Fire Council are eligible to receive a \$10,000 Accidental Death or Dismemberment policy.

### **Additional Areas of Departmental Support (Optional)**

- > Provide the family transportation to the hospital.
- > Assign an officer to serve as the communication link between the department and the family. It is the responsibility of this Family Liaison Officer to communicate the family's wishes to the department concerning the department's level of involvement in the funeral service. An immediate issue is whether the family wants to interact with the media and what they want said to the press. The department should defer to the family's wishes regarding personal information about the deceased as much as possible and provide support as needed.
- > Assign an officer to serve as the coordinator for the implementation of the department's involvement in the funeral service. It is the responsibility of the Funeral Officer to manage the logistics of the funeral service with the cooperation of the funeral home director.

### **Initial Roles of Personnel**

#### **Hospital Liaison**

One person should be appointed as a Hospital Liaison, who reports directly to the hospital and acts as liaison between the hospital and incident commander via telephone. This person should accept the following responsibilities:

- > If death occurs, request that blood gases be drawn as soon as possible.
- > Ensure that no sensitive information is released to the news media.
- > Collect all personal articles if family is not yet present at the hospital.
- > Keep incident commander apprised of the condition of the individual if an injury has occurred.

#### **Public Information Officer**

The Public Information Officer (PIO) obtains from the investigative team the information necessary to docu-

ment the facts of the incident and begin a preliminary news release concerning the incident. Under no circumstances should the PIO release any information about the individual until the next of kin has been notified and until the information has been approved by the Incident Commander. The PIO role carries with it the following responsibilities:

- > Gather all facts pertaining to the incident.
- > Gather background information pertaining to the firefighter.
- > Prepare a brief statement.
- > Wait for approval and notification of next of kin. before releasing any information to the news media.

The roles of both the Hospital Liaison and Public Information Officer should be maintained until instructions are received from the Incident Commander or the Chief. The activation of department support will be contingent upon the specific situation and expressed desires of the family. The department should provide support to accomplish the goals of the funeral service and to the surviving family members without assuming financial responsibility for the funeral service.

### **Procedures for Notification**

Prompt notification of the next of kin cannot be stressed enough in the case of a line-of-duty death. No one wants to hear of the death of a loved one over a television or radio broadcast.

Departments should appoint a Notification Officer. Normally the Chief or his designee fulfills this role and is accompanied by the Chaplain when making a death notification. Notification by some other form of communication other than in person, say by telephone, is acceptable only in exceptional cases. Extreme emotional trauma is not uncommon when one is notified of the death of a loved one, and care should be taken to ensure that the next of kin are not alone at this time.

The official notification serves a three-fold purpose: assures the next of kin that the information is valid; provides a knowledgeable source of information concerning the death; and assures the next of kin that assistance is available at a time when they need it most. The Notification Officer and Chaplain should be prepared to stay with the next of kin until a family member

or friend arrives. As soon as is appropriate, they should determine if the family has a particular person, preferably a close family friend and department member, to act as Family Liaison Officer.

Prior to visiting the survivors, the Notification Officer should be familiar with the circumstances of the death and the personal data concerning the individual. Be sure the Notification Officer has official fire department identification in his/her possession. Also be absolutely certain of the status of the firefighter, check and double check with the hospital, and insist on an official pronouncement of death before proceeding. Clear the release of information with the incident commander to be certain the information is correct.

If the next of kin arrives on the scene, it is a good idea to provide them with some type of identification, such as an armband or something similar. Tell them that this is to assist the department in locating them if they are needed. This also is to alert emergency personnel to be careful of making comments when the next of kin are nearby.

After notification of the next of kin, the Public Information Officer, Emergency Command Center, and the deceased's religious groups will need to be notified.

The Chief will give instructions to dispatch the death announcement. Usually, station flags are lowered to half staff, and the front of the station is draped in black bunting for seven days after the funeral. A news conference should be arranged to ensure that the media obtain the most factual information.

In addition to the above, others need to be notified:

- > State Fire Marshal's Office.
- > State Worker's Compensation Board (within 48 hours).
- > Department's Worker's Compensation Board.
- > National Fire Academy/U. S. Fire Administration.
- > State Fire Incident Reporting System.
- > Federal Public Safety Officers' Benefit Program (PSOB).





## Description of Funeral Options

The families of the deceased or the deceased's own personal information sheet should help to make the decision about how simple or elaborate the funeral will be. The department may offer certain options for the family to consider, but ultimately, it is the family who makes the final decisions. The options to consider include the following:

### Honor Guards

If an honor guard is requested by the family, it becomes the responsibility of the funeral director and the department to assure that the request is honored. Ideally, a list of honor guards or members comprising an honor guard will be available. Typically, the honor guards are to report in their dress uniforms and outfitted in white gloves. If two honor guards are used (a fire department and military honor guards), they are to be placed at the head and foot of the casket. Four honor guard members should be present during viewing hours to periodically relieve the members standing guard at the casket.

### Pallbearers

If the family chooses to use fire department personnel as pallbearers, it must be determined which firefighters the family would like to have in the service; usually six to eight are needed. They wear dress uniforms and white gloves; berets are optional.

The pallbearers are exempt from following the majority of orders given to the remainder of the formation because of the specific responsibility they are assigned. The instructions to the pallbearers on the removal, handling, and transporting of the casket should be given by the Funeral Director.

Sometimes, at the discretion of the member's fire department, a piece of fire apparatus is used as a caisson to carry the casket. In this case, the pallbearers would be assigned to drive and ride on the apparatus from the beginning to the end of the funeral procession.

A practice session before the funeral is recommended if possible.

Traditionally, the casket is draped with an American flag for veterans and all uniformed personnel, but this is



optional. If this is done, three of the pallbearers need to remove, fold, and present the flag(s) to the widow and mother (if present) at the cemetery. Two pallbearers are assigned to fold the flag by military standards and present it to the third pallbearer who, in turn, presents it to the next of kin. At the time of the funeral, it must be determined who will accept the expense of the flag, the department or the family. See Appendix C, Military Standards and Flag Folding Procedures for instructions on folding the flag.

### Transportation

A department vehicle and driver may be offered to the immediate next of kin during the viewing and funeral period. This is entirely at the discretion of the department.

### Meals

With the amount of arrangements that have to be dealt with and the emotional distress that accompanies a death, meals are often a bother for the deceased's family. Traditionally, family and friends provide food, or unions or associations may be able to provide for these needs, including preparation, delivery and financial support. Should these arrangements be needed, the Chief should appoint someone to coordinate these efforts.

### Child Care

If child care presents a problem for the family during the viewing and funeral period, this need should be identified and assistance provided.

### Procession

The family may indicate the desire for a procession from the funeral home and/or church to the cemetery. The procession process starts with the staging of vehicles at the funeral home prior to the funeral beginning and ends upon arrival at the cemetery. Specifics usually are under the direction of the Funeral Director with the cooperation of the Procession Officer, the Church Officer, and the Cemetery Officer. Among the options to consider:

- > Use of department vehicle(s) as caisson, flower car, and/or miscellaneous transportation
- > Procession route, which may include a drive or walk by the deceased's fire station or home, or other special considerations
- > Providing a static display of apparatus if requested and appropriate on the procession route
- > Providing crossed ladders or aerial equipment if requested and appropriate at the cemetery entrance

A pumper may be appropriate as a caisson to carry the casket. Should this option be exercised, the apparatus will have to be taken out of service for a period of time, cleaned, draped in bunting, and retrofitted or adapted to easily accept the casket.

### Flower Apparatus

A piece of fire apparatus can serve as a flower vehicle in the procession. It will have to be taken out of service, cleaned, draped in bunting, and retrofitted to carry flowers.

### Last Alarm Service

A traditional bell ringing ceremony at the end of the church service may be exercised, signifying the firefighter's last alarm. A short reading accompanies the ringing of the bell. See Appendix D.

### Musical Arrangements

Here again, the family selects the musical arrangements for the service and cemetery, to include choirs, bands, bagpipes, singers, organ arrangement, etc. These are coordinated through the Family Liaison Officer.

### Readings

The family should decide the appropriate Scripture readings or verses and who will read them. Arrangements are made with the family's church and clergy for both the church and cemetery services. See Appendix D for sample readings.

### Eulogy

Typically, the family decides what, when, and where the eulogy will be presented. This may be appropriate at any one of the steps in the entire ceremony, at the funeral home, the church, or the cemetery. A clergy member, family member, or friend from the department may perform this task. The Family Liaison Officer makes the appropriate contacts with the church and cemetery representatives, as well as the Funeral Director, to coordinate the delivery of the eulogy on behalf of the family if desired. See Appendix E for guidelines on preparing a eulogy.

### Crossed Aerial Ladders

Should the family wish to have crossed aerial ladders at the cemetery entrance, the Family Liaison Officer should forward this request to the Survivor Action Officer for coordination and approval. The implementation of this request is handled by the Procession Officer.

### Static Equipment Display of Outside Equipment

The family may choose to exercise a static display of department apparatus with fire personnel at attention and saluting the passing casket, during the procession. This final tribute may be set up anywhere; however, it is usually at the church, fire station on the procession route, or at the cemetery entrance. The Procession Officer is responsible for handling the placement of all vehicles during the procession.

### Burial in Uniform

The department usually provides the uniform should the family wish to bury the deceased this way. The Family Liaison Officer will deliver the clothing to the Funeral Director upon request. See Appendix H.

### Closed Casket

If the family wishes for a closed casket, a picture of the deceased in uniform and the deceased's clean helmet may be placed on top of the casket or displayed on a small table near the casket during the viewing. These can later be presented to the family.

### Walk Through

A scheduled walk-through paying tribute to the deceased may be exercised either at the church or the funeral home as a form of paying tribute from fellow firefighters. This should be coordinated with the Funeral Director and the Funeral Officer. If this is done, the fire personnel line up single file by rank and agency. The formation then files through single file past the casket, stopping briefly to pay respects. The contingent then exits the chapel or funeral home.

### Refreshments or Post Services Reception

Should the family approve, an after-services reception may be held at a church hall, school cafeteria, or fire station. The Survivor Action Officer should coordinate the event, calling upon affiliated agencies to assist in donating food for the service.

### Bunting

Station and apparatus bunting should be available for a department to use on short notice. It may be appropriate to purchase it on a regional basis. The front of the station will be draped with black bunting until seven days after the funeral. Should fire trucks be used for caissons or flower carts, they too should be bunted.

### Half Staff Flag Protocol

The affected department can lower its American flag to half mast from the time of notification that a department member has passed away until 1700 hours the day of the funeral and interment. When a flag is at half mast, no other flags should be flown on the same halyard.

The Chief of the affected department can petition the local government to lower their flag(s).

### Badge Shrouding

Shrouding of a badge is accomplished by placing a 1/2" to 3/4" piece of black material horizontally at the badge's midpoint entirely around the badge. The shroud should be placed on badges at the time of notification of the death and may remain on the badge for a 30-day mourning period.



## Appendix A

### Personal Information Sheets

Fire departments are encouraged to have up-to-date personal information sheets for each firefighter. Personal information sheets can be helpful in the event of a personnel injury or death because they provide department officials and family members with easy access to important information in a timely and organized manner. Forms should be confidential and updated on an annual basis and may provide information in the following categories:

- > Contact information.
- > Family information.
- > Personal information (i.e. physician, attorney, accountant, bank, etc.).
- > Location of a will.
- > Insurance policies.
- > Funeral and burial preferences.
- > Awards, decorations, and achievements.
- > Final wishes.

To view a sample form that can be altered to fit the needs of your department, visit: [www.nvfc.org/LODD](http://www.nvfc.org/LODD).



## Appendix B

### Public Safety Officers' Benefits (PSOB) Information

#### PSOB Program

The PSOB Program provides death benefits in the form of a one-time financial payment to the eligible survivors of public safety officers whose deaths are the direct and proximate result of a traumatic injury sustained in the line of duty or certain eligible heart attacks or strokes.

