

**FIREFIGHTER FATALITIES
IN THE UNITED STATES-2013**

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**National Fire Protection Association
Fire Analysis and Research Division**

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Abstract

In 2013, a total of 97 on-duty firefighter deaths occurred in the U.S. This large increase over the total for the past few years is due almost entirely to two high-fatality incidents – the Yarnell Hill Fire that killed 19 wildland firefighters and the explosion in West TX that killed 9 responding firefighters (as well as an EMT and several local residents). Despite the large number of traumatic and burn injuries that occurred in those incidents, stress and other medical-related issues, which usually result in heart attacks or other sudden cardiac events, continued to account for the largest number of fatalities. One-third of the deaths resulted from overexertion, stress and related medical issues. Of the 32 deaths in this category, 29 were classified as sudden cardiac deaths (usually heart attacks), one due to a cerebral aneurysm, one to a stroke and one was a suicide.

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

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2013 Experience

In 2013, 97 firefighters died while on-duty in the U.S. This total represents a sharp increase over recent years due primarily to two disastrous incidents – the Yarnell Hill Fire in Arizona that claimed the lives of 19 wildland firefighters and the explosion at a fertilizer plant in Texas that killed nine firefighters, along with an EMT and five local residents.* Over the previous four years, the annual total ranged between 61 and 82 deaths. The annual average over the past decade is 87 deaths. Figure 1 shows firefighter deaths for the years 1977 through 2012, excluding the 340 firefighter deaths at the World Trade Center in 2001.¹

Of the 97 firefighters who died while on duty in 2013, 41 were volunteer firefighters, 25 were career firefighters, 19 were members of a wildland firefighting crew associated with a municipal fire department, five were employees of federal land management agencies, three were federal contractors, two were state contractors, one was an employee of a state land management agency and one was a prison inmate.²

In 2013, in addition to the two multiple-fatality incidents mentioned above, there was a four-fatality incident in which the victims were killed in a structural collapse and a double-fatality incident, where one firefighter became trapped in a structure fire and another firefighter, a member of the Rapid Intervention Crew sent in to rescue him, was caught in a structural collapse. More details will be presented throughout this report.

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,

* Five of the victims were members of the local volunteer fire department. Five other firefighters who were members of neighboring fire departments responded from a nearby EMS class and were also killed. One of those five is counted by his fire department, and in this report, as an EMT.

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 a comprehensive study of on-duty firefighter fatalities would include chronic illnesses (such as cancer or heart disease) that prove fatal and that arise from occupational factors. In practice, there is no mechanism for identifying fatalities that are due to illnesses that develop over long periods of time. This creates an incomplete picture when comparing occupational illnesses to other factors as causes of firefighter deaths. This is recognized as a gap the size of which cannot be identified 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.

The NFPA also 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.[†])

[†] USFA link is usfa.dhs.gov/fireservice/fatalities/index.shtm, National Fallen Firefighters' Memorial link is www.firehero.org/

Readers comparing reported losses should carefully consider the definitions and inclusion criteria used in any study.

Type of Duty

Figure 2 shows the distribution of the 97 deaths by type of duty. The largest share of deaths occurred while firefighters were operating on the fire ground (56 deaths). This is the highest number of fire ground deaths since 1999 (aside from the deaths at the World Trade Center in 2001), largely due to the 32 deaths in the three largest multiple-fatality incidents. In fact, the number of fire incidents in 2013 at which firefighters were killed (26 fires) is consistent with the average number of such fatal fires over the previous 10 years. This number has ranged from 16 to 29, with a resulting 21 to 37 fire ground deaths annually, but two of the fatal fires in 2013 were more deadly than have generally occurred.

Half of the fire ground deaths (28 of 56) occurred at 10 wildland fires or prescribed burns, making 2013 an exceptionally bad year for wildland firefighter fatalities. There were 27 deaths at 15 structure fires and one death at an outside fire. Seventeen of the 56 fire ground victims were volunteer firefighters, 12 were career firefighters, and 27 were wildland firefighters (including one prison inmate). In the 10-year period ending in 2012, an average of four wildland firefighters died annually at wildland fires or prescribed burns. The average number of career firefighter deaths on the fire ground over the past 10 years is 12 deaths per year, while the average for volunteer firefighters is 13 deaths per year.

Seventeen firefighters died while responding to or returning from emergency calls. It is important to note that deaths in this category are not necessarily the result of crashes. Eight deaths occurred in collisions or rollovers, five were due to sudden cardiac events, one to a stroke, one firefighter was struck by a vehicle on arrival at a crash scene, one slipped and fell from apparatus on arriving back at the station, and one was killed when he was knocked to the ground in an altercation back at the fire station after a call. All crashes and sudden cardiac deaths are discussed in more detail later in this report. Thirteen of the victims were volunteer firefighters, three were career firefighters and one was contractor with a state land management agency. The