RESEARCH

Firefighter Fatalities in the United States-2015

June 2016

Rita F. Fahy
Paul R. LeBlanc
Joseph L. Molis

Abstract

In 2015, a total of 68 firefighters died while on-duty in the U.S. The largest share of deaths occurred at fire scenes (24 deaths). Sudden cardiac death accounted for the majority of the on-duty deaths (35 deaths, or 51 percent). There were three multiple-fatality incidents – an apparatus crash on a wildland fire that killed three firefighters, a helicopter crash that killed two contractors working on a prescribed burn and a wall collapse that killed two firefighters. Deaths among volunteer firefighters and deaths in road vehicle crashes continued low in 2015.

Keywords: Firefighter fatality, statistics, heart attack, sudden cardiac death

Acknowledgements
This study is made possible by the cooperation and assistance of the United States fire service, the Public Safety Officers' Benefits Program of the Department of Justice, CDC's National Institute for Occupational Safety and Health, the United States Fire Administration, the Forest Service of the U.S. Department of Agriculture, and the Bureau of Indian Affairs and the Bureau of Land Management of the U.S. Department of the Interior. The authors would also like to thank Carl E. Peterson, retired from NFPA's Public Fire Protection Division and Thomas Hales, MD, MPH, of CDC-NIOSH, for their assistance on the study.

For more information about the National Fire Protection Association, visit www.nfpa.org or call 617-770-3000. To learn more about the One-Stop Data Shop go to www.nfpa.org/osds or call 617-984-7451.

Copies of this analysis are available from:

National Fire Protection Association
One-Stop Data Shop
1 Batterymarch Park
Quincy, MA 02169-7471
www.nfpa.org
e-mail: osds@nfpa.org
phone: 617-984-7451

NFPA No. FFD10

Table of Contents

List of Tables and Figures

2015 Experience

In 2015, 68 firefighters died while on-duty in the U.S. – the fourth time in the past five years that the total number of deaths has been below 70. The annual average number of deaths over the past decade is 81. Figure 1 shows on-duty firefighter deaths for the years 1977 through 2015, excluding the 340 firefighter deaths at the World Trade Center in 2001.[1]

Of the 68 firefighters who died while on duty in 2015, 32 were volunteer firefighters, 24 were career firefighters, six were employees of federal land management agencies, three were federal contractors, one was an employee of a state land management agency, one was a civilian employee of the military and one was a state prison inmate.[2]

There were three multiple-fatality incidents in 2015: an apparatus crash on a wildland fire killed three wildland firefighters, a helicopter crash killed two contract firefighters working on a prescribed burn, and a wall collapse at a structure fire killed two firefighters.

One firefighter was murdered last year, when he was deliberately struck and killed by a motorist during a fundraising event. One firefighter died by suicide while on duty.

Analyses in this report examine the types of duty associated with firefighter deaths, the cause and nature of fatal injuries to firefighters, and the ages of the firefighters who died. They highlight deaths in intentionally-set fires and in motor vehicle-related incidents.[3] Finally, the study presents summaries of individual incidents that illustrate important concerns in firefighter safety.

Introduction

Each year, NFPA collects data on all firefighter fatalities in the U.S. that resulted from injuries or illnesses that occurred while the victims were on-duty. The term *on-duty* refers to:

- being at the scene of an alarm, whether a fire or non-fire incident (including EMS calls);
- responding to or returning from an alarm;
- participating in other fire department duties such as training, maintenance, public education, inspection, investigation, court testimony or fund raising; and
- being on call or stand-by for assignment at a location other than at the firefighter's home or place of business.

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.

The type of firefighters included in this study can be:

- members of local career and volunteer fire departments;
- seasonal, full-time and contract employees of state and federal agencies who have fire suppression responsibilities as part of their job description;
- prison inmates serving on firefighting crews;
- military personnel performing assigned fire suppression activities;
- civilian firefighters working at military installations; and
- members of industrial fire brigades.

Fatal injuries and illnesses are included even in cases where death is considerably delayed. When the injury and the death occur in different years, the incident is counted in the year of the injury.

The NFPA recognizes that other organizations report numbers of duty-related firefighter fatalities using different, more expansive, definitions that include deaths that occurred when the victims were off-duty. (See, for example, the USFA and National Fallen Firefighters Memorial websites.[*]) Readers comparing reported losses should carefully consider the definitions and inclusion criteria used in any study.

Long-Term Effects on Firefighters' Physical and Emotional Health

This study focuses on the deaths of firefighters that are due to specific events while on-duty, but NFPA recognizes that a comprehensive study of on-duty firefighter fatalities would include chronic illnesses, such as cancer or heart disease, that arise from occupational factors and prove fatal. The number of deaths due to long-term exposures, however, cannot be estimated at this time because of limitations in tracking the exposure of firefighters to toxic environments and substances and the potential long-term effects of such exposures. Besides the challenges that firefighter illnesses pose for gaining a complete picture of the firefighter fatality problem, we would be remiss if we did not also monitor the increasingly well-publicized problem of firefighter suicide.

[*] USFA link is https://www.usfa.fema.gov/, National Fallen Firefighters' Memorial link is www.firehero.org/

Suicide According to the Firefighter Behavioral Health Alliance (FBHA), 94 firefighters and 23 EMTs and paramedics died by suicide in 2015. [†] One firefighter died by suicide while on duty.

Due to the efforts of FBHA and others, recognition of the importance of behavioral health programs and peer support for firefighters is becoming more widespread. As with heart disease and cancer, this is a problem that follows firefighters after their careers end, whether in retirement or some other form of separation from the fire service. FBHA recently produced a report on behavioral health and suicide prevention that was published by the National Volunteer Fire Council (NVFC), with support from USFA.[‡] In collaboration with National Fallen Firefighters Foundation (NFFF), the Medical University of South Carolina has developed a training course[§] for counselors who work with firefighters.

NFPA 1500, Standard on Fire Department Occupational Safety and Health Program, requires access to a behavioral health program that provides assessment, counseling and treatment for such issues as stress, anxiety, and depression. The goal of such programs is to change the culture of the fire service, help people to identify the warning signs, eliminate any stigma associated with mental health issues and asking for help, and provide training and assistance with retirement planning. According to FBHA statistics, almost one-fifth of the firefighters and EMTs who died by suicide were retired firefighters and EMTs. Early recognition and treatment of behavioral health issues are key to addressing this problem.

Cancer Regarding the long-term health effects of firefighting, there has been a vast change in the attention now paid to cancer risk and cancer prevention in the fire service. These efforts include research, education, behavioral changes and a variety of controls to minimize exposure to contaminants. Although we cannot identify the total number of fire service-related cancer deaths that occur each year, the International Association of Fire Fighters alone lists on its website almost 80 firefighter cancer deaths that were reported to them in 2015.[**]

The National Institute for Occupational Safety and Health (NIOSH) recently undertook two large studies focused on firefighter cancer. The first was a multi-year study to examine the cancer risk of firefighters, using health records of approximately 30,000 current and retired career firefighters from three large city fire departments to look at mortality and cancer incidents. The second looked at exposure-response among 20,000 firefighters from the same fire departments. Results of the first phase, which reported evidence of a relationship between firefighting and cancer, were published in October,

---

[†] http://www.ffbha.org/
[‡] http://www.nvfc.org/wp-content/uploads/2015/09/ff_suicide_report.pdf
[§] https://helping-heroes.org/user/login
[**] http://www.iaff.org/hs/lodd/advancedSearch.asp

2013.[††] Results of the second study, published in 2015, showed a relationship between firefighting and lung cancer and leukemia.[‡‡]

In efforts to raise awareness in the fire service of the heightened risk of cancer and ways to reduce exposures, valuable video presentations have been produced by organizations including, among others, the Boston Fire Department[§§], the University of Cincinnati and Cincinnati Fire Department[***] and the National Fallen Firefighters Foundation.[†††] These videos help to inform firefighters of the steps they can take to address the hazards they face. Other efforts to inform the fire service of safe practices stem from research undertaken by the Fire Protection Research Foundation, including an on-going four-phase study[‡‡‡] to enhance the cleaning procedures for PPE that are outlined in NFPA 1851, Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting, and an earlier respiratory exposure study[§§§] that was completed in 2012. The Firefighter Cancer Support Network is an excellent resource for access to information on health-related topics and support and mentorship following a cancer diagnosis.[****]

Cardiac Issues In contrast to the relatively recent strong focus on firefighter cancer and suicide, heart disease has been recognized as a serious health issue for the fire service for quite some time now.[4] Sudden cardiac death has consistently accounted for the largest share of on-duty firefighter deaths since the NFPA began this study in 1977. The NFPA has several standards that focus on the health risks to firefighters. For example, NFPA 1582, Standard on Comprehensive Occupational Medical Program for Fire Departments, outlines for fire departments the medical requirements that must be met by candidate firefighters and incumbent fire department members. NFPA 1500 calls for fire departments to establish a firefighter health and fitness program that meets NFPA 1583, Standard on Health-Related Fitness Programs for Fire Department Members, and requires that firefighters meet the medical requirements of NFPA 1582.