- > As of October 1, 2009, the amount of the PSOB benefit is \$311,810 for eligible deaths. Since October 15, 1988, the benefit has been adjusted each year on October 1 to reflect the percentage of change in the Consumer Price Index. For each death and disability claim, the award amount is solely determined by the actual date of the officer's death or disability. To view past or current benefit amounts, view [PSOB Benefit Chart](#).
- > The PSOB Program provides disability benefits for public safety officers who have been permanently and totally disabled by a catastrophic injury sustained in the line of duty if that injury permanently prevents the officer from performing any gainful work. Medical retirement for a line-of-duty disability does not, in and of itself, establish eligibility for PSOB benefits.
- > As defined by Congress in Public Law 90-351 (Sec. 1217), a public safety officer is an individual serving a public agency in an official capacity, with or without compensation, as a law enforcement officer, firefighter, or member of a rescue squad or ambulance crew. Retroactive to September 11, 2001, chaplains also are included in the PSOB Act definition of a public safety officer.

#### Hometown Heroes

On December 15, 2003, the Hometown Heroes Survivors Benefits Act expanded the circumstances under which public safety officer deaths resulting from heart attacks and strokes may be covered by the PSOB program.

- > The Hometown Heroes Act establishes a statutory presumption that public safety officers who die from a heart attack or stroke following a nonroutine stressful or strenuous physical public safety activity or training, died in the line of duty for benefit purposes.
- > The Hometown Heroes presumption may be overcome by "competent medical evidence to the contrary."
- > The Hometown Heroes Act excludes actions of a "clerical, administrative, or nonmanual nature" from consideration.

#### Additional Information and Assistance

##### Website

The PSOB website is a great resource with detailed descriptions, frequently asked questions, and a PSOB checklist, visit [www.ojp.usdoj.gov/BJA/grant/psob/psob\\_heroes.html](http://www.ojp.usdoj.gov/BJA/grant/psob/psob_heroes.html).

For more information regarding Hometown Heroes, visit

[www.ojp.usdoj.gov/BJA/grant/psob/psob\\_heroes.html](http://www.ojp.usdoj.gov/BJA/grant/psob/psob_heroes.html).

To view additional Line of Duty Death resources, visit [www.nvfc.org/page/657/In the Line of Duty.htm](http://www.nvfc.org/page/657/In_the_Line_of_Duty.htm).

##### PSOB Call Center

The PSOB Call Center is fully staffed Monday through Friday from the hours of 7:00 a.m. 0- 7:00 p.m., Eastern time.

To reach a representative, call 1-888-SIGNL13 (744-6513).



## Appendix C

### Military Standards and Flag Folding Procedures

#### Position of Attention

Assume the position of attention on the command “Fall In” or the command “Attention.”

To assume this position:

- > Bring your heels together smartly so that the heels are on the same line with the toes pointing out equally, forming an angle of 45°.
- > Keep your legs straight without locking your knees.
- > Hold your body erect with your hips level, chest lifted and arched, and your shoulders square and even.
- > Let your arms hang straight, without stiffness, along your sides with the back of the hands outward: curl your fingers so that the tips of the thumbs are along-side and touching the first joint of your forefingers.
- > Keep your thumbs straight and along the seams of your trousers with all fingertips touching the trouser legs.
- > Keep your head erect and hold it squarely to the front with your chin drawn in so that the axis of your head and neck is vertical.
- > Look straight to the front.
- > Rest the weight of your body equally on the heels and balls of your feet.
- > Remain silent except when replying to questions or when directed otherwise.

#### Rest Positions at the Halt

##### Parade Rest

Typically, “Parade Rest” is commanded from the position of attention only. The command for this movement is “Parade, Rest”.

To assume this position:

- > On the command of “Rest,” move your left foot ten (10) inches to the left of your right foot.
- > Keep your legs straight, resting your weight equally on the heels and balls of both feet.
- > Simultaneously, place your hands at the small of your back and centered on your belt.

- > Be sure to keep the fingers of both hands extended and joined, interlocking your thumbs so that the palm of the right hand is outward.
- > Hold your head and eyes facing front.
- > Remain silent and do not move.
- > Change in position may be to return to attention or at ease for dismissal.

*Note: On the preparatory command for attention, immediately assume Parade Rest when at the position of at ease. If for some reason, once a subordinate element is already at attention they remain so and do not execute parade rest on the preparatory command nor does the subordinate leader give a supplementary command.*

##### Stand at Ease

The command for this movement is “Stand at Ease”. On the command of execution, “Ease” execute parade rest, but turn your head and eyes directly toward the commander. “At Ease” or “Rest” may be commanded from this position.

##### At Ease

The command for this movement is “At Ease”. On the command “At Ease” you may move; however, you must remain standing and silent with your right foot in place. “Rest” may be commanded from this position.

##### Rest

The command for this movement is “Rest”. On the command “Rest” you may move, talk, smoke, or drink unless otherwise specified. You must remain standing with your right foot in place. “At Ease” may be commanded from this position.

#### Facing at the Halt

##### Facing to the Flank

Facing to the flank is a two (2) count movement. The command is “Left (Right) Face”.

To execute this move:

- > On the command of execution, “Face” slightly raise your right heel and left toe, and turn 90 degrees to the left on your left heel, assisted by a slight pressure on the ball of your right foot.
- > Keep your right leg straight without stiffness.

- > On the second count, place your right foot beside your left foot, resuming the position of “Attention”.
- > Hold your arms as at “Attention” when executing this movement.

### Facing to the Rear

Facing to the rear is a two (2) count movement. The command is “About, Face”.

To execute this move:

- > On the command of execution, “Face” move the toe of the right foot to a position touching the ground approximately one-half the length of your foot to the rear and slightly to the left of the left heel.
- > Rest most of your weight on the heel of the left foot, and allow your right knee to bend naturally.
- > On the second count, turn to the right 180 degrees on the left heel and ball of the right foot, resuming the position of attention.
- > Hold your arms as at “Attention” when executing this movement.

## Hand Salutes

### Present Arms

The hand salute is a one count movement. The command is “Present, Arms”.

To execute this move:

- > On the command of execution, “Arms” raise the right hand to the forehead and with the tip of the forefinger; touch the rim of the visor slightly to the right of the right eye.
- > The fingers and thumb are extended and joined, palm down.
- > The outer edge of the hand is barely canted downward so that neither the palm nor the back of the hand is visible from the front.
- > The upper arm is horizontal with the elbow inclined slightly forward and the hand and wrist straight.

### Order Arms

“Order arms” from this salute is a one count movement. The command is “Order Arms”.

To execute this move:

- > On the command of execution, “Arms” return your hand smartly to your side, resuming the position of Attention.

### Aligning the Squad

The squad leaders should command the squad to the appropriate interval prior to giving the command for alignment.

To align the squad to “Normal Interval”, the commands are Dress Right, Dress, and Ready, Front. These commands are given only when the men are at “Order” or “Sling Arms”.

- > On the command of execution, “Dress” each man except the right flank man turns his head and eyes to the right and aligns himself on the right flank man.
- > Each man (except the left flank man) extends his left arm and positions himself by short right or left steps until his right shoulder touches the fingertips of the man on his right.
- > On the command of execution, “Front” each man lowers his arm smartly to his side. At the same time he turns his head and eyes to the front and resumes the position of “Attention”.

*Note: If the squad leader desires exact alignment, he marches (on the command of execution, Dress) by the most direct route to a position on line with the squad, “Halts” one step from the right flank man, and “Faces” down the line. From this position, he verifies the alignment of the squad, as necessary, calling them by name or number. The squad leader remains at “Attention” taking short steps to the right or left as necessary, he faces to the half right in marching, returns parallel to the formation, faces to the left, and commands Ready, Front. These procedures also apply when aligning the squad at close or double interval.*

### Aligning the Squad at Close Interval

To align the squad at “Close Interval”, the commands are “At Close Interval Dress Right”, “Dress” and “Ready, Front”.

- > The movement is executed in the same manner prescribed for alignment at normal intervals, except the squad members obtain close interval.

### Aligning the Squad at Double Interval

To align the squad at “Double Interval” the commands are “At Double Interval Dress Right”, “Dress” and “Ready, Front”.

- > These commands are given only when the troops are “Unarmed” or at “Dress”, each man (except the right flank man) turns his head and eyes to the right and aligns himself on the right flank man.
- > At the same time, each man (except the right flank man) turns his head and eyes to the right and aligns himself on the right flank man.
- > At the same time, each man (except the right and left flank man) extends both arms and positions himself by short right or left steps until his fingertips are touching the fingertips of the men on his right and left.
- > The right flank man raises only his left arm and the left flank man raises only his right arm.

### Aligning the Squad in Column

To align the squad in column, the command is “Cover”.

- > On this command, each man (except the number one man) raises his left arm to a horizontal position, fingers extended and joined, palm down, and obtains an arm’s length plus approximately six inches (from the fingertips) to the back of the man to his front.
- > At the same time, each man aligns himself directly behind the man to his front.
- > To resume the position of attention, the command “Recover” is given.
- > On this command, each man lowers his arm smartly back to his side.

### Marching the Squad

- > For short distances only, the squad may be marched forward while in a line formation.
- > When marching long distances, the squad is marched in column.
- > To form a column formation from a line formation, the command is “Right, Face”.
- > When a column formation is originated from a line formation at close interval, the squad may be marched for short distances at the half step with less than correct distance.

- > To obtain correct distance while marching with less than correct distance, the command is “Extend, March”.
- > On the command of execution, “March”, the number one man takes one more 15 inch step and then steps off with a 30 inch step.
- > All other members begin marching with a 30 inch step at the approximate same point as the number one man or as soon as correct distance has been obtained from the man to their front.

### Cremated Remains

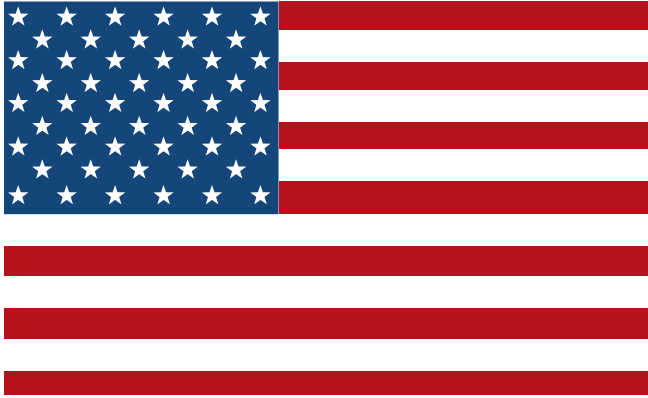
- > When remains are cremated and the ashes interred with military honors, the foregoing instructions will govern, with necessary modifications.
- > Military regulations provide that where the cremated remains are carried by hand one man will be detailed to carry the receptacle containing the ashes. Four (4) other men will function as bearers of the Flag of the United States.
- > When the receptacle containing the ashes is carried from the conveyance into the chapel, from the chapel to conveyance, or from the conveyance to the grave, the flag bearers follow with the flag folded in proper manner and carried by the leading flag bearer on the right.
- > When the receptacle has been placed on the stand before the chancel of the chapel, or in the conveyance, the folded flag is placed beside the receptacle. If the caisson is equipped with casket container for the receptacle, the open flag is laid upon the container as prescribed for a casket.
- > When the remains of the deceased are conducted to a crematory and the ashes are to be interred with military honors later, the ceremony consists only of the escort to the crematory. Arms are presented as the remains are borne into the crematory. The firing of volleys and the sounding of Taps are omitted. However, if the funeral ceremony is held at the crematory and no further military honors are anticipated, the volleys may be fired and Taps sounded at discretion of the commanding officer.



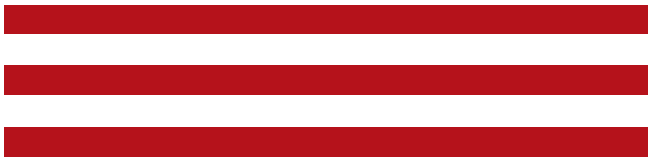
## Flag folding procedures

(Courtesy of the American Legion)<sup>1</sup>

The traditional method of folding the flag is shown below.



A)



Straighten out the flag to full length and fold lengthwise once.

B)



Fold it lengthwise a second time to meet the open edge, making sure that the union of stars on the blue field remains outward in full view. (A large flag may have to be folded lengthwise a third time.)

C)



A triangular fold is then started by bringing the striped corner of the folded edge to the open edge.