Information on developing a wellness-fitness program is available from other organizations, for example, the IAFC/IAFF Fire Service Joint Labor-Management Wellness-Fitness Initiative[††††] and

---

[††] http://www.cdc.gov/niosh/firefighters/pdfs/OEM_FF_Ca_Study_10-2013.pdf
[‡‡] http://www.cdc.gov/niosh/firefighters/pdfs/Daniels-et-al-(2015).pdf
[§§] https://www.youtube.com/watch?v=hOvBypsaHog
[***] https://www.youtube.com/watch?v=Y-7I0U3323Y
[†††] http://www.everyonegoeshome.com/2016/02/17/the-silent-killer/
[‡‡‡] http://www.nfpa.org/PPECleaning
[§§§] http://www.nfpa.org/research/fire-protection-research-foundation/projects-reports-and-proceedings/for-emergency-responders/personal-protective-equipment/respiratory-exposure-study-for-fire-fighters
[****] http://www.firefightercancersupport.org/
[††††] http://www.iafc.org/files/healthWell_WFI3rdEdition.pdf.pdf

NVFC's Heart-Healthy Firefighter Program.‡‡‡‡ The Heart-Healthy Firefighter Program was launched in 2003 to address heart attack prevention for all firefighters and EMS personnel, through fitness, nutrition and health awareness.

We will continue to cover deaths that result from specific on-duty activities in this study, but NFPA is focused on all aspects of health and safety in the fire service, and EMS, as evidenced particularly by the Fire Protection Research Foundation's work on cancer prevention behaviors and the health and wellness provisions of NFPA 1500 and NFPA 450, Guide for Emergency Medical Services and Systems. The remainder of this report will focus on the on-duty fatalities in 2015.

Type of Duty

Figure 2 shows the distribution of the 68 deaths by type of duty. The largest share of deaths occurred while firefighters were operating at fires (24 deaths), accounting for just over one-third of the on-duty deaths in 2015. This is the fourth time in the last six years that the total has been below 25. There has been an average of 30.5 fire ground deaths over the past 10 years (2006 through 2015). There were two multiple-fatality fires in 2015. Three firefighters were killed when their apparatus crashed on a wildland fire. This incident will be described in more detail later. In another incident, two firefighters were killed and two others were injured when a wall collapsed at a structure fire.

Seventeen of the 24 fire ground deaths occurred at 16 structure fires. In addition, there were five deaths at three wildland fires and two at two vehicle fires. Eleven of the 24 fire ground victims were career firefighters, eight were volunteer firefighters and five were employees of federal land management agencies. The average number of deaths on the fire ground over the past 10 years is 12 deaths per year, for both career and volunteer firefighters.

Eleven firefighters died while responding to or returning from emergency calls. It is important to note that deaths in this category are often not the result of crashes. In fact, in 2015, eight of the deaths while responding to or returning from alarms were due to sudden cardiac death, and another death resulted from a stroke. One firefighter was killed in a collision while responding to a medical call and another was struck by a passing vehicle while directing traffic at the station for apparatus responding to a mutual aid call. All crashes and sudden cardiac deaths are discussed in more detail later in this report. All 11 victims were volunteer firefighters. The number of deaths that occurred while responding to or returning from calls has averaged 20 per year over the past 10 years and 14 per year over the past five

‡‡‡‡ http://www.healthy-firefighter.org/

years. The first 10 years that NFPA conducted this study (1977 through 1986), the average number of deaths per year while responding to or returning from alarms was 36. There has been a marked reduction in both crash deaths and cardiac-related deaths while responding to or returning from alarms over the past 40 years.

Ten firefighters died at non-fire emergencies -- five at medical emergencies, three at motor vehicle crashes, one while attempting to rescue people trapped by rising flood waters, and one while directing traffic at the scene of a possible gas leak. Four of the nine suffered sudden cardiac deaths, three were struck by vehicles, one was involved in the crash of an ambulance transporting a patient, one had a stroke and one drowned.

Nine deaths occurred during training activities. Sudden cardiac death claimed all nine firefighters. Five of the nine were working out or running at the station as part of routine physical fitness training, one was attending an air management training, another was attending in-service apparatus training, one during a wildland firefighting fitness test and one collapsed during wildland fire training.

The remaining 14 firefighters died while involved in a variety of non-emergency-related on-duty activities. One firefighter was intentionally struck by an impatient driver at a fundraising event; the driver was charged with murder. Another firefighter died by suicide at the station while on duty. Seven of the fatalities were due to sudden cardiac death. Six of these seven firefighters were engaged in normal administrative or station duties and one was on standby at a racetrack. Two other firefighters died of medical causes while at the station – one death as a result of a stroke and the other, an aneurysm. Two federal contractors were killed when their helicopter crashed while they were involved in aerial ignition operations at a prescribed burn; a third contractor was seriously injured but survived. One firefighter died of complications from traumatic injuries suffered in a collision while returning to the fire station after picking up equipment for maintenance.

Cause of Fatal Injury or Illness

Figure 3 shows the distribution of deaths by cause of fatal injury or illness. The term *cause* refers to the action, lack of action, or circumstances that resulted directly in the fatal injury.[5]

Overexertion, stress and medical issues accounted for by far the largest share of deaths. Of the 40 deaths in this category, 35 were classified as sudden cardiac deaths (usually heart attacks), three were due to strokes and one to an aneurysm. The suicide death by gunshot falls into this category as well. See the section below for more details on sudden cardiac deaths.

The second leading cause of fatal injury was vehicle crashes, which claimed eight lives. Another five firefighters were struck and killed by vehicles – four at or during emergency responses and one in a deliberate act against the victim. These vehicle-related deaths are discussed in detail later in this report.

Structural collapses resulted in six deaths. Two firefighters were killed when a wall collapsed at a fire that was set in a nail salon and spread throughout the apartments above. The area had been declared a collapse zone but the victims and other firefighters had not yet left the area when the collapse occurred. In separate incidents, three firefighters fell into the basement when floors collapsed while they were operating at fires in single-family dwellings. All three died of smoke inhalation. One firefighter was crushed under a collapsing porch roof as he and two other firefighters were exiting the structure due to deteriorating conditions inside.

Four firefighters died in fatal falls. In separate incidents, two firefighters fell down elevator shafts – one in an apartment building and one in a vacant warehouse. In a second vacant warehouse fire, a firefighter stepped on a skylight and fell 20 feet (six meters) to a concrete floor. One firefighter fell through the ceiling of an underground bunker while fighting a grass and structure fire and died of complications from burn injuries and trauma.

Two firefighters were struck and killed by falling trees – one on a wildland fire and the other at a vehicle fire. One firefighter was caught or trapped by rapid fire progress on a wildland fire when the wind shifted. One firefighter became separated from the rest of his crew while fighting a basement fire and was lost inside a structure.

Nature of Fatal Injury or Illness

The term *nature* refers to the medical process by which death occurred and is often referred to as *cause of death* on death certificates and in autopsy reports.

Figure 4 shows the distribution of deaths by nature of fatal injury or illness. As in almost every year since 1977, sudden cardiac death accounted for the largest share of the deaths annually, with 35 deaths. Sudden cardiac deaths will be discussed in more detail in the next section.