D)



The outer point is then turned inward, parallel with the open edge, to form a second triangle.



E)



The diagonal or triangular folding is continued toward the blue union until the end is reached, with only the blue showing and the form being that of a cocked (three-corner) hat.

To view the United States Flag Code for additional information regarding the presentation and use of the American flag, visit: [www.legion.org/flag/code](http://www.legion.org/flag/code).

<sup>1</sup> [www.legion.org/flag/folding](http://www.legion.org/flag/folding)

## Appendix D

### Sample Readings for Funeral Services

*Note: The following readings and prayers are suggestions only. Prayers and readings should reflect the religious beliefs of the honoree and be included only after speaking with the surviving family.*

#### LEADER:

O God, who heals the broken in heart, and binds up their wounds, look in tender pity and compassion upon your servants whose joy has turned to mourning. Leave them not comfortless, but grant that they may be drawn closer to one another and to you by their common sorrow. Fill their souls with the light and comfort of your presence. Grant unto them such a vision of that life wherein all mysteries shall be revealed, and all tears be wiped away, that they may be able to endure. Dwell with them and be their God, until the day breaks and the shadows flee.

We are gathered here on this occasion to pay our respects to a firefighter who has answered his/her final call on this earth. He/she was a loyal member of this association. He/she stood forth as a real man/woman, highly regarded by his brother and sister firefighters.

Let the words of the 23rd Psalm give comfort:

The Lord is my shepherd, I shall not want: He makes me lie down in green pastures. He leads me beside still waters: He restores my soul. He leads me in the paths of righteousness for his name's sake. Even though I walk through the valley of the shadow of death, I fear no evil, for you are with me. Your rod and your staff comfort me. You prepare a table before me in the presence of my enemies. You anoint my head with oil, my cup overflows. Surely, goodness and mercy shall follow me all the days of life, and I shall dwell in the house of the Lord forever.

God's message comes to us from the book of Ecclesiastes, Chapter 3:

There is a time for everything: A time for every occupation under heaven . . . A time for giving birth . . . A time for dying . . . A time for planting . . . A time for uprooting what has been planted . . . A time for suffering . . .

A time for healing . . . A time for tears . . . A time for laughter . . . A time for mourning . . . A time for dancing . . . A time for loving . . . A time for hating . . .

What does man gain for the effort that he makes? I contemplate the tasks that God gives to mankind for labor. All that he does is apt for its time: But though He has permitted man to conserve time in its wholeness, man cannot comprehend the work of God from beginning to end. I know there is no happiness for man except in pleasure and enjoyment while he lives. And when man eats and drinks and finds happiness in his work this is a gift from God.

#### MINISTER:

Let us pray ...

O Lord, we implore you to grant this mercy to your departed servant that he who in his desires served his fellow man may not receive punishment for his misdeeds: So that as charity and love unite him with us on earth, your mercy may unite him with you in heaven. Amen. Let us consider the words of Psalm 90:

Lord, you have been our dwelling place in all generations, before the mountains were brought forth or ever you had formed the earth and the world. From everlasting to everlasting you are God. You turn man back to the dust and say "Turn Back O Children of Men". For a thousand years in your sight are but as yesterday when it is past, or as a watch in the night. You sweep men away: They are like a dream, like grass which is renewed in the morning: In the morning it flourishes and is renewed: In the evening it fades and withers.

For we are consumed by your wrath; we are overwhelmed. You have set our iniquities before you, our secret sins in the light of your countenance. For all our days pass away under your wrath, our years come to an end like a sigh. The years of our life are three score and ten, or even by reason of strength fourscore: Yet their span is but toil and trouble: They are soon gone and we fly away. Who considers the power of your anger, and your wrath according to the fear of you? So teach us to number our days that we may get a heart of wisdom. Return, O Lord, how long? Have pity on your servants: Satisfy us in the morning with your steadfast love that

we may rejoice and be glad all our days. Make us glad as many days as you have afflicted us, and as many years as we have seen evil, let your work be manifest to your servants, and your glorious power to their children. Let the favor of the Lord our God be upon us, and establish you. The work of our hands upon us. Our second scripture reading is taken from St. Matthew:

When the son of man comes in his glory escorted all the angels then he will take his seat on his throne of glory.

All the nations will be assembled before him and he will separate men one from another as the shepherd separates sheep from goats. He will place the sheep on his right hand and the goats on his left. Then the king will say to those on his right hand, "Come you whom my father has blessed": Take for your heritage the kingdom prepared for you since the foundation of the world. For I was hungry and you gave me food: I was thirsty and you gave me drink: I was a stranger and you made me welcome: Naked and you clothed me: Sick and you visited me: In prison and you came to me. Then the virtuous will say to him in reply: "Lord, when did I see you hungry and feed you: Thirsty and gave you drink?" "When did I see you a stranger and make you welcome: Naked and clothe you: Sick or in prison and go to see you?" And the king will answer, "I tell you solemnly, in so far as you did this to one of the least of these brothers of mine, you did it to me."

Let us pray.

O God, who said as long as you did it for one of these, my children, you did it for me, grant a fitting reward to your fireman who has given his time and energy for the good of others. To him who gave up his rest at all hours of the day and night, grant eternal rest: To him who has answered his final alarm on earth, grant a place of refreshment, joy and peace . . . AMEN.

#### **LEADER:**

Because of this man and other firefighters, our lives are free: Because of them our families live: Because of them our homes are blessed. Let us not enshroud their memory with thoughts of sorrow. Tears or words of sympathy cannot bring back the comfort of those loving hands. Only the solemn pride of service to others is theirs who live to remember.

Firefighters and friends, let us here pledge ourselves anew to united service, to consecrate and dedicate our work by a devotion to mutual helpfulness in the protection of those left behind. And finally, to you, the family, the relatives, and the intimate friends of our departed firefighter, we realize how futile are mere words to express our deep and abiding sympathy in your loss. May you be consoled with our promise for continued devotion to firefighting and for the protection of property and life of our fellow firefighters.

#### **MINISTER:**

And now, let us pray together The Lord's Prayer...

Our Father who art in heaven,  
hallowed be thy name.

Thy kingdom come.  
Thy will be done  
on earth as it is in heaven.

Give us this day our daily bread,  
and forgive us our trespasses,  
as we forgive those who trespass against us,  
and lead us not into temptation,  
but deliver us from evil.

For thine is the kingdom,  
and the power, and the glory,  
forever.

AMEN.

#### **LEADER:**

Holy Father, in these moments of remembrance, lift our hearts and minds above the shadowy darkness of death to the light of your presence. We thank you for the life of our comrade now removed from our association. We are grateful for his devotion to a firefighters' duty, for his dedication to the preservation of life and property, for the way he faced danger in his service to the community.

We ask the comfort of your blessing upon his family. May they be sustained by pleasant memories, a living hope, the compassionate friends, and the pride of duty well done. Grant them peace and freedom from fear. Finally, we pray your guidance and strength for those who continue to battle the fiery foe. Grant safety to those who engage in the constant war against the destructive

force of the flame and explosion. Keep them who devote themselves to the work of a firefighter in your hands. So may they be free of the danger of fire . . . AMEN.

**MINISTER:**

The blessing . . .

The Lord bless you and keep you,

The Lord make his face shine upon and give you peace, The Lord lift up the light of his presence upon you,

Now and always . . . AMEN.

*- Prayer Courtesy of the Cumberland County Volunteer Fireman's Association*



**A Firefighters Prayer**

We call upon You for strength and guidance.

Look kindly upon us in our needs.

Teach us to look always to You for assistance,  
as our fellow citizens look to us.

Give us courage, that we may import courage  
to others. Make us studious, and give us pride  
and joy in our work.

When the gong sounds, calling us to duty,  
give us speed and efficiency.

As our siren wails, ride with us through the  
city streets, shielding us from danger.

On the fire scene, may our officers and men  
always work as an honorable, courageous  
and victorious team.

Walk with us through the terror of flame  
and explosion.

May our hearts be always ready if we should  
be summoned before our Eternal Chief in the midst  
of our labors.

Through our ministrations to our suffering  
fellow-men, we dedicate our lives humbly to  
Your praise and glory.

In joy or sorrow, we ask only that You may be  
pleased with our service, that when the Last Alarm  
shall have sounded for us, we may receive  
our eternal assignment with you.

AMEN

*-Author Unknown*



### **A Fire Chief's Prayer**

*(In memory of L. Marvin Mokma, Chief, Holland Fire Dept.)*

I am called to many duties, Lord  
And now I've been called home.

I've had to leave the ones I love  
To stand before your throne.

I'll not complain, it's not my way  
But there are some things I'll ask

And please, Lord, grant them to me  
For the loved ones I hold fast.

I dare to ask because I know  
How you've blessed in the past.

I've learned to trust your grace, O Lord  
That's how I've come this far

So now, O God, I humbly pray, Hear this Fire Chiefs prayer.

Bless my wife and family—so often left alone,  
They knew where I was going and  
Trusted you to bring me home.

Well, now I'm home and wait for them  
Keep them within the faith—that one day,  
Someday, we'll be together in this place.

And O dear God, bless my men  
I trained them as best I could.

I tried to do your will with them  
And lead them as You would.

I need to know You're with them Lord  
Or else how can I stay  
And peacefully enjoy this place of endless day.  
This heaven where there is no night,  
No fire to kill and burn

I guess that's why it's now my rest, my place, my turn.

And Lord, be with my community  
And keep it safe as it can be  
For all its folks are special, and very dear to me.

They are all my friends, and by your grace  
I served them as best I could

So hear this Fire Chiefs prayer, O Lord  
And grant it please — I already knew You would.

AMEN

*- Dennis B. Wilcox, Chaplain, Holland Fire Department*

### Firefighter's Funeral and Graveside Services

*Three (3) strokes on the gong or chimes*

In His infinite wisdom, the Supreme Chief of the Universe has one more sounded to last alarm, and our brother has answered his last call to duty.

When the hour of death comes, it is faith and knowledge that alleviate our sorrow and that comfort us; faith in God and knowledge that He has called our brother home.

God sent our brother into our midst so that we might enjoy his love, his friendship, and his loving devotion--so that we might know his virtues, and bury his imperfections.

Because of these things, we cling to the memory of our pleasant associations with our brother and cherish the hope that when the Supreme Chief sounds that last alarm for us, we shall answer that call to our Father's home and there find our brother waiting to welcome us once more.

\_\_\_\_\_ was born \_\_\_\_\_.  
(Name) (Date)

He was appointed to the Fire Department on \_\_\_\_\_ as a \_\_\_\_\_ on \_\_\_\_\_.

He retired on \_\_\_\_\_ and answered his last alarm on \_\_\_\_\_.  
(Date)

(or answered his last alarm while performing his duty to his fellow men on \_\_\_\_\_). His departmental record shows \_\_\_\_\_ years, \_\_\_\_\_ months, \_\_\_\_\_ days of faithful service. He leaves to mourn: \_\_\_\_\_, \_\_\_\_\_.

We give our love and heartfelt sympathy to the bereaved family and loved ones.

### "Last Alarm" Ceremony

The life of a firefighter is closely associated with the ringing of a bell.

As he (she) begins his (her) hours of duty; it was the bell that started it off. Through the day and night, each alarm is sounded by a bell, that called him (her) to fight fire and to place his (her) life in jeopardy for the good of his (her) fellow man.

And when the fire is out and the alarm has come to an end, the bell rings three times to signal the end.

And now \_\_\_\_\_ has completed the task, his (her) duties well done and the bell rings three times in memory of, and, in tribute to, his (her) life and service.

*Ring bell three times*

## APPENDIX E

### Preparing a Eulogy

The family should decide if there will be a eulogy and who they would like it to be delivered by. The family should also be consulted when deciding where in the service or ceremony the eulogy will fit best. If a eulogy is decided upon, the Family Liaison Officer should make the appropriate contacts and advise the Funeral Officer so the proper arrangements can be made.

Writing a eulogy can be an emotional process. A eulogy should pay tribute to the deceased and offer comfort to surviving family and friends.

When writing a eulogy it is important to:

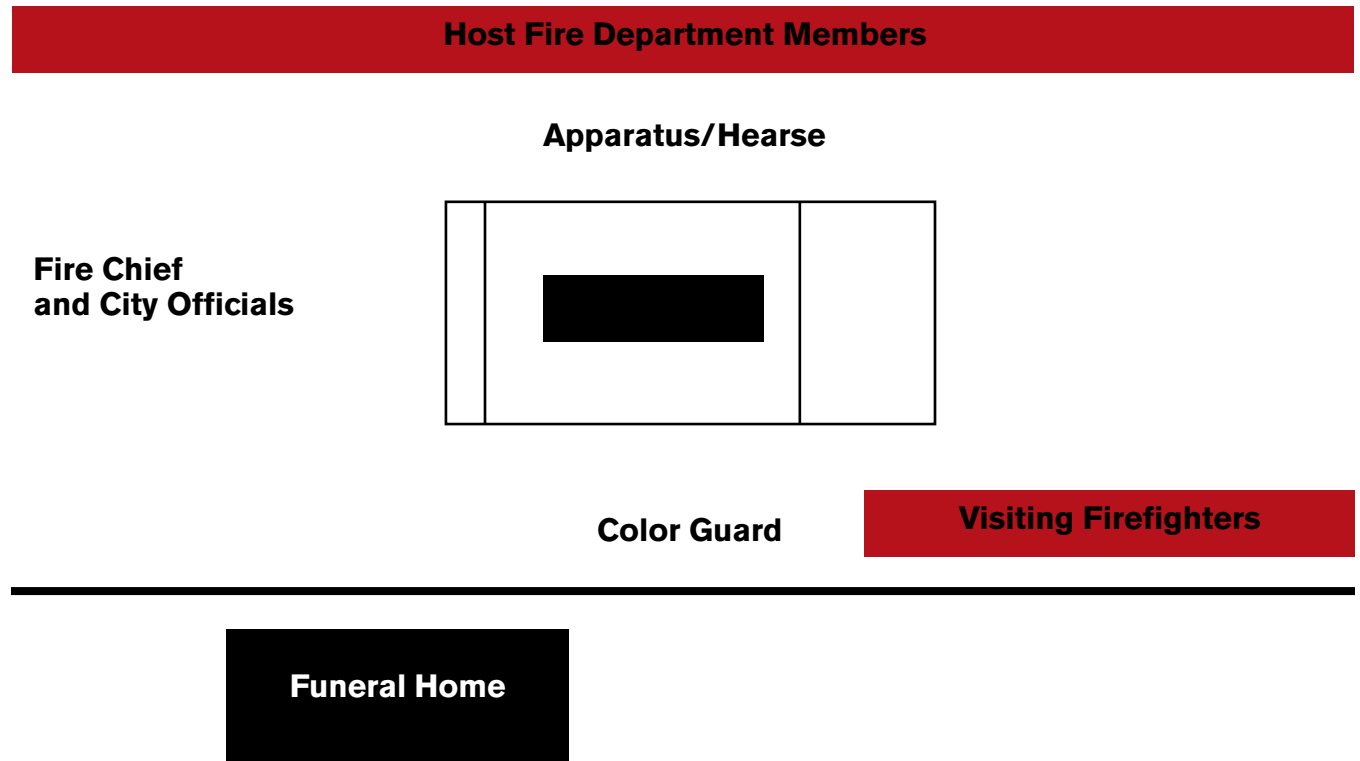
- > Do your research. Talk to family members and friends of the deceased to get a better understanding of their accomplishments, honors and awards, and significant achievements.
- > Include personal stories and anecdotes. If you do not have personal stories or memories, include ones gathered from family and friends.
- > Stick to a theme. Your remarks should have structure and be organized.
- > Prepare a draft. Be sure to offer condolences and acknowledge family members and close friends of the deceased.
- > Celebrate the person's life; don't dwell on their death or the events that lead up to it.
- > Be sure to practice giving your remarks and receive feedback in necessary.
- > Identify someone who would be willing to finish your remarks if you are overcome with emotion.
- > Express the fire department's support for the family.



## APPENDIX F

### Suggested Funeral Formations

*(Courtesy of the Federation of Fire Chaplains)*

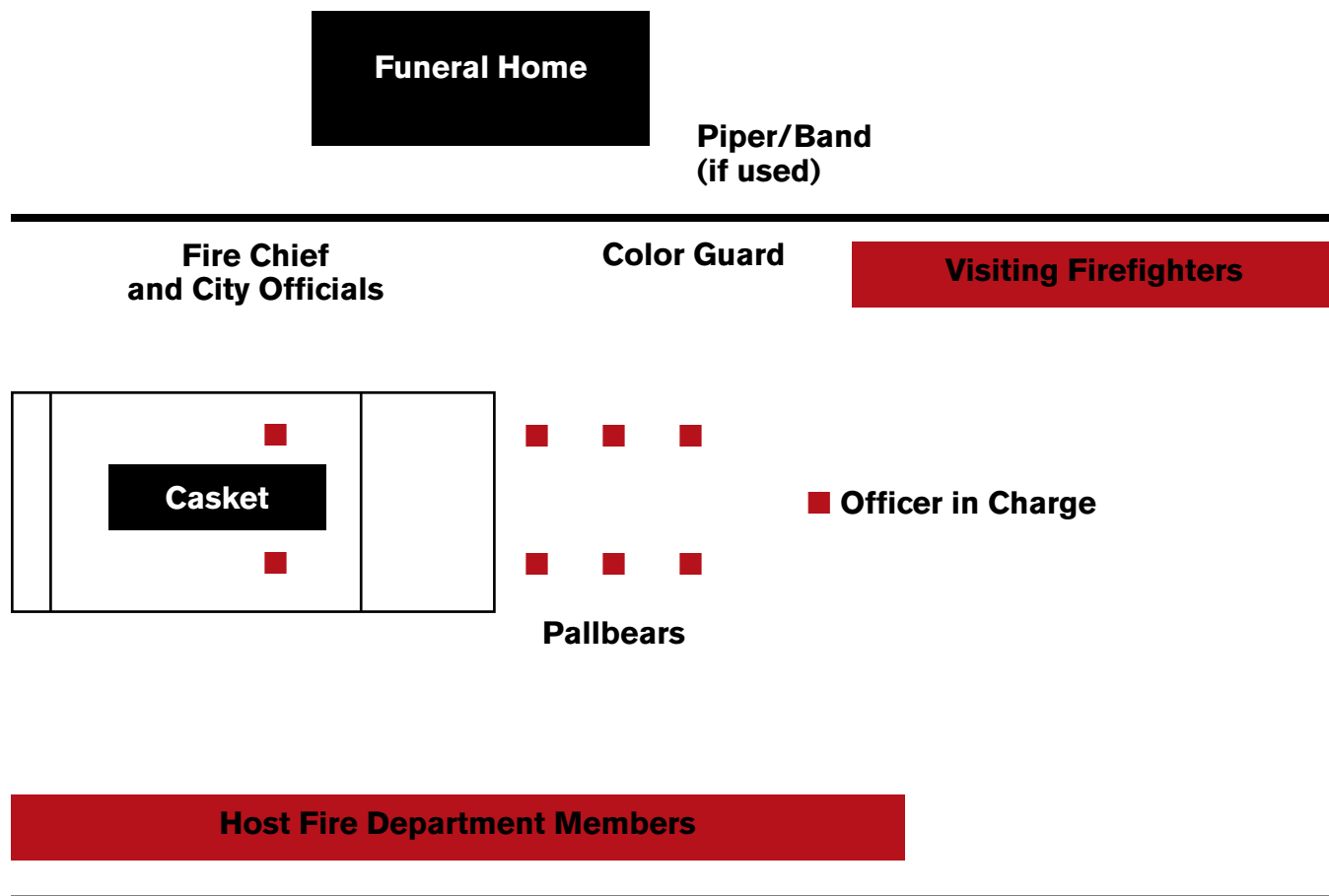




---

## Suggested Church Formations

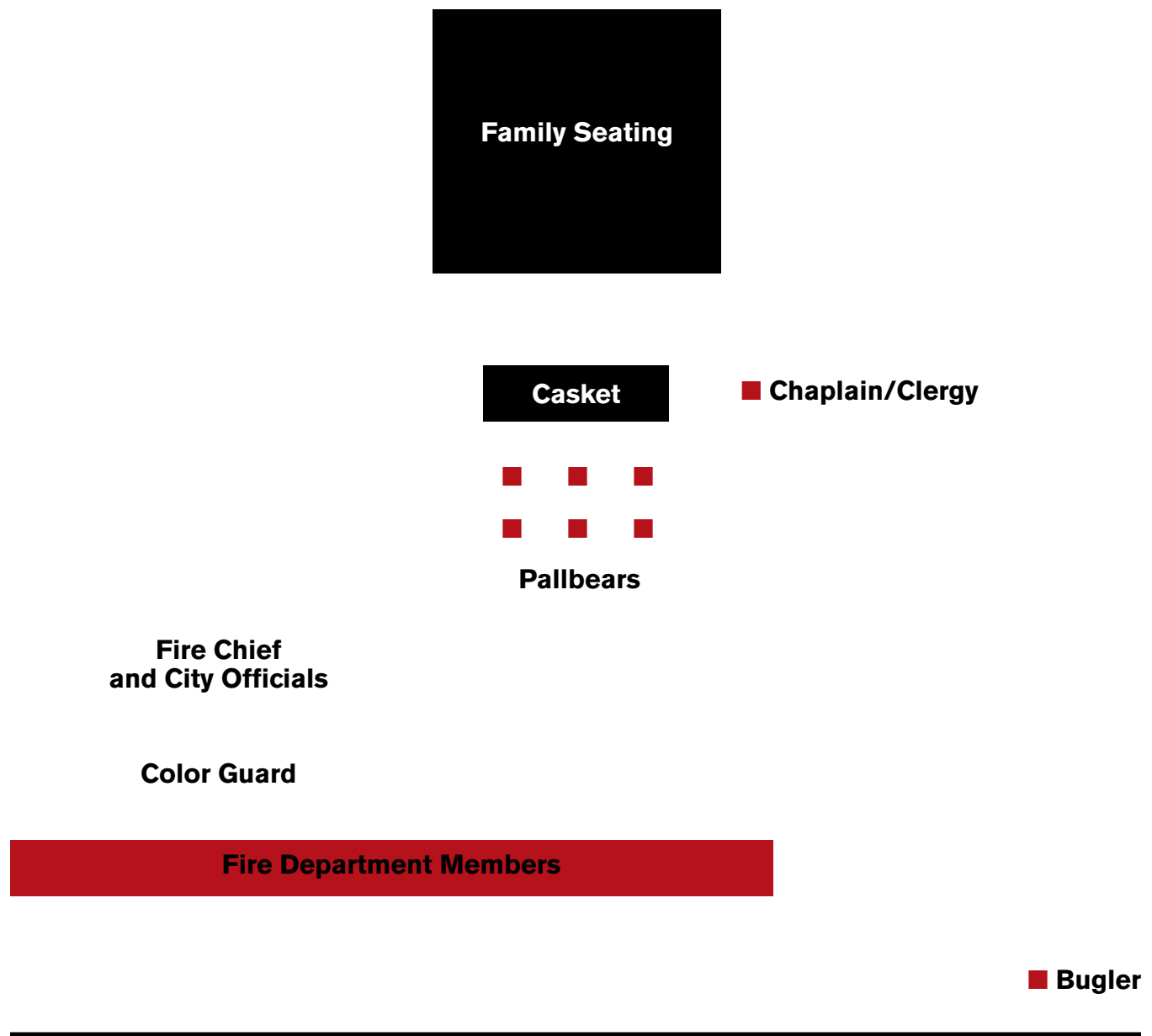
*(Courtesy of the Federation of Fire Chaplains)*



---

## Suggested Final Committal Service Formations

*(Courtesy of the Federation of Fire Chaplains)*

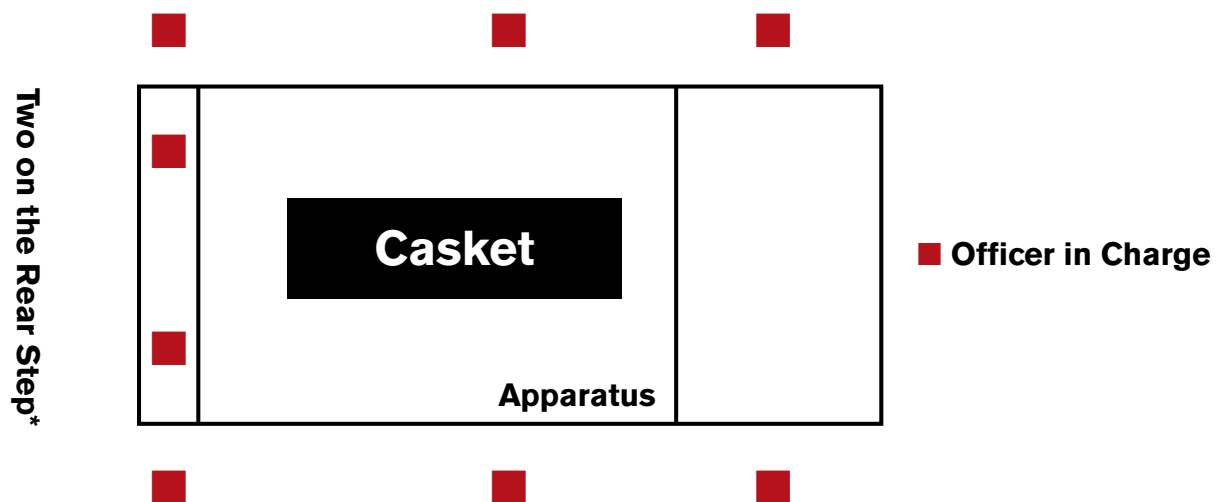


---

## Pallbearers' Location When Marching

*(Courtesy of the Federation of Fire Chaplains)*

---



---

\*Note: Check to see if this practice is allowed in your jurisdiction.