The second leading nature of fatal injury was internal trauma, with 16 deaths. The other major category of fatal injury was asphyxiation or smoke inhalation, with nine deaths. There were three deaths due to strokes, two due to burns and one death each due to drowning, gunshot (suicide) and an aneurysm.

Sudden Cardiac Deaths

In 2015, the 35 sudden cardiac deaths with onset while the victim was on-duty is only one less than the toll in 2014 and reinforces last year's finding that the general downward trend in on-duty sudden cardiac deaths since 2007 has stopped. Cardiac-related events accounted for 51 percent of the deaths in 2015, and 42 percent over the past 10 years.

The number of deaths in this category is, though, significantly lower than in the early years of this study. From 1977 through 1986, an average of 60 firefighters a year suffered sudden cardiac deaths while on duty (44.7 percent of the on-duty deaths during that period). These are cases in which the onset of symptoms occurred while the victim was on-duty and death occurred immediately or shortly thereafter. The average number of deaths fell to 44 a year in the 1990s and to 34 in the past decade. In spite of this reduction, sudden cardiac death continues to be the number one cause of on-duty firefighter fatalities in the U.S. and, with exceptions in 1984 and 2013, has accounted for the single largest share of deaths in any given year.

Ages of Firefighters

The firefighters who died in 2015 ranged in age from 18 to 92, with a median age of 49.5 years. Figure 5 shows the distribution of firefighter deaths by age and whether the cause of death was sudden cardiac death or not.

Sudden cardiac death accounts for a higher proportion of the deaths among older firefighters, as might be expected. Almost two-thirds of the firefighters over age 40 who died in 2015 died of heart attacks or other cardiac events.

Figure 6 shows death rates by age, using combined career and volunteer firefighter fatality data for the five-year period from 2011 through 2015 and estimates of the number of career and volunteer firefighters in each age group from NFPA's 2013 profile of fire departments (the mid-year in the range).[6]

The lowest death rates were for firefighters under age 40. Their death rate was about half to three-quarters of the all-age average. The rate for firefighters aged 60 and over was two and one-half times the average. Firefighters aged 50 and over accounted for almost half of all firefighter deaths over the five-year period, although they represent one-quarter of all career and volunteer firefighters in the U.S.

Fire Ground Deaths

Of the 24 fire ground fatalities, eight were due to asphyxiation or smoke inhalation, seven to sudden cardiac death, seven were due to internal trauma and crush injuries and two to burns. Seventeen of the 24 deaths occurred at 16 structure fires, five on three wildland fires and two at vehicle fires.

Except for 2001 at the World Trade Center and 2013, when an exceptionally high number of firefighters were killed at the scene of fires (19 firefighters on the Yarnell Hill wildland fire and nine in an explosion at a fertilizer plant), deaths on the fire ground have been declining fairly steadily since 1999. With 24 fire ground deaths in 2015, and is the fourth time in the past six years that the total has been below 25.

Figure 7 shows the distribution of the 24 fire ground deaths by fixed property use. The 17 deaths at structure fires include 10 in fires involving one- and two-family dwellings, two deaths in apartment building fires, two deaths in vacant warehouse fires, two deaths in one fire that started in a nail salon, and one death in a fire at a large commercial structure.

None of the structures in which firefighters died was reported to have had an automatic fire suppression system.

Among the non-structure fire deaths, five firefighters died at three wildland fire incidents – three firefighters were killed in an apparatus crash, one was overrun by fire and one was struck by a falling tree. Two firefighters were killed at the scene of motor vehicle fires -- one was struck by a falling tree and the other suffered sudden cardiac event.

To put the hazards of firefighting in various types of structures into perspective, the authors examined the number of fire ground deaths per 100,000 structure fires by property use. Estimates of the structure fire experience in each type of property were obtained from the NFPA's annual fire loss studies from 2010 through 2014 (the 2015 results are not yet available) and from the updated firefighter fatality data for the corresponding years. The results are shown in Figure 8.

This figure illustrates that, although many more firefighter deaths occur at residential structure fires than at fires in any other type of structure, fires in some nonresidential structures, such as manufacturing, public assembly, storage and mercantile properties, are more hazardous to firefighters, on average. There were 12.8 fire ground deaths per 100,000 nonresidential structure fires from 2010 through 2014, compared to 2.7 deaths per 100,000 residential structure fires. The highest death rates over the five-year period occurred in manufacturing properties. The very high rate over this time period is largely influenced by the fertilizer plant fire in 2013 that killed nine firefighters. The high rate for public assembly properties is influenced by two multiple-fatality deaths in the same year that claimed

six lives. The low rate in educational properties over that five-year period may reflect the fact that these occupancies are among the most regulated, most-protected and most-frequently inspected and that their occupants are among the most likely to call the fire department to report fires while the fires are still in their early stages. The rate in that five-year period for stores/offices and storage properties, which includes garages at dwellings, reflects the relatively small number of fatalities that have occurred in such structures in recent years. The rate for health care and correctional properties is the result of a single fatality over the five-year period in a type of property that has a very low occurrence of reported fires.

From 2006 through 2015, there were 21 deaths in 18 fires in vacant buildings and buildings under demolition or renovation.

Vehicle-Related Deaths

In 2015, 13 firefighters died in vehicle-related incidents, including eight firefighters who died in vehicle crashes.

- One of the crashes involved a helicopter operating at a prescribed burn and was mentioned above. The crash, which killed two contractors, is being investigated by the National Transportation Safety Board (NTSB) but the final report has not yet been released.
- Three federal wildland firefighters were killed when their engine went off the road in zero visibility and then 40 feet (12 meters) down an embankment. The firefighters were trying to escape the blaze that overspread their position when the wind shifted.
- A firefighter transporting a patient died when the ambulance he was driving rear-ended a truck. The patient and another firefighter survived the crash. No details on factors in the crash or seatbelt use were reported.
- A firefighter riding as passenger in the front seat of an ambulance was killed while responding on a medical call when the vehicle collided with a slow-moving piece of construction equipment. Patchy fog and early morning sun glare were cited as factors in the crash. There were no details on seatbelt use.
- A firefighter riding in the passenger seat of a fire department pickup truck died of complications from injuries suffered when the truck struck another vehicle that pulled out in front of it. The firefighter was picking up equipment for maintenance at the time of the crash. No details on seatbelt use were available.

Five other firefighters were struck and killed by vehicles, including one in a deliberate act. That firefighter was participating in a charity fundraiser in an intersection when a driver who was annoyed by

the slowed traffic deliberately struck him with his vehicle. The other incidents occurred during emergency calls.

- One firefighter was directing traffic at the scene of a motor vehicle crash within a safe zone established using fire apparatus and police vehicles when he was struck by a drunk driver who drove into the safe zone.
- At another motor vehicle crash, a firefighter was killed on a highway by a driver who swerved to avoid hitting a parked fire truck and struck the victim.
- A firefighter, wearing a fire police vest, was directing traffic at a fire station while department vehicles were responding to a call when he was hit by a driver who did not see him. Solar glare was cited as a factor in the incident.
- In violation of fire department policy, a firefighter rode on the back step of an engine while it was driven to a helicopter landing site during a medical aid call. The driver was not aware that the firefighter was on the back step. The victim slipped or fell on dismounting and was crushed when the driver reversed the vehicle to put it in position.

NFPA publishes several standards related to road and vehicle safety issues.

- NFPA 1002, *Standard on Fire Apparatus Driver/Operator Professional Qualifications*, identifies the minimum job performance requirements for firefighters who drive and operate fire apparatus, in both emergency and nonemergency situations.
- NFPA 1451, *Standard for a Fire and Emergency Services Vehicle Operations Training Program*, provides for the development of a written vehicle operations training program, including the organizational procedures for training, vehicle maintenance, and identifying equipment deficiencies.
- NFPA 1911, *Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus*, details a program to ensure that fire apparatus are serviced and maintained to keep them in safe operating condition.
- NFPA 1901, *Standard for Automotive Fire Apparatus*, addresses vehicle stability to prevent rollovers, and gives manufacturers options on how to provide it. New vehicles will have their maximum speed limited, based on their weight, and will have vehicle data recorders to monitor, among other things, acceleration and deceleration, and seatbelt use.

- NFPA 1906, *Standard for Wildland Fire Apparatus*, establishes minimum design, performance and testing requirements for new vehicles over 10,001 lb. gross vehicle weight (4,500 kg) rating that are specifically designed for wildland fire suppression.
- NFPA 1091, *Standard for Traffic Control Incident Management Professional Qualifications*, just published in 2015, identifies the minimum job performance requirements necessary to perform temporary traffic control duties at emergency incidents on or near an active roadway.

The provisions of NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, include requirements that operators successfully complete an approved driver training program, possess a valid driver's license for the class of vehicle, and operate the vehicle in compliance with applicable traffic laws. All vehicle occupants must be seated in approved riding positions and secured with seatbelts before drivers move the apparatus, and drivers must obey all traffic signals and signs and all laws and rules of the road. This includes coming to a complete stop when encountering red traffic lights, stop signs, stopped school buses with flashing warning lights, blind intersections and other intersection hazards, and unguarded railroad grade crossings. Passengers are required to remain seated and must not release or loosen their seatbelts for any reason while the vehicle is in motion. In related efforts, the USFA has an excellent website with resources on emergency vehicle and roadway operations safety.[§§§§]

The focus of vehicle safety programs should not be exclusively on fire department apparatus, since, over the years, private vehicles have been the vehicles most frequently involved in road crashes. NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, includes a requirement that when members are authorized to respond to incidents or to fire stations in private vehicles, the fire department must establish specific rules, regulations, and procedures relating to the operation of private vehicles in an emergency mode. NFPA 1451, Standard for a Fire and Emergency Service Vehicle Operations Training Program, also requires training for those using privately-owned vehicles.

Requirements are also in effect for emergency personnel operating on roadways. The 2009 version of the Federal Highway Administration's Manual of Uniform Traffic Control Devices (MUTCD) requires anyone working on a roadway to wear an ANSI 107-compliant high-visibility vest. An exemption was created for firefighters and others engaged on roadways that allows them to wear NFPA-compliant personal protective clothing (turn-out gear) when directly exposed to flames, heat and

[§§§§] http://www.usfa.fema.gov/operations/ops_vehicle.html

hazardous material. NFPA 1500 requires firefighters working on traffic assignments where they are endangered by motor vehicle traffic to wear clothing with fluorescent and retroreflective material and use fire apparatus in a blocking position to protect firefighters. The 2009 edition of NFPA 1901 requires that ANSI 207-compliant breakaway high-visibility vests be carried on all new fire apparatus, and MUTCD 2009 allows emergency responders to use them in lieu of ANSI 107-compliant apparel. Advice on compliance with the updated Federal rules can be found at: MUTCD.[*****] NFPA 1901 also requires reflective striping for improved visibility on new apparatus and a reflective chevron on the rear of fire apparatus. Advice on how to improve visibility of existing apparatus can be found at: video.[†††††]

Career/Volunteer Comparison

Figure 9 compares the number of deaths of career firefighters and volunteer firefighters from local fire departments since the study was first done in 1977. The 32 deaths of volunteer firefighters while on-duty in 2015 is the second lowest total for volunteers and well below the annual average of 42 deaths per year. It is the fourth time in the past five years that the total has been at or below 35 deaths. In the earliest years of this study, the annual average number of deaths of volunteers while on duty was 67. The 24 deaths of career firefighters marks the sixth consecutive year that the total has been at or below 25. The trend for career firefighters has been relatively flat over the past 10 years, except for a spike in 2007 due to a single nine-fatality incident.

A breakdown of the fatality experience of the 56 career and volunteer firefighters killed in 2015 is shown in Table 1.

Intentional Fires and False Calls

Four firefighters were killed as a result of three intentionally-set fires in 2015 – two in the wall collapse at the nail salon fire, one when a floor collapsed in a single-family home, and another who suffered a fatal cardiac event while responding to a set fire in a single-family home. From 2006 through 2015, 50 firefighters (6.0 percent of all on-duty deaths) died in connection with intentionally-set fires, either at the fire or while responding to or returning from the fire. The 2013 explosion and fire in West, Texas, resulting in the deaths of nine firefighters, was recently reported to have been deliberately set.

In 2015, no deaths resulted during a false call. Over the past 10 years, 10 firefighter deaths have

[*****]http://www.respondersafety.com/Articles/2009_Edition_of_the_Manual_on_Uniformed_Traffic_Control_Devices_MUTCD_Released_December_16_2009.aspx
[†††††] http://www.respondersafety.com/MarkedAndSeen.aspx

resulted from false calls, including malicious false alarms and alarm malfunctions.

In summary

There were 68 on-duty firefighter deaths in 2015. For quite a few years, on-duty firefighter deaths had averaged around 100 deaths per year, but recently there has been a fairly consistent decrease in the annual totals. The exception in the past five years was 2013, when the total number of deaths was 97, resulting in part from two fires that claimed a total of 28 lives. In four of the last five years, the total number of deaths has been below 70, dropping the average number of deaths since 2006 to 81 deaths per year.

Deaths among volunteer firefighters have shown a particularly marked decrease, averaging half as many deaths in the past five years as in the earliest decade of this study. We have seen substantial reductions in the number of deaths in road vehicle crashes in recent years, although it is too soon to consider that a solid trend.

Those are positive developments, but we still see a high proportion of deaths due to cardiac issues. Sudden cardiac death accounted for more than half of the on-duty deaths in 2015, as it did in the previous year. There was an on-duty suicide in 2015, and a firefighter was murdered. Violence against firefighters is not as rare as some might think. Since 1996, 22 firefighters have been fatally assaulted while on duty.

References

1. The NFPA's files for firefighter on-duty fatal injuries are updated continually for all years.

2. For this report, the term *volunteer* refers to any firefighter whose principal occupation is not that of a full-time, paid member of a fire department. The term *career* refers to any firefighter whose occupation is that of a full-time, paid fire department member.

3. For this report, the term *motor vehicle-related incident* refers to motor vehicle collisions (including aircraft and boats) and rollovers, as well as to incidents such as falls from or struck by vehicles where the involvement of the vehicle played an integral role in the death.

4. E. S. Soteriades, D. L. Smith, A. J. Tsismenakis, D. M. Baur, and S. N. Kales, "Cardiovascular Disease in US Firefighters: A Systematic Review," *Cardiology in Review*, Vol. 19, No. 4, July/August 2011, pp. 202-215.

5. The categories for cause of injury and nature of injury are based on the 1981 edition of NFPA 901, *Uniform Coding for Fire Protection*.

6. H. J. G. Haynes and G. P. Stein, "U.S. Fire Department Profile 2013," NFPA Fire Analysis and Research Division, Quincy, Massachusetts, November 2014.

U.S. Department of Justice Death, Disability and Educational Benefits for Public Safety Officers and Survivors

Line of duty deaths: The Public Safety Officers' Benefits (PSOB) Act, signed into law in 1976, provides a federal death benefit to the survivors of the nation's federal, state, local and tribal law enforcement officers, firefighters, and rescue and ambulance squad members, both career and volunteer, whose deaths are the direct and proximate result of a traumatic injury sustained in the line of duty. The Act was amended in 2000 to include FEMA employees performing official, hazardous duties related to a declared major disaster or emergency. Effective December 15, 2003, public safety officers are covered for line-of-duty deaths that are a direct and proximate result of a heart attack or stroke, as defined in the Hometown Heroes Survivors' Benefits Act of 2003. The Dale Long PSOB Improvements Act of 2012 expands the Hometown Heroes Act to include vascular ruptures.

A 1988 amendment increased the amount of the benefit from $50,000 to $100,000 and included an annual cost-of-living escalator. On October 1 of each year, the benefit changes as a result. The enactment of the USA PATRIOT bill in 2001 increased the benefit to $250,000. The current benefit is $ 339,881, tax free.