## Appendix G

### Involving Your Fire Corps Team or Auxiliary

Fire department funerals can be complex, stressful, and time consuming. If your department has an active Fire Corps team or other non-operational support group like an auxiliary, they can be utilized to help in the aftermath of the death of a department member. One way they can assist is in the planning and implementing of the funeral service.

Tasks that Fire Corps or other non-operational members can perform include:

- > Work with the funeral home regarding details of having a fire service funeral.
- > Help with the staging of the funeral procession.
- > Coordinate parking at the cemetery.
- > Direct pedestrian traffic to ensure guests and participants know where they need to be.
- > Serve food to members of the department, family and guests after the funeral.
- > Provide clean-up services.
- > Bring food to on-duty department members at the station during the funeral service.

Fire Corps teams and other non-operational support units can be a great asset during a time of loss. Departments can integrate citizen volunteers into funeral procedure planning to help ensure they have the proper personnel in place to deal with a firefighter death.



## Appendix H

### Additional Resources

The following is a list of organizations that provide assistance with preparing for and performing a firefighter funeral:

#### > Wills for Heroes Foundation

The Wills for Heroes Foundation is a nonprofit organization that provides legal documents free of charge to the nation's first responders, including wills, living wills, and powers of attorney. For more information visit [www.willsforheroes.org/](http://www.willsforheroes.org/).

#### > The Lighthouse Uniform Company's Fallen Firefighter Dress Uniform Program

The Lighthouse Uniform Company's Fallen Firefighter Dress Uniform Program seeks to provide Class A uniforms for burial purposes to firefighters killed in the line of duty. There is no charge for the uniform, only freight. For more information visit [www.lighthouseuniform.com/fallenffprogram/](http://www.lighthouseuniform.com/fallenffprogram/).

#### > The National Fallen Firefighters Foundation

The National Fallen Firefighters Foundation offers several programs and resources for departments to prepare for and handle a line of duty death. To access resources and information for departments visit [www.firehero.org/resources/departments/](http://www.firehero.org/resources/departments/).

#### > International Association of Fire Fighters

The International Association of Fire Fighters has several resources dealing with line of duty deaths for union members. To access these resources, visit, [www.iaff.org/HS/LODD/index.html](http://www.iaff.org/HS/LODD/index.html).

#### > The International Association of Fire Chiefs

The International Association of Fire Chiefs has several downloadable resources for line of duty deaths located under their Safety and Health Section on their Documents to Download page. To access these resources visit [www.iafc.org/displaycommon.cfm?an=1&subarticlenbr=20](http://www.iafc.org/displaycommon.cfm?an=1&subarticlenbr=20).

#### > The Federation of Fire Chaplains

The Federation of Fire Chaplains is a nonprofit organization that provides guidance for departments to cultivate successful chaplaincies. The Federation provides resources from how to start a chaplaincy program to how to administer aid, comfort, and counsel in times of hardship. To access these resources, visit [http://firechaplains.org/?page\\_id=168](http://firechaplains.org/?page_id=168).



**National Volunteer Fire Council**

7852 Walker Drive, Suite 450  
Greenbelt, MD 20770

[www.nvfc.org](http://www.nvfc.org)

©2010



## *Contents*

*This guide is intended to assist fire departments in planning and conducting an investigation of a line-of-duty death. The same procedures are applicable to other situations that require a thorough investigation with a focus on occupational safety and health, including serious accidents, injuries and situation where a death or serious injury is narrowly averted.*

- Introduction
- Objectives
- Complicating factors
- The Investigation Team
- Investigative Authority
- Team Members
- Immediate Actions
  - Isolate the Scene
  - Impound Evidence
  - Document Safety Equipment
  - Photograph the Scene
  - Arrange for an Autopsy
  - Identify Witnesses
- Second-Stage Actions
  - Conduct Interviews
  - Obtain Records
  - Develop a Time Line
  - Examine Physical Evidence
  - Research Documents
  - Get Expert Assistance
  - Obtain Legal Advice
- Analyses and Report Development
- Report Presentation
- Cooperation With Other Agencies
- Appendix A
  - Other Participation
- Appendix B
  - Related Information



## *Introduction*

Investigation of a line-of-duty death of a member is one of the most difficult and important activities that must be conducted by a fire department. This difficulty is compounded by the fact that the investigation must usually be conducted under extremely stressful circumstances and often under pressure for the rapid release of information. It is important for every fire department to have a plan and to be prepared to conduct such an investigation.

The procedures of a line-of-duty death investigation can and should be applied to other situations, particularly accidents that result in serious injuries, or incidents that could have resulted in death or injury under slightly different circumstances. A "close call" should be interpreted as a warning to prevent the same situation from happening again and to ensure that all protective systems are adequate and functional.

A thorough investigation will require both time and effort. It is important to discover, identify, research and fully document every causal factor or potential causal factor. The investigation should focus on factual information. It should present the facts of what happened, identify the causal factors and recommend appropriate corrective actions. In many cases there will be conflicting theories and opinions about the incident. There may also be a number of very different accounts from witnesses and individuals who were involved. The investigation should follow up on every lead or theory to discover the actual facts, as precisely as they can be determined.

The visible product of an investigation is a report, usually in printed form, including photographs, illustrations and diagrams to fully document the incident and the conclusions and recommendations that are reached through the investigative process. The printed document is often supplemented by videotapes, audiotapes, and physical evidence. This official report document may be accompanied by materials that will assist in presenting the report to a live audience. The most important application of an investigation, however, is the manner in which the conclusions and recommendations are used and applied to prevent future accidents and injuries.

It may be necessary to work with outside agencies or to involve independent experts to assist with the investigation of an incident. The involvement of other organizations and need for specialized assistance will depend on the nature of the incident, legal or statutory considerations, the capabilities of the fire department, and other circumstantial factors. Several organizations that could be involved in an investigation are listed in this document.



## *Objectives*

The investigation of a line-of-duty death may serve several different purposes. The most important objective, in every case, is to prevent the same situation from occurring in the future. We should never be satisfied until we can be sure that we are doing everything in our power to prevent accidents, injuries, occupational illnesses and line-of-duty deaths.

### **Primary Objectives**

1. To determine the direct and indirect causal factors which resulted in a line-of-duty death, particularly those factors that could be used to prevent future occurrences of a similar nature, including:
  - Identifying inadequacies involving apparatus, equipment, protective clothing, standard operating procedures, supervision, training, or performance
  - Identifying situations that involve an unacceptable risk
  - Identifying previously unknown or unanticipated hazards
2. To ensure that the lessons learned from the investigation are effectively communicated to prevent future occurrences of a similar nature. (When appropriate, this should include dissemination of the information through fire service organization and professional publications.)

### **Additional Objectives**

3. To satisfy the requirements of the Public Safety Officer Benefits (PSOB) Program and other entitlements (see pages 31-40 of this manual).
4. To identify potential areas of negligence and causal factors that could result in criminal prosecution or civil litigation.
5. To ensure that the incident and all related events are fully documented and evidence is preserved to provide for additional investigation or legal actions at a later date.
6. To provide factual information to assist those involved who are trying to understand the events they experienced.
7. To provide the information to other individuals and organizations that are involved in the cause of fire service occupational safety and health.



## *Complicating Factors*

Investigations are often complicated by factors and situations that could cause the investigation team to lose sight of the true objectives and damage the credibility of the completed report. The investigators must have a firm understanding of their mission and must have the support and independence necessary to perform a thorough and unbiased investigation.

The investigation team may be placed in the uncomfortable position of investigating the actions of friends, co-workers and superior officers. There may be pressure to find a particular individual or one isolated act or omission responsible for the fatal incident. There may also be a desire to absolve an individual of responsibility or to protect the reputation of the fire department. Emotional reactions are natural when a fatality occurs and they can be magnified when accusations are made or when an individual feels personal responsibility. The investigation should attempt to separate the emotions from the facts and present an unbiased analyses of the incident.

The mission of the investigation team must be directed and limited to finding facts and developing recommendations that are based only on the facts. Any instruction that attempts to alter the mission is inappropriate and any suggestion that a bias or cover-up is involved is a serious accusation.

A report that is based on factual information should speak for itself. The facts should be documented and available for review and the conclusions and recommendations should be clearly supported. In most cases a series of contributing factors will be found, leading to a number of recommendations.

Accusations of negligent acts and determinations of personal responsibility or liability are beyond the scope of a fact-finding report. If the report presents facts that lead to a conclusion of this nature, it is up to administrative, regulatory, or legal bodies to initiate appropriate actions.

There are times when significant facts cannot be determined with certainty. The actions of the victim may have been based upon circumstances that only the victim could describe. Other factors may be subject to conflicting theories or contradictory evidence. In these situations it is up to the investigation team to investigate as thoroughly as possible and to differentiate, in the report, between established facts and speculation or expert opinion. A report should never be based on unsupported assumptions.

A further complication may arise if there are any suggestions of criminal responsibility for an incident. In these situations it is essential to work closely



## LODD Response Plan

---

with the appropriate law enforcement agencies to coordinate activities and share information during the investigation. This will depend on the nature of the suspicion and the relationship between the investigating agencies. In most cases it is possible to develop a positive working relationship that allows the investigation of both aspects of the situation to proceed.



## *Investigation Team*

An investigation of a line-of-duty death is not a job for one individual. A thorough investigation will usually require at least 3-5 individuals and may involve a larger team. The fire department should have a plan that identifies an investigation team that will be immediately activated when an incident occurs. Designated team members should respond to the scene of the incident to begin the investigative procedures as soon as possible.

The plan should identify more than one potential team leader and several potential team members. The assignment process should be planned and documented based on the availability of designated individuals and particular circumstances of the incident. The team members should be immediately reassigned from their regular duties to devote their full efforts to the investigation. In larger departments there may be a duty roster system or a primary designated individual and number of potential alternates. Smaller departments may plan to work together, assembling a team from a mutual aid group or from more than one agency.

The ideal team leader should be thoroughly familiar with fire department operations, with health and safety issues, and with investigative techniques. Because few individuals possess true expertise in all three of these essential areas, the team should be assembled to combine the abilities of different individuals who can contribute to the project. The fire department safety officer should be a member of the team and may be the best choice to be the team leader. The team leader should be the individual who is most capable of managing and leading a group effort with these and other needed abilities.