A decedent's spouse and minor children are the first eligible beneficiaries for PSOB Program purposes. In cases in which the public safety officer had no surviving spouse or eligible children, the death benefit is to be awarded to either the individual most recently designated as beneficiary for PSOB benefits with the officer's public safety agency, organization, or unit, or, if there is no designation of beneficiary of PSOB benefits on file, then to the individual designated as beneficiary under the most recently executed life insurance policy on file with the agency at the time of death. (*See* 42 U.S.C. § 3796(a)(4) for specific details.) If no individuals qualify under 42 U.S.C. § 3796(a)(4), then the benefit is paid to the public safety officer's surviving parents; if the officer is not survived by a parent, the benefit may be paid to the officer's children who would be eligible to receive it but for their age (i.e., adult children).

Line of duty disabilities: In 1990, Congress amended the PSOB benefits program to include permanent and total disabilities that occur on or after November 29, 1990. The amendment covers public safety officers who are permanently unable to perform any gainful employment in the future. PSOB is intended for those few, tragic cases where an officer survives a catastrophic, line of duty injury. Only then, in the presence of the program's statutory and regulatory qualifying criteria, will PSOB's disability benefit be awarded. The bill's supporters anticipated that few PSOB disability claims would be eligible annually.

Public Safety Officers' Educational Assistance Program (PSOEA): An additional benefit, signed into law in October 1996 and amended in 1998, provides an educational assistance allowance to the spouse and children of public safety officers whose deaths or permanent and total disabilities qualify under the PSOB Act. This benefit is provided directly to dependents who attend a program of education at an eligible education institution and are the children or spouses of covered public safety officers. It is retroactive to January 1, 1978, for beneficiaries who have received or are eligible to receive the PSOB death benefit. Students may apply for PSOEA funds for up to 45 months of full-time classes. As of October 1, 2015, the maximum benefit a student may receive is $ 1,021 per month of full-time attendance.

Further benefits information: To initiate a claim for death benefits, to receive additional information on filing a disability claim or to receive additional information about coverage, call, email, or write the Public Safety Officers' Benefits Office, Bureau of Justice Assistance, Office of Justice Programs, U.S. Department of Justice, 810 7th Street, N.W., Washington DC 20531. The telephone number is (888) 744-6513 and the email address is ASKPSOB@usdoj.gov. PSOB death claims can be filed online as well at: https://www.psob.gov. Please note that the PSOB Office "Call Center" is available to take calls Monday through Friday from 7:00 AM until 5:00 PM ET.

Table 1
Comparison of On-Duty Deaths Between Career and Volunteer Firefighters, 2015*

	Career Firefighters		Volunteer Firefighters	
	Number of Deaths	Percent of Deaths	Number of Deaths	Percent of Deaths
Type of duty				
Operating at fire ground	11	46 %	8	25 %
Responding to or returning from alarms	0	0	11	34
Operating at non-fire emergencies	3	13	7	22
Training	5	21	1	3
Other on-duty	5	21	5	16
TOTALS	24	100 %	32	100 %
Cause of fatal injury				
Overexertion/stress/other related	15	63 %	20	63 %
Motor vehicle crash	0	0	3	9
Structural collapse	4	17	2	6
Struck by vehicle	0	0	4	13
Lost inside structure	0	0	1	3
Fell	3	13	1	3
Murder	1	4	0	0
Trapped underwater	1	4	0	0
Struck by object	0	0	1	3
TOTALS	24	100 %	32	100 %
Nature of fatal injury				
Internal trauma/crushing	5	21 %	8	25 %
Sudden cardiac death	13	54	18	56
Asphyxiation (including smoke inhalation)	3	13	1	3
Burns	0	0	2	6
Stroke/aneurysm	1	4	3	9
Drowning	1	4	0	0
Gunshot (suicide)	1	4	0	0
TOTALS	24	100 %	32	100 %
Rank				
Firefighter	13	54 %	22	69 %
Company officer	11	46	3	9
Chief officer	0	0	7	22
TOTALS	24	100 %	32	100 %

Table 1
Comparison of On-Duty Deaths Between Career and Volunteer Firefighters, 2015* (Cont'd.)

	Career Firefighters		Volunteer Firefighters	
	Number of Deaths	Percent of Deaths	Number of Deaths	Percent of Deaths
Ages of firefighters **All deaths**				
25 and under	0	0 %	2	6
26 to 30	2	8	0	0
31 to 35	2	8	1	3
36 to 40	3	13	1	3
41 to 45	5	21	2	6
46 to 50	6	25	2	6
51 to 55	3	13	4	13
56 to 60	1	4	9	28
61 to 65	1	4	3	9
Over 65	1	4	8	25
TOTALS	24	100 %	32	100 %
Ages of firefighters **Sudden cardiac deaths only**				
36 to 40	2	15 %	0	0 %
41 to 45	3	23	1	6
46 to 50	3	23	1	6
51 to 55	2	15	2	11
56 to 60	1	8	6	33
61 to 65	1	8	3	17
over 65	1	8	5	28
TOTALS	13	100 %	18	100 %
Fire ground deaths by fixed property use				
Dwellings and apartments	7	64 %	5	63 %
Vacant warehouse	2	18	0	0
Mercantile	2	18	1	13
Vehicle fire	0	0	2	25
TOTALS	11	100 %	8	100 %

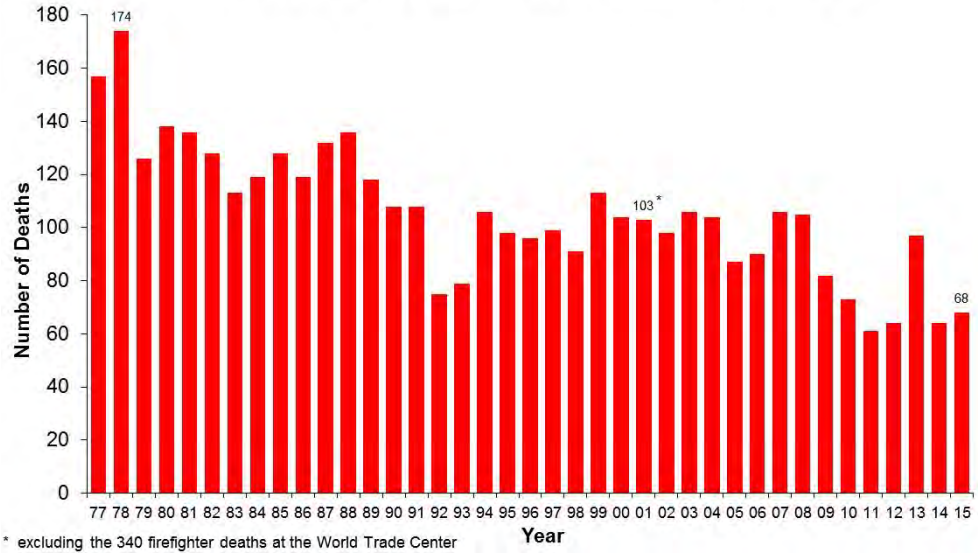
Table 1
Comparison of On-Duty Deaths Between Career and Volunteer Firefighters, 2015* (Cont'd.)

	Career Firefighters		Volunteer Firefighters	
	Number of Deaths	Percent of Deaths	Number of Deaths	Percent of Deaths
Years of service				
5 or less	2	8 %	4	13 %
6 to 10	4	17	1	3
11 to 15	4	17	4	13
16 to 20	5	21	1	3
21 to 25	5	21	4	13
26 to 30	2	8	2	6
over 30	2	8	16	50
TOTALS	24	100 %	32	100 %
Attributes of fire ground deaths**				
Intentionally-set fires	3		1	
Search and rescue operations	2		0	
Motor vehicle crashes	0		3	
False alarms	0		0	

* This table does not include the 12 victims who were employees or contractors with federal or state land management agencies, or members of a military fire department or inmate fire crew.