## *Investigative Authority*

One of the most important considerations in appointing the team leader is to delegate the necessary authority to conduct a complete and thorough investigation. While the fire chief has the ability to assign and delegate the authority to any member of the department, a team leader who holds command or management level rank can usually function more efficiently in gaining cooperation and coordinating team efforts. The individual should also be respected for expertise, impartiality and conscientious work. No other officer should have the authority to interfere with the investigation.



## *Team Members*

A list of potential team members should be maintained, based on individual abilities and qualifications. At least one member of the team should be trained and qualified in investigative procedures, preferably with specialized training in accident and injury investigation. A trained and qualified fire investigator or accident investigator can provide the other team members with guidance on the proper collection and preservation of evidence, managing interviews and preparing investigative reports.

The team should include members who are very familiar with the type of activities and hazards that were involved in the incident, with the safety procedures that should apply to the situation, and with the organization and operations of the department. Additional capabilities that may be needed include photographers, video specialists, and experts in other areas that may apply to the particular situation. Some of these individuals may not need to be assigned to the team on a full time basis if their skills are available when needed.

It may not be possible to find all of these qualifications within the fire department. For example, a traffic accident involving fire apparatus will require an individual who is qualified to investigate accidents involving heavy trucks. This individual may have to be “borrowed” from a state or local police agency or it may be necessary to contract with a private investigator.

One of the first concerns of the team leader will be to identify the individuals or the particular capabilities that will be needed to investigate the incident. The plan should identify individuals who would be called upon, depending on the specific situation. If the plan does not identify anyone with expertise in the particular area of concern, one of the highest priorities will be to locate and engage the services of a qualified individual. The plan should provide a mechanism to quickly arrange for the services of any outside assistance that could be needed. The local law enforcement agency may be able to provide valuable assistance, particularly in managing and documenting evidence.

The plan should provide for the immediate response of a designated or provisional team leader and at least one or two additional team members when a fatal incident occurs. The remaining team members should be reassigned from their regular duties to the investigation team within 12-24 hours.



## *Immediate Actions*

There are several actions that should be implemented immediately when a line-of-duty death or a serious accident occurs.

### **The Incident Commander should direct the following actions:**

#### **1. Isolate the Scene**

The scene of the incident should be secured and guarded; only those individuals who have a specific reason to enter should be allowed inside the perimeter. An officer and as many members as are necessary should be assigned to secure the scene. Police assistance may be necessary to establish and maintain scene security. Senior officers should respect the need to preserve the scene for the investigation team and not use their privilege of rank to violate the perimeter.

The sooner that isolation is implemented, the easier it will be to investigate the scene and to account for any disruptions of the physical evidence. The only reasons to violate this rule would be to provide medical treatment in an attempt to save the victim or to control a fire that could destroy the evidence. If an obviously dead body is present, the scene should be left undisturbed for the investigators. The scene should be maintained until all physical evidence has been documented, photographed and measured.

#### **2. Impound Evidence**

All items that could have a bearing on the investigation should be impounded and protected until they can be turned over to the investigation team. In the case of a fire fatality, items such as protective clothing and breathing apparatus will be extremely important in the investigation. Physical evidence should be handled in the same manner as evidence from an arson investigation or criminal investigation. A qualified fire investigator would usually be the most appropriate team member to manage the physical evidence.

Every reasonable effort should always be made to rescue, treat, and transport a victim to a hospital, if there is any possibility of preserving life. In this process protective clothing, breathing apparatus, and other items may be removed from the victim and could be easily misplaced. The Incident Commander should immediately assign someone to take custody of any items that are removed from the secured area and to turn them over to the investigation team. Any necessary movement of evidence should be noted and recorded.

#### **3. Document the Condition of Safety Equipment**

Information relating to the performance of protective clothing, breathing apparatus and other safety equipment is extremely significant in fatalities that occur during fire suppression operations and hazardous materials incidents. This



information should be documented by written notes and supported by photographs. If the victim must be moved, or if it is necessary to remove protective clothing and equipment before the investigation team arrives, it is important to note the condition of pertinent items.

### **Questions on the Condition of Safety Equipment\***

\*Note: This list would apply to a firefighter who died in a fire suppression incident. A similar set of concerns would apply to any other type of situation.

#### ***Breathing Apparatus***

Was the victim wearing SCBA?  
Was the face piece in place?  
Was there pressure remaining in the air cylinder?  
Were the valves in their normal positions?  
Were straps and other components in their normal use configuration?  
Was there any visible damage to the SCBA?  
Were any components missing?  
Where were they found?  
How old was the SCBA?  
When was the last test?  
If needed, were the repairs made?

#### ***Personal Alert Safety System (PASS) and Radio***

Was the victim carrying a PASS device?  
Was it turned on, and how do you know?  
Was it functioning when the victim was found?  
Did the victim have a portable radio or any other equipment?  
Where was it found?  
Was it in operable condition?

#### ***Protective Clothing***

Was the victim wearing full protective clothing?  
Was any protective clothing damaged?  
Had the victim removed any item of protective clothing?  
Where was it found?  
Did the victim have/wear all the required personal protective equipment?

### **The investigation team should implement the following steps:**

#### **4. Photograph the Scene**

The scene should be diagrammed and photographed in the same manner that a crime scene would be documented. Large color prints are the preferred method of documentation. If the fire department does not have a qualified photographer, a police photographer should be requested to provide this service, under the



direction of the team leader. All photographs should be delivered to the team leader.

**5. Arrange for an Autopsy**

An autopsy should be conducted for every line-of-duty death. If the death is fire-related, the medical examiner should be requested to look particularly at blood gases, including carboxyhemoglobin levels and other products of combustion. An alcohol level test is also necessary to meet the requirements of the Public Safety Officer Benefits Program (see pages 31-40 of this manual).

**6. Identify Witnesses**

It is often impossible for the investigation team to interview all of the witnesses at the scene or immediately after the incident. The immediate priorities should be to obtain essential information from individuals who were directly involved and to identify witnesses for later follow up.

## *Second-Stage Actions*

The immediate actions will generally require several hours and should be conducted according to a documented and established plan. The second stage will usually begin on the following day, when the full investigation team meets to plan the remainder of the investigation and to make assignments for different functions. It is up to the team leader to identify the resources that will be needed and to establish a plan to manage the investigation. There will be information to gather and analyze, witnesses to be interviewed, references to be checked and a report to be prepared.

**7. Conduct Interviews**

Full interviews should be conducted with every fire department member involved in the event. At a major incident this may have to be confined to those who were at the scene at the time of the fatal event or who were in any way involved with the victim before or during the event. All interviews should be recorded, with the consent of the witness (record that, too), and notes should be documented. The list of witnesses to interview will often grow as different leads are followed. Anyone who has information that could be significant should be encouraged to inform the investigation team and every contact should be interviewed, including members of the general public.

One objective should be to locate and interview anyone who makes a statement reported in the news media. These statements often confuse the issues in the early stages of an investigation; finding the person who made a statement is usually the best way to determine its accuracy. The team should obtain and review copies of all news broadcasts and published accounts of the incident.



The reporters themselves should be interviewed, if their reports suggest some factor not consistent with the information found by the team. These individuals should be approached as any other witness—by requesting their assistance in determining exactly what happened.

### **8. Develop a Time Line**

The compilation of records, radio tapes and other data should allow the team to establish a basic time line for the incident. The time line establishes the sequence of events chronologically, sometimes to the second. Additional information should be added to the time line as it is obtained, until the time line can be used to fully describe:

*...who did what, and who saw what,  
...at what location, and at what time?*

This is one of the basic building blocks of an investigation process. In establishing a time line it is important to synchronize the time base for different records. Misleading information may result if times are compared from different sources, assuming that the clocks were synchronized at the time of the incident. The investigation team should verify the times that are recorded for a verifiable simultaneous event and apply the appropriate correction factor to all other time measurements.

### **9. Examine Physical Evidence**

All physical evidence, including protective clothing and equipment that was impounded at the scene, should be thoroughly examined by qualified personnel. All findings should be thoroughly documented and photographed. It may be necessary to have certain items inspected or tested by qualified experts or by testing laboratories. It is important to maintain the chain of custody for all physical evidence as it is examined by different individuals and to ensure that reports are obtained and the items are returned to a secure area.

### **10. Research Documents**

All existing departmental standard operating procedures, training materials, and similar sources of guidance that would apply to the situation should be reviewed to determine:

1. How the situation “should” have been handled.
2. Whether or not it was handled in the expected manner.
3. Whether or not this would have had an impact on the outcome.

Records should be examined to determine if the individuals involved had received the proper training in the relevant topics.

All applicable NFPA standards, ANSI standards, OSHA regulations and similar information that could relate to the events should also be studied. NFPA annual reports on firefighter deaths and injuries should be consulted to determine if





similar situations have occurred in other departments and the conclusions from those reports should be compiled. If possible, the full reports from those incidents should be obtained.

Where equipment or apparatus is involved, specifications and maintenance records should be obtained. Operators should be asked if any problems were previously noted and a determination should be made if required inspections and repairs had been completed on schedule. Talk to the maintenance crew.

### **11. Expert Assistance**

There are several situations that will require the assistance of qualified experts. Apparatus failures, particularly those that involve aerial devices, should be examined by mechanical engineers and metallurgists who are qualified to determine the specific cause of the failure. Breathing apparatus should be examined and tested, if it was involved in any manner (see Appendix B).

Expert assistance is available in many different areas. If the needed expertise is not available within the fire department, it is an excellent investment to find the best individual to assist the team in specific areas or to be part of the entire investigation. Where an incident has become extremely controversial, it may be advisable to have a recognized independent investigator participate in the investigation or review the evidence to develop an independent report.

### **12. Obtain Legal Advice**

Legal issues will involve nearly every aspect of a line-of-duty death investigation. Where potential criminal action is a possibility, the safety investigation should be independent, but must be coordinated with the appropriate law enforcement agencies. Issues of potential liability, including product liability and possible violations of occupational health and safety laws, will be a consideration in almost every case. These factors should not be allowed to restrict the investigation, but it is advisable to consult an attorney and to have the report reviewed by the fire department's attorney before it is released.



---

## *Analysis & Report Development*

There is no magic formula for how to compile and analyze all of the data necessary to conduct a thorough investigation and prepare a report. It requires time and effort to fully understand, prepare, and develop a comprehensive report on a complicated situation. The team members should work toward a full understanding of the events that occurred, the responsibilities and actions of key individuals, the factors that made the department vulnerable to a fatal incident, and the actions that should have been taken or should be implemented now to prevent a similar occurrence in the future.

Every component of the “puzzle” should be followed back to its root cause. For instance, the evidence may suggest that an individual was not properly trained to handle a particular situation. This should be followed back to determine if the training was available, if the individual was trained, was trained in an improper procedure, or had taken action that was inconsistent with training that had been provided. This could lead to a recommendation for refresher training, for training in a new area, for a change in the procedure that training is based upon, or for a system to ensure that members attend all training classes.

Every contributing or suspected contributing factor should be followed back to a conclusion and tied in with all of the other factors to develop a complete report. The investigation team should continue its efforts until the team members are satisfied that they fully understand what happened, why it happened, and what steps need to be taken to prevent a similar occurrence in the future.

The information should be compiled into a written document, supported by photographs, diagrams, and supporting data to fully present the facts of the incident. Additional supporting information should be maintained in the investigation files.



## *Report Presentation*

The report should be presented to the fire chief as a completed document. In most cases, the presentation of the document should occur at a meeting with all of the team members present. The team leader should present an overview of the report, including all conclusions and recommendations, using audio-visual aids to illustrate the presentation. The fire chief and other staff members should be prepared to ask questions of the team members.

The report should also be presented to the fire department Health and Safety Committee. In most cases the majority of the investigation team members will be members of the Health and Safety Committee or directly involved with the committee's functions. The Health and Safety Committee should be involved in the development of the investigation procedure and plan.

The Health and Safety Committee should review the full report, paying particular attention to the recommendations to prevent future occurrences of a similar nature. As a representative body, the Health and Safety Committee adds credibility to the investigative process and to the final report. The committee should be asked to endorse the recommendations of the investigation team. The Health and Safety Committee should have the option to request the fire chief to refer the report back to the investigation team, if the report is considered inaccurate or inadequate or if the recommendations are not feasible. The ultimate responsibility is the fire chief's.

A special presentation of the report for the members who were involved in the incident should be considered. This should be discussed with the critical incident stress team to determine if there are individuals who would have a difficult time attending such a presentation. In most cases, the presentation and discussion of the report with the members involved will help to bring closure to the situation. The final report should then be released to the department. This may involve printing and distributing a document or a presentation by the team at a training session. Every member of the department should see the final report or a presentation of its major points.

Under most state laws, the release of the completed report makes it a public document, accessible to the news media and any interested party. Supporting documents and evidence that remains in the investigative file may or may not be accessible. If there is a known media interest in the report, copies should be made available to reporters who have requested it. Copies should also be sent to organizations that are involved in fire fighter health and safety, including the United States Fire Administration, National Fire Protection Association, and International Association of Fire Chiefs. Copies should also be sent to other fire



departments that have requested information on the incident and to all individuals and organizations that provided assistance in the investigation. (see Appendix A)

**Restricting Release**

While one of the basic principles contained in the procedure is the value of conducting an open investigation and sharing the results for educational purposes, there will be cases where the possibility of litigation being brought against the department is a major concern. In these cases the attorneys representing the fire department will probably be strongly opposed to releasing any potentially damaging information. Anything that the investigation team finds in its investigation could potentially be used against the department and, under litigation discovery procedures, the department can be forced to release all observations and reports, including all evidence compiled in the investigation. The department may be forced to release information even if it has proven to be inaccurate through the internal investigation. There may be certain privileges or other restrictions regarding release of the report. These privileges may arise from privacy laws and be applicable to the description of the decedent and bar release to any but the decedent's representatives, or bars release if the report bears upon a criminal investigation, or under certain limited circumstances if the report is produced as a result of a critical self-analysis designed to identify methods of improving operations. Any restrictions on the release of the report should be coordinated with the department's attorney.

The concern over discovery should never restrain a fire department from taking corrective action to avoid another incident. The courts have generally found that taking action based upon knowledge gained from an adverse incident to prevent a recurrence of an event is not an admission of responsibility for the original event. Conversely, corrective action which was recommended, but not implemented, prior to the incident may be construed to be evidence of negligence and possibly even gross negligence. The decision of when to release final report will have to be determined through discussions between the fire chief and the attorneys.

**News Media**

The news media often generate an atmosphere of tension around an investigation, fueled by the speculation and accusations that may surround an incident. The possibility that an individual may have been negligent or that some inappropriate act may have caused a death makes an excellent news story, particularly when fire department members are willing to be quoted. These same feelings may come to the surface when an investigation is perceived as a "cover-up" or a "witch hunt," which does not help any situation.

Media inquiries should be directed to the team leader or the department's Public Information Officer (PIO). While the investigation is in progress, it is appropriate



## LODD Response Plan

---

to provide information on how the investigation is being conducted. No findings should be released until the full report is completed and reviewed. Certain information, such as the medical examiner's report, will be released as public records at the same time they are available to the investigation team.

When the time comes to release the final report, copies should be made available to the news media through the Public Information Officer (PIO). The PIO may recommend a press conference or for the team leader to be available for interviews, if there is a high level of news interest in the report.

In some cases it will be necessary to interview reporters who covered the incident as witnesses. News photographs and videotape have been valuable in several investigations and most news organizations will provide copies if the department will make an official request with assurance that they will be used only to support the investigation and subsequent training objectives.



---

## *Cooperation With Other Agencies*

A line-of-duty death will require a high level of cooperation among the fire department investigation team and other agencies and organizations that will be involved in investigating or seeking information on the incident. This may include organizations that have a statutory authority or responsibility to investigate the incident and others that have legitimate reasons to be involved or to be interested in the results. There may also be organizations that are requested to assist the fire department investigation team. The best policy is to be extremely cooperative with other agencies that have a recognized reason to be involved in the investigation.

The investigation team assigned by the fire chief should be the authority having jurisdiction over the internal investigative process. If the incident is a fire, the investigation team should be on the scene before fire department operations are completed and should retain control of the scene as long as is necessary to conduct the investigation. If it is not a fire incident, control of the scene may fall within the jurisdiction of another agency and the investigation team will have to seek their cooperation to complete its on scene research.

If the incident is vehicle accident or a situation where some other agency has primary jurisdiction for the investigation, the team leader will have to establish a close liaison with that agency. Most public agencies will recognize the need for the fire department to conduct an investigation and will work cooperatively with the investigation team.

### **Fire Cause Investigator**

A fire cause investigation may be carried out concurrently with the safety investigation. If there is evidence of arson or other criminal acts, the situation will become much more complicated. The investigation of the safety factors involved in the incident must continue, while a high level of coordination is provided with fire investigation and law enforcement investigators. The fire department should retain custody of the scene until both sets of investigators have completed their examination and gathering of evidence.

The best approach to a situation that involves parallel fire cause and safety investigations is to meet with the law enforcement agencies and establish a cooperative relationship. There is no reason to compromise a fire cause investigation, particularly where there is a possibility that criminal activity is responsible for the death of a firefighter; nor should a criminal investigation stand in the way of the safety analysis. The two activities can sometimes be completed independently, where the area of origin and the area where the death occurred



are physically separate. In other cases the investigations can be mutually supportive.

Where a possible arson investigation is involved, the investigation team may have to carefully control evidence and limit the release of information until the law enforcement authority having jurisdiction is comfortable having it released. In most cases the criminal issues, particularly the specific cause of a fire, will not be critical issues in the safety investigation and the release of a safety report should not compromise a criminal prosecution.

**Medical Examiner**

In most areas the medical examiner or coroner has the responsibility to make the official determination of cause of death and may send an investigator to the scene. The on-scene investigative responsibility is sometimes delegated to the police agency. These investigators are generally not experts at investigating fires or fire deaths and will usually be pleased to work with the fire department team to gather their information.

The remains of the deceased should be turned over to the medical examiner for an autopsy. The Public Safety Officer Benefits Program requires certain tests to be reported by the medical examiner and the list should be provided before the autopsy. The results of the autopsy should be incorporated into the investigation report.

The U.S. Fire Administration published a standard protocol for a firefighter autopsy in 1995. The publication focuses on the specific causal factors that are of concern in a line-of-duty death, particularly relating to toxicity and thermal injuries. It is a good idea to establish a relationship with the medical examiner when developing the investigation procedure, since the pace of events when an incident occurs makes this a poor time to explain the need for a special autopsy.

**OSHA**

The employer is usually required to notify the state agency that is responsible for occupational safety and health, or the Occupational Safety and Health Administration of the federal government, of any line-of-duty death. (This will depend on the relationship between the state agency and the federal Occupational Safety and Health Administration.) In most cases this agency will send an investigator to prepare a report on the incident. The orientation and approach of the investigating agency varies considerably from one state to another.

The role of OSHA is primarily to investigate the employer on behalf of the employee. The investigation is intended to determine if the employer was in violation of occupational safety and health laws in a manner that could have



## LODD Response Plan

---

caused or contributed to the death or injury of the employee. The employer is usually considered to be responsible for any violation, even if the victim's own negligence caused the accident, because it is presumed to be the employer's responsibility to ensure the employees comply with all health and safety regulations. The employer may be fined or subject to other penalties if violations are found.

The OSHA investigation may take one of several courses. The OSHA investigator will usually invite the union to participate in any discussion relating to the investigation as the representative of the employee. In many fire departments, the union and the department have a joint commitment to an effective health and safety program and share an equal interest in determining causal factors and corrective actions. Where there has been labor-management conflict, particularly over health and safety issues, an OSHA investigation may become a tense situation for management.

The OSHA investigator may not be extremely familiar with fire department standard operating procedures and may have to rely on fire department members to explain the standard operating procedures and to help interpret the regulations that apply. The best policy is usually to be open and cooperative, to demonstrate to the investigator that the department is not trying to conceal anything and is dedicated to a full and open investigation. In many cases, an open invitation to participate and to share in the conclusions of an investigation has created a positive relationship with OSHA investigators.

An OSHA investigator may insist on conducting a completely independent investigation or may refuse to work with management investigators. In some cases the investigator may appear to be committed to finding fault with the department for violations ranging from minor to major. This can create a very difficult situation for the investigation team and requires sound legal advice. This should not deter the fire department from conducting its own thorough and honest investigation and from being willing to share the results with other investigating agencies, although the city attorney may insist on reviewing any report before it is released.

Unfortunately, in some cases, the OSHA report has cited the fire department for violations that were insignificant or imagined because of investigators who were unfamiliar with fire department operations and applicable standards. In other cases major violations have been overlooked. These situations are often difficult to avoid and even more difficult to correct, particularly when the reports are released to the public.



**Insurance Carrier**

Many cities and fire departments are insured by private insurance carriers, while others are self-insured and have their own loss management offices. The insurer's organization may be able to assist the team in obtaining expert assistance in particular areas or in conducting some forms of research to support the investigation. The insurer may also have training materials, guides, forms, and other materials that can assist the team in conducting or preparing to conduct an investigation.

In the case of a line-of-duty death the insurance carrier and/or the city's loss management department will almost definitely want to be kept informed on the progress of the investigation. The insurer may send its own investigation team, particularly where there will be a claim to be paid. The investigator who represents the department's insurance carrier should be supportive of a good internal investigation and should be looked upon as an asset to the investigation team. The extent of the insurer's direct involvement will depend on their relationship with the fire department and their expertise in the type of situation under which the incident occurs.

**USFA**

The United States Fire Administration (USFA) and the National Fire Academy (NFA) are both very concerned with fire service health and safety issues. The USFA has requested to be notified immediately of any line-of-duty death and to be sent a copy of all investigation reports. The USFA also serves as a point of contact for the Public Safety Officers' Benefits Program.

The USFA contracts with a private sector investigative organization to prepare reports on incident of national interest and significance; this includes most incidents of multiple firefighter deaths and could include single fatalities in unusual circumstances. USFA does not have any investigative authority and the primary objective is to report and disseminate information that would be of interest to the fire service and other agencies, as well as supporting the USFA's health and safety projects. The report is for informational purposes only and is always submitted to the local jurisdiction for review and approval before it is released. In some cases USFA will request copies of the fire department's investigative reports or send a contractor to gather information from the local jurisdiction's investigation team.

If requested by the fire department, USFA has the ability to dispatch a contracted investigator to assist or advise the local jurisdiction in conducting the investigation, in some cases within hours of the occurrence. Most of the USFA contracted investigators are well qualified to assist the investigation team and are probably involved in more line-of-duty death investigations than any other



investigators. The request should be made directly to the USFA by calling 301-447-1000.

**NFPA**

The National Fire Protection Association (NFPA) has a continuing interest in firefighter health and safety, particularly as it relates to the development of NFPA standards. For many years NFPA has sent investigators to prepare reports on major incidents and often to assist local investigators. The NFPA investigation reports are primarily informational and often describe the relationship between NFPA standards and the incident. They are carefully limited to a factual discussion of the incident and are often published in NFPA periodicals and presented at NFPA meetings.

NFPA has no investigative or enforcement powers and participates in investigations only at the invitation or with the approval of the authority having jurisdiction. If requested by the local jurisdiction, NFPA is usually willing to send an investigator to assist the fire department investigation team. NFPA also has a staff of specialists in several different areas of fire protection who are available for consultation on unusual cases.

**Other Investigators**

It is not unusual for a line-of-duty death to become the focus of multiple official and unofficial investigations in addition to those mentioned above. One of the characteristics of our current society is intense interest in establishing fault or blame for an incident. This may extend as far as accusations of criminally negligent acts and demands for criminal prosecution of individuals who are considered to be responsible for a line-of-duty death. While such charges are very rarely filed against fire department or against individual officers or members, the accusations have caused many difficult situations.

In some cases law enforcement agencies and prosecutors have launched their own investigations into incidents, adding unwanted pressure and complexity to an already tense situation. When these situations occur, the best policy for the fire department is to continue conducting its own investigation and to offer to share its findings with other investigators. Whether or not to invite the other agencies to participate along with the fire department's internal investigation team will depend on several factors, including jurisdiction and the relationship between the organizations. The accusers may attempt to discredit the internal investigation and use their legal authority to conduct their own investigation. At these times it is important to have good legal advice and a well established plan of conducting a thorough and honest internal investigation.