** Because these attributes are not mutually exclusive, totals and percentages are not shown.

Figure 1
On-Duty Firefighter Deaths - 1977-2015



* excluding the 340 firefighter deaths at the World Trade Center

Figure 2
Firefighter Deaths by Type of Duty - 2015

Figure 3
Firefighter Deaths by Cause of Injury -- 2015

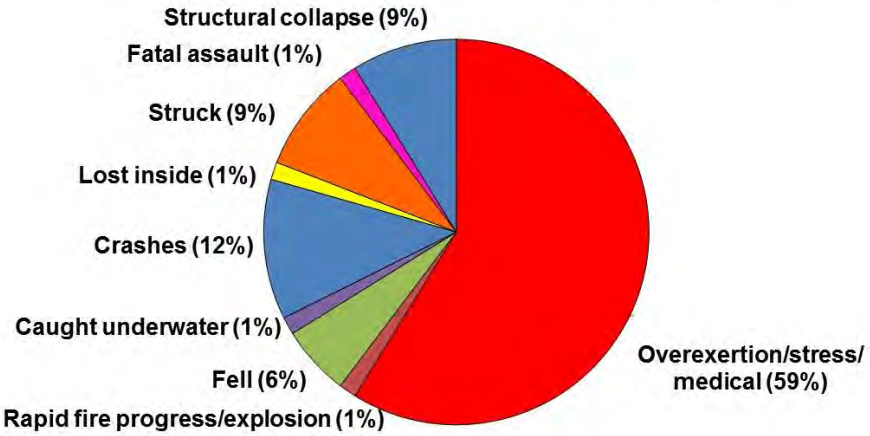


Figure 4
Firefighter Deaths by Nature of Injury -- 2015

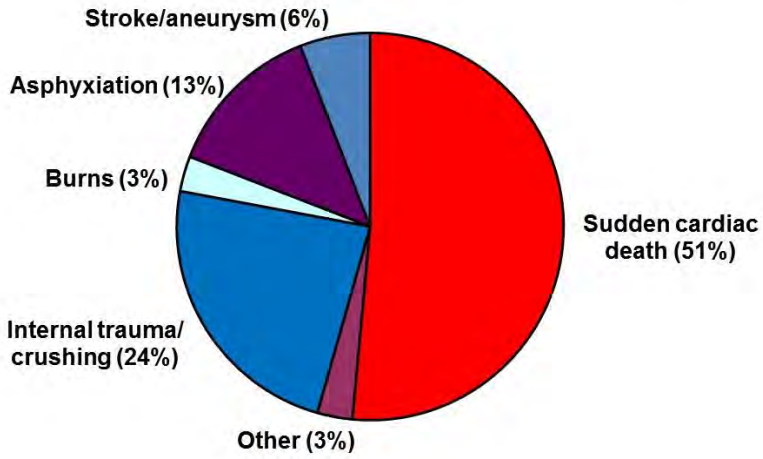


Figure 5
Firefighter Deaths by Age and Cause of Death
2015

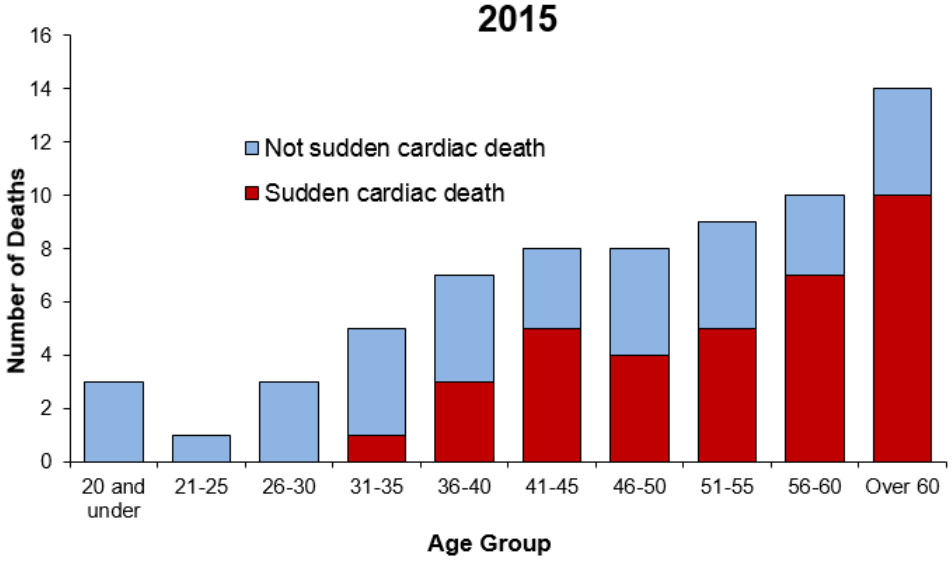


Figure 6
On-Duty Death Rates per 10,000 Career and Volunteer Firefighters
2011-2015

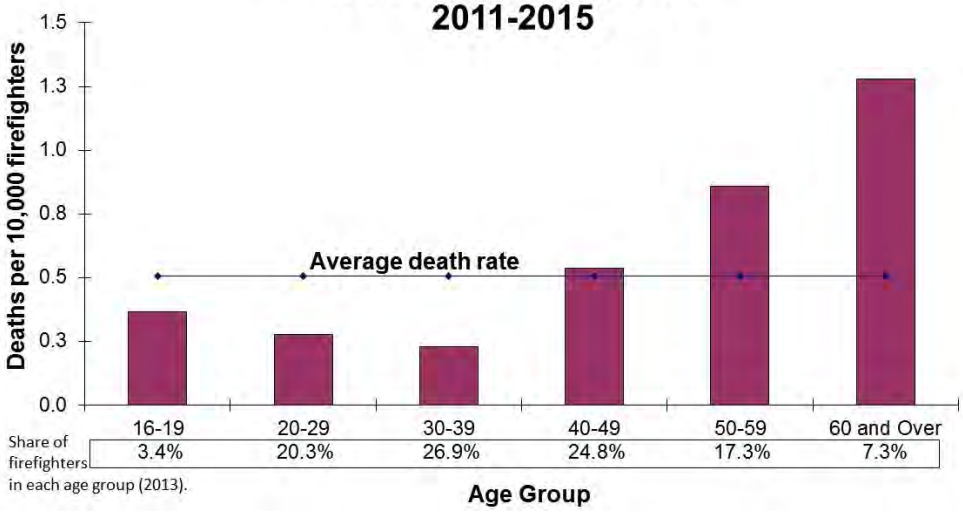
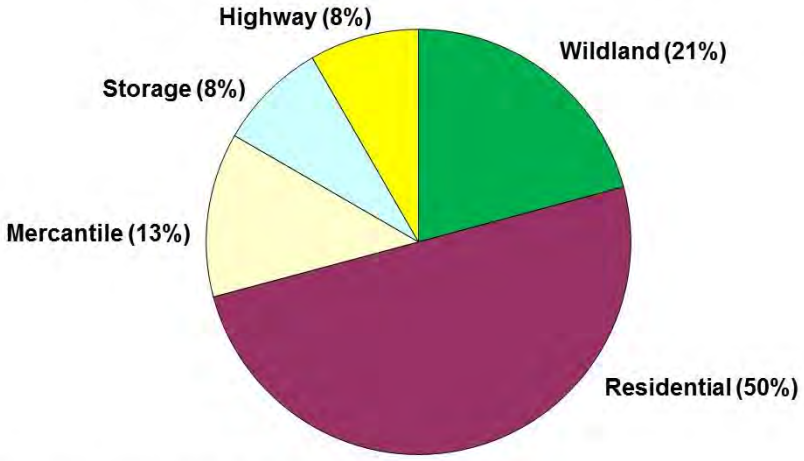


Figure 7
Fire Ground Deaths by Fixed Property Use*



* There were 24 deaths on the fire ground in 2015.