**PSOB**

The Public Safety Officer's Benefits Act (Public Law 94-430) is intended to pay a sum in excess of \$151,635 (as of fiscal year 2000) to the survivors of any fire fighter who dies or is permanently disabled in the line of duty. A claim must be made to the Department of Justice, either by the survivors or by the involved fire department on their behalf. The responsibility rests with the claimants to submit a claim, so that determination of eligibility can be made. The PSOB staff should be contacted at 202-307-0635 or 1-888-744-6513 as soon as possible after a death occurs to ensure that the proper documentation is assembled and submitted.



## *Appendix A*

### **IAFC**

The International Association of Fire Chiefs does not have a specific role in the investigation of line-of-duty deaths, but is dedicated to assisting its members in any situation where the resources of IAFC could contribute to the investigation or to making the results of an investigation known to the fire service. It is with this purpose in mind that this guide was produced. When an investigation yields information that should be known to all fire service members to prevent future tragedies, the IAFC Health and Safety Committee will assist in that mission. In some situations IAFC has assisted fire departments in locating individuals with the needed expertise to assist in an investigation.

### **IAFF**

The International Association of Fire Fighters is extremely active in occupational health and safety and often becomes involved in investigations that involve the death or serious injury of career firefighters. This has included encouraging state and federal agencies to investigate incidents and engaging independent experts to investigate some situations.

The IAFF Health and Safety Office has resources that can be extremely helpful in situations involving the performance of protective clothing, breathing apparatus and other safety devices. These resources are usually accessible through the union local. A shared labor-management commitment to a health and safety program should support the fire department's investigation process, as well as providing access to IAFF assistance when it is needed.

However, it is difficult to predict the approach that IAFF will take to any particular incident. Where there is an effective ongoing safety program that involves labor and management, the IAFF will usually be supportive of a well managed internal investigation. Where there is labor-management conflict over health and safety issues, the investigation process may be used as an opportunity to escalate existing labor-management disputes.

### **NIOSH**

The National Institute for Occupational Safety and Health (NIOSH) is an agency of the federal Department of Health and Human Services that is primarily directed toward the development of research data to support the Occupational Safety and Health Administration (OSHA). In this role NIOSH may request permission from the fire department to investigate incidents that involve topics of particular concern or interest, such as confined space incidents and heat stress deaths.



## LODD Response Plan

---

NIOSH is also the agency that tests and certifies respiratory protective equipment and is very interested in situations where breathing apparatus may be a factor in a fatality. Any time that breathing apparatus performance is suspected as a problem in a line-of-duty death, the fire department should contact NIOSH and request to have the apparatus examined.

NIOSH has no investigative authority or regulatory powers and is not intended to find fault or assign responsibility, other than gather information and finding facts to support research and future rulemaking. NIOSH has excellent resources and is usually extremely cooperative in assisting the local jurisdiction with an investigation, particularly if it fits the agenda of current research topics. It will identify lessons and examples and it may indicate actions that could or should have been taken to prevent the incident. In this manner it is very much a parallel to the fire department's internal investigation.

### **DOT**

The U.S. Department of Transportation is primarily interested in two types of incidents where line-of-duty deaths may occur. The investigation of vehicle accidents, particularly where there is a suggestion that vehicle design or maintenance defects may be responsible, is one area where DOT assistance may be extremely helpful. DOT is also very interested in hazardous materials transportation incidents. Department of Transportation assistance may be requested through the U.S. Fire Administration when a local jurisdiction feels that it would benefit from their assistance. In some cases the DOT investigators will arrive under their own investigative authority and ask to participate in an investigation. DOT has the authority to conduct an investigation, in cooperation with local authorities or independently; their cooperation will usually strengthen the resources of a fire department's investigation team.

### **NTSB**

The National Transportation Safety Board (NTSB) is primarily involved in the investigation of accidents involving interstate public transportation carriers. The investigation of accidents involving fire apparatus with public carriers has caused NTSB to take an interest in fire apparatus vehicle design and maintenance, as well as driver training. NTSB is also involved in the investigation of most aircraft incidents. This agency may be contacted and requested to assist in the investigation of a major accident, although in most cases NTSB investigators will respond on their own to incidents that fall within the scope of their investigative authority.



## *Appendix B*

### **Product Liability**

The worker's compensation plans in most states provide the compensation program as an employee's only remedy for occupational injury or death. This means that the employee or the employee's survivors cannot sue the employer for liability, unless the right to compensation benefits is waived or gross negligence can be proven. In most cases this is an effective shield for the fire department against law suits, but it opens a Pandora's box when equipment failure is suspected of contributing to a serious injury or death. In several cases the survivors have sued the manufacturers of personal protective clothing and safety equipment, apparatus manufacturers, and other parties for damages, usually on the basis of faulty design or failure to meet standards.

This concern makes it extremely important to isolate and impound all such equipment and to maintain custody of it. The manufacturer should be invited to examine the items in the presence of a member of the investigation team, but the items should generally not be removed or released to anyone. The manufacturer's comments should be requested for the report. If the equipment is to be tested in a laboratory, an independent lab should be used and the chain-of-custody back to the fire department should be maintained.

### **Post traumatic incident stress**

Post traumatic incident stress has been recognized and documented as a significant factor in the fire service. A line-of-duty death is one of the most stressful situations that can occur. All members involved in the incident should go through a critical incident debriefing process and, if necessary, should receive additional support and treatment.

It is important not to overlook the investigation team in dealing with post traumatic stress. The pressures on the team members are as significant as those on the personnel who were involved in the incident and often must be prolonged for several days or weeks. In addition to their own stress, the team members are directly exposed to the feelings and reactions of everyone else who may have been affected by the incident.

It is generally inappropriate to have the investigation team members participate with the other personnel in group processes, since their presence may inhibit others from exposing their inner feelings. The investigators may be seen as an intrusion into the stress management process and may be subject to hostility from some of the participants. It is preferable to provide a separate stress management process for the investigation team, as a group, at regular intervals



## LODD Response Plan

---

in their work on the case. The critical incident team should assign a liaison to work with the investigation team and arrange for the investigators to receive full support for their stress, both during and after the investigation.

For more information on critical incident stress teams, contact the American Critical Incident Stress Foundation, P.O. Box 204, Ellicott City, MD 21401. The foundation's hotline is 410-313-2473.

### **Recordkeeping**

Detailed notes on all aspects of an investigation form the foundation for a thorough report. A *Witness Control Sheet* containing case number, date, time, name of person interviewed, locations, and remarks (or additional information as needed according to local preferences) should be maintained for all interviews.

### **Resource List**

United States Fire Administration  
Emmitsburg, MD 21727  
301-447-1272  
301-447-1000 (after hours)

Critical Incident Stress Debriefing Hotline  
P.O. Box 204  
Ellicott City, MD 21401  
410-313-2473

For further information contact:  
International Association of Fire Chiefs  
4025 Fair Ridge Drive  
Fairfax, VA 22033-2868  
703-273-0911  
Fax 703-273-9363

## **BELL CEREMONY**

The men and women of today's fire service are confronted with a more dangerous work environment than ever before. We are forced to continually change our strategies and tactics to accomplish our tasks.

Our methods may change, but our goals remain the same as they were in the past, to save lives and to protect property, sometimes at a terrible cost. This is what we do, this is our chosen profession, this is the tradition of the fire fighter.

The fire service of today is ever changing, but is steeped in traditions 200 years old. One such tradition is the sound of a bell.

In the past, as fire fighters began their tour of duty, it was the bell that signaled the beginning of that day's shift. Throughout the day and night, each alarm was sounded by a bell, which summoned these brave souls to fight fires and to place their lives in jeopardy for the good of their fellow citizen. And when the fire was out and the alarm had come to an end, it was the bell that signaled to all the completion of that call. When a fire fighter had died, it was the mournful toll of the bell that solemnly announced a comrade's passing.

We utilize these traditions as symbols, which reflect honor and respect on those who have given so much and who have served so well. To symbolize the devotion that these brave souls had for their duty, a special signal of three rings, three times each, represents the end of our comrades' duties and that they will be returning to quarters. And so, to those who have selflessly given their lives for the good of their fellow man, their tasks completed, their duties well done, to our comrade, the last alarm.

Sounding of the bell: three series of three, silenced between rings with a white gloved hand.

Note: there is no standardization of number of strikes. Different departments and organization have adopted differing series of rings. Departments in eastern and mid-west states have adopted their alarm codes while most west coast departments have adopted 3-3-3 or 3-4-3 in remembrance of the 343 FDNY Firefighters that perished on 9-11-2001.



## Firefighters Prayer

When duty call's me, oh Lord,  
Wherever Flames may rage,  
Give me the strength to save some life  
Whatever Be its age.  
Help me embrace a little child  
Before it is too late  
Or save an older person from  
The horror of that fate  
Enable me to be alert,  
and oh Lord, guide my every move,  
for life is so precious,  
please don't let us loose.  
I want to fill my calling and  
To give the best in me  
To guard my every neighbor  
And protect their property  
And if according to thy will,  
That I must give my life,  
Then with thy protecting hand my Lord,  
I pray thee, protect my children and my wife.

Amen

## Missing Man Table and Honors Ceremony

Moderator:

As you entered the dining area, you may have noticed a table at the front, raised to call your attention to its purpose -- it is reserved to honor our missing loved ones [or missing comrades in arms, for veterans].

Set for six, the empty places represent Americans still [our men] missing from each of the five services -- Army, Navy, Marine Corps, Air Force, Coast Guard - and civilians. This Honors Ceremony symbolizes that they are with us, here in spirit.

Some [here] in this room were very young when they were sent into combat; however, all Americans should never forget the brave men and women who answered our nation's call [to serve] and served the cause of freedom in a special way.

I would like to ask you to stand, and remain standing for a moment of silent prayer, as the Honor Guard places the five service covers and a civilian cap on each empty plate.

Honor Guard:

(In silence or with dignified, quiet music as background, the Honor Guard moves into position around the table and simultaneously places the covers of the Army, Navy, Marine Corps, Air Force and Coast Guard, and a civilian hat, on the dinner plate at each table setting. The Honor Guard then departs.)

Moderator:

Please be seated ..... I would like to explain the meaning of the items on  
this special table.

The table is round -- to show our everlasting concern for our missing  
men.

The tablecloth is white -- symbolizing the purity of their motives when  
answering the call to duty.

The single red rose, displayed in a vase, reminds us of the life of each of  
the missing, and the[ir] loved ones and friends of these Americans who  
keep the faith, awaiting answers.

The vase is tied with a red ribbon, symbol of our continued determination  
to account for our missing.

A slice of lemon on the bread plate is to remind us of the bitter fate of  
those captured and missing in a foreign land.

A pinch of salt symbolizes the tears endured by those missing and their  
families who seek answers.

The Bible represents the strength gained through faith to sustain those  
lost from our country, founded as one nation under God.

The glass is inverted -- to symbolize their inability to share this evening's  
[morning's/day's] toast.

The chairs are empty -- they are missing.

Let us now raise our water glasses in a toast to honor (Name)

Note: This is a military ceremony that many have adapted to recognize a fallen  
Firefighter or Police Officer.



**Alaska  
Line of Duty Death  
Response Guide**

**October 2015**



**DRAFT**



**State of Alaska  
Division of  
Fire & Life Safety**

**Alaska State  
Fire Chiefs  
Association**

**Alaska State  
Firefighters  
Association**

**Alaska  
Line of Duty Death  
Response Guide**

**October 2015**



**DRAFT**



**State of Alaska  
Division of  
Fire & Life Safety**

**Alaska State  
Fire Chiefs  
Association**

**Alaska State  
Firefighters  
Association**

**Alaska  
Line of Duty Death  
Response Guide**

**October 2015**



**DRAFT**



**State of Alaska  
Division of  
Fire & Life Safety**

**Alaska State  
Fire Chiefs  
Association**

**Alaska State  
Firefighters  
Association**

**Alaska  
Line of Duty Death  
Response Guide**

**October 2015**



**DRAFT**



**State of Alaska  
Division of  
Fire & Life Safety**

**Alaska State  
Fire Chiefs  
Association**

**Alaska State  
Firefighters  
Association**