Figure 8
On-Duty Fire Ground Deaths per 100,000 Structure Fires 2010-2014

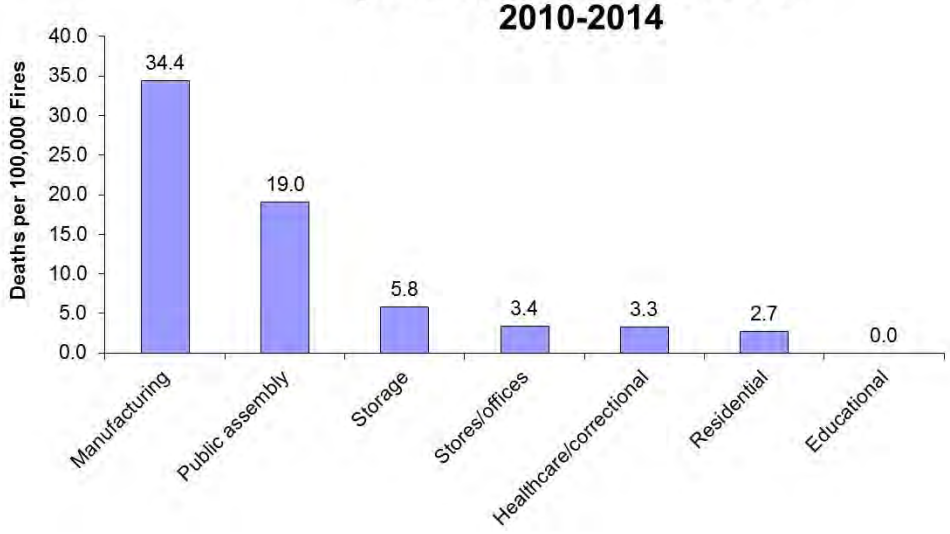
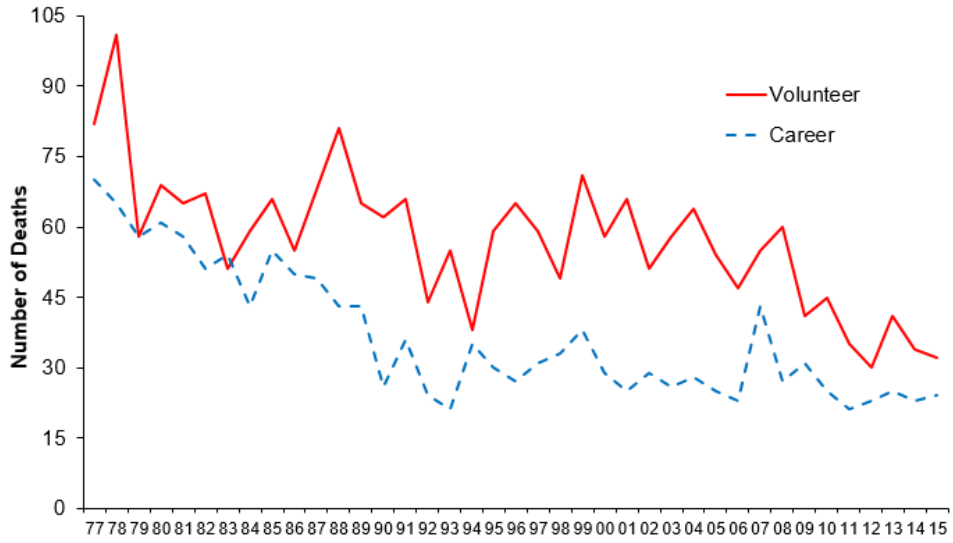


Figure 9
Career and Volunteer Firefighter Deaths
1977 - 2015*



* excluding the 340 firefighter deaths at the World Trade Center in 2001

2015 Selected Firefighter Fatality Incidents

Floor collapse

At 5:45 p.m. on February 11, the owner of a one-story, wood-frame, single-family, ranch-style house covering 2,500 square feet (230 square meters) lit a trash fire in a metal barrel next to the carport where his car was parked. He then went inside to join his wife. When he later heard crackling and popping sounds, he went outside to investigate and found his car, the carport, and other combustibles on fire. Seeing that brisk winds were spreading the fire to the house, he immediately went back inside and called 911 before leaving the house with his wife.

A responding engine company, including a 46-year-old lieutenant with 24 years' service, reported to the incident commander, who ordered them to ventilate the basement.

All members of the company were dressed in full turn-out gear, including positive pressure self-contained breathing apparatus (SCBA). When the company members reported they were unable to enter the basement due to the amount of hoarded items stored in it, the incident commander reassigned them to cut ventilation holes in the kitchen floor. As conditions deteriorated, the incident commander ordered them out of the building. As they left the house, the floor in the foyer collapsed, plunging the lieutenant and four firefighters into the basement.

The rapid intervention team (RIT), supplemented by firefighters from other companies, quickly retrieved the four fallen firefighters, but the lieutenant was pinned from the waist down by debris and surrounded by fire. Thirty minutes after the collapse, the RIT managed to pull the lieutenant from the basement and took him to a hospital, where he was pronounced dead. His face-piece was knocked off sometime between the collapse and his removal from the building, and he died of smoke inhalation.

The four firefighters and a battalion chief were burned and suffered various degrees of smoke inhalation as a result of staying in the building and helping until everyone was rescued. All the firefighters and the chief, who sustained the worst injuries, are expected to recover.

Struck by vehicle

Shortly after 9 p.m. on February 15, a 52-year-old firefighter arrived in his personal vehicle at the scene of a car crash on a highway. Using a flashlight, he began to direct traffic while standing in a safe zone that earlier responders had created by placing the fire department's apparatus and police vehicles in such a way as to reduce traffic to a single lane.

An SUV operated by an intoxicated individual left the travel lane and entered the safe zone, hitting the firefighter and pinning him between the SUV and the fire apparatus. The firefighters on the scene immediately went to his aid and transported him to a hospital, where he was pronounced dead as a result of blunt force trauma to the head.

The driver, who fled the scene, was later tracked to his home and arrested. He was charged with felony driving under the influence resulting in death and leaving the scene of an accident.

Sudden cardiac death

On February 19 at 6:48 p.m., the fire department responded to a 911 call from someone who discovered a fire in a neighboring single-story, wood-frame duplex. The house, which had no fire detection or suppression system, was unoccupied at the time.

Members of the first-arriving engine company, who were all dressed in full personal protective equipment, advanced a charged hose line into the structure. Soon afterward, the engine company officer, a 57-year-old captain with 37 years' service, left the building and began walking to an EMS unit when he collapsed. Paramedics and fire personnel immediately gave him medical attention and transported him to a hospital, where he died on February 21 from complications of myocardial infarction due to hypertensive atherosclerotic cardiovascular disease. The captain, who was 6 feet 4 inches (193 cm) tall and weighed 368 pounds (167 kilograms), had a history of hypertension and Type 2 diabetes, as well as hyperlipidemia and obesity, for which he was taking prescription medications.

The cause of the fire was resistance heating and arcing in a multi-plug electrical adapter.

Structural collapse

At 8:30 a.m. on March 3, three firefighters responded on mutual aid to a house fire in a neighboring jurisdiction. When they arrived at the two-story, wood-frame house 13 minutes later, the incident commander assigned them to interior fire attack.

The firefighters, dressed in full personal protective equipment, including SCBA, entered the building with a hose line and began to fight the fire. A short time later, however, fire conditions deteriorated, and the three firefighters started backing out of the building. As the first firefighter, an 18-year-old high school senior, left the house, the front porch roof, which was covered with wet snow, collapsed, trapping him under the debris in a position that inhibited his breathing.

Once he was extricated, an EMT managed to revive him, and he was transported to a hospital and placed on a respirator. Six days later, he was taken off the respirator and died as a result of positional asphyxiation.

The other two firefighters were able to escape the building with minor injuries.

Fall down elevator shaft

On March 26, the fire department received a call at 5:30 a.m. reporting a fire at a five-story building containing 38 apartments. The non-combustible structure was equipped with an operational fire alarm–smoke detection system, which operated. An elevator served all five levels. The elevator doors looked and operated like regular apartment doors, and were equipped with hydraulic door closers and heavy-duty door pulls.

The first-due companies found no fire showing when they arrived, but the district fire chief confirmed 10 minutes later that they had a working fire and called for a second alarm six minutes after that.

Among companies responding to the second alarm was a heavy rescue company with an officer, two firefighters, and a fire apparatus operator (FAO). On arrival, they reported to the incident commander,

who ordered them to help search the fifth story. The four, who were dressed in full personal protective equipment, including positive pressure SCBAs, entered the building through the front door and walked up the stairs on the left side of the building.

The officer and the two firefighters reached the fifth story before the FAO and started to search the apartments. As the FOA reached the fifth-story landing, he met other members of the fire department who were taking two victims out of the building. Because he couldn't see them clearly, he asked if they were members of his company and identified himself. They identified the company they were assigned to and continued down the stairs.

At this point, the FAO entered the fifth-story hallway and opened an unlocked door, apparently thinking it was an apartment door. He fell 23 feet (7 meters) head first down the elevator shaft to the top of the elevator, which was stopped near the second story. His head became wedged between the outside wall of the elevator and the wall of the shaft. No one saw him fall. Members of his company found him when they heard the low air alarm on his SCBA sound. The firefighter was extricated, treated, and taken to a hospital, where he was pronounced dead from head injuries.

Investigators determined that the fire started in the kitchen of an apartment on the second floor when the occupant left food cooking unattended. The fire spread to the hallway, generating copious amounts of smoke throughout the building.

Helicopter crash

On March 30 at 2:35 p.m., a helicopter crashed while its three-person contract crew was monitoring a controlled burn in a national forest. Two crew members were killed and the third was seriously injured.

Witnesses on the ground who were in contact with the helicopter reported that their vision was obscured by smoke, and none of them saw the helicopter crash. Satellite tracking data indicated that the helicopter had been flying low over the 800-acre (324-hectare) burn area for about 50 minutes before it went down. Its last reported position, at 2:33 p.m., indicated that it was flying at an altitude of 350 feet (107 meters) with a heading of 150 degrees. One witness told investigators that he saw the helicopter make a 180-degree left turn, and that about seven seconds later he heard a noise that sounded like an air hose being detached from a high-pressure tank, followed by the sound of the helicopter hitting trees and the ground.

The pilot died of smoke inhalation, and a second crew member died of trauma. The lone survivor, who also suffered severe trauma, was found outside the helicopter when the medivac helicopter arrived.

This information was contained in a preliminary report on the incident from the National Transportation Safety Board.

Sudden cardiac death

On April 7, a 51-year-old wildland contract tree faller (a logger hired to cut down trees) died while participating in a pack test, also known as a work capacity test, that he was required to take to qualify for one of the three levels of wildland firefighting duty. The test he was taking was the most difficult test, requiring him to hike 3 miles (5 kilometers) in 45 minutes carrying a 45-pound (20-kilogram) pack.

After one lap around the track of the multi-surface trail, the faller went to the lavatory. When the test administrator went to check on him, he found him collapsed on the floor. The administrator called the EMT who was on scene, and she started cardiopulmonary resuscitation immediately. An ambulance took the victim to a hospital, where he was pronounced dead of a heart attack. Investigators later learned that the faller had a history of heart problems and had once had heart surgery.

Struck by tree

On May 3, firefighters responded at 1:28 a.m. to an automobile crash with ensuing fire. After extinguishing the blaze, they began picking up their equipment to return to their station when a dead tree not involved in the crash fell unexpectedly on a 41-year-old firefighter with 11 years' service, pinning him to the ground. Other crew members removed the firefighter quickly and administered first aid. He was transported to a hospital, where he died as a result of a broken neck.

Drowning

At 10:30 p.m. on May 23, firefighters were called to evacuate approximately 10 people who were stranded in their homes by rising flood waters caused by heavy rainstorms that had swept across the area.

A 46-year-old fire captain escorting the trapped residents along a walkway next to a culvert fell into the culvert, and the rushing water carried him into a 36-inch (91-centimeter) storm drain that narrowed into an 18-inch (46-centimeter) pipe. He became trapped in the drain and drowned. The body of the 20-year veteran was recovered several hours later.

A fire lieutenant who also fell into the culvert while trying to help the captain survived the incident and was taken to a hospital for treatment of his injuries.

Fall through skylight

On June 28, a passerby called the fire department at 9:30 p.m. to report a fire in a Dumpster in front of a vacant warehouse. The warehouse was a single-story, unprotected, non-combustible structure with 14,000 square feet (1,300 square meters) of ground-floor area. It had no detection or suppression system.

The first two companies of the first alarm assignment, a truck and an engine company, arrived on scene four minutes after they were dispatched. The truck company moved the Dumpster away from the building as the engine company used a charged hose line to extinguish the fire. Both companies noted that an area under the window near the burning Dumpster was charred.

Shortly afterward, the chief and the rest of the first alarm companies arrived. The chief took command and asked the officer and crew of the first truck company to enter the warehouse to see if the fire had spread. Once inside, they saw a haze, so the chief sent the crew of the second truck company up to the roof to look for any sign of fire extension.

Finding that the flames had not spread to the roof, the firefighters began returning to the ground when one of them stepped through a skylight. The 46-year-old man, who was dressed in full personal protective clothing, including SCBA, fell 20 feet (six meters). Nearby crews heard him land.

The chief called the ambulance that was standing by, and firefighters on scene began giving the injured firefighter first aid. He regained consciousness and was transported to a hospital, where doctors determined that he had fractured his wrist, several of his ribs, and the transvers processes of three vertebrae. He had also dislocated an elbow and torn his right brachial artery. He was treated for these wounds and discharged from the hospital on July 9.

On July 15, the injured firefighter complained of shortness of breath. He was taken by ambulance to the hospital, but became unresponsive before reaching the hospital. Efforts to revive him failed, and he was pronounced dead on arrival as a result of complications of blunt force trauma.

As a result of this incident, the fire department implemented a mandatory safety reporting policy that requires the firefighter completing the fire report to indicate whether any safety concerns arose at the incident. In addition, the department's Fire Prevention and Operations Divisions must identify buildings that have skylights or translucent panels that pose similar risk. The Fire Prevention Division also submitted a code amendment requiring fluorescent signage and guardrails around roof openings of this type, and the department proposed assigning a dedicated safety officer to fire scenes, separate from the incident commander. The department also proposed that its Training Division provide additional training based on the observations made at this incident during the department's professional development training. Finally, the department provided each company with a tool to use to cut off turn-out gear and hired an outside contractor to create incident command software that will improve incident accountability, provide enhanced aerial and street level view mapping, ensure National Incident Management systems consistency, and provide real-time access to preplans prior to and during an incident.

Struck by tree

On August 8, a fire crew was called to a forest fire in a remote area at 5:30 p.m. The crew was engaged in initial attack activities when a weakened hemlock tree fell on two of the firefighters. One man, a 21-year-old with a year's service, died on scene of head injuries in spite of his colleagues' efforts to resuscitate him. The second firefighter sustained head injuries and a bone-bruised knee, but survived. He was treated at a hospital and released.

Investigators determined that the fire, which was confined to less than an acre (0.4 hectares), was started by a lightning strike.

Vehicle crash

At 7:30 a.m. on September 23, the fire department received a call for a 63-year-old man who was having chest pains. As three firefighters, including the assistant chief of EMS, responded with the rescue ambulance, they crashed into the rear of a slow-moving front-end loader.

The assistant chief, who was sitting in the front passenger seat, died of blunt force trauma to the head. It was not reported if he was wearing a seat belt. The other two firefighters were treated for minor injuries and released from the hospital. The operator of the front-end loader was not injured.

Investigators cited early morning sunshine, fog, and speed as reasons for the crash.

Sudden cardiac death

On December 4, a fire department ambulance responded to a large retail store for a man in cardiac arrest. Among those responding in the ambulance was a 49-year-old firefighter with 13 years of service. He began supporting an ambulance crew already on scene by starting chest compressions as part of cardiopulmonary resuscitation.

As he worked on the patient, however, he went into cardiac arrest himself, and a second ambulance was called. He was transported to a hospital, where he died of a coronary artery thrombosis resulting from coronary atherosclerosis. No history of heart problems was reported.

Lost inside

On December 19, the fire department received a telephone call at 7 p.m. requesting that they respond on mutual aid for a chimney fire. Once on scene, two firefighters were ordered to run a charged hose to the basement to extinguish the fire there.

As they prepared the hose, a firefighter from another fire department asked if they needed help and the three firefighters, dressed in full PPE including SCBA, advanced the hose into the basement. The third firefighter stayed at the door and fed hose to the nozzle man and back-up man inside. A short time later, they realized that the back-up firefighter, a 19-year-old male with three years of service, had become separated from them.

He was quickly found and removed to the outside. He was treated by on-scene paramedics and transported to a hospital, where he later died from his injuries. Cause of death was inhalation of super-heated gases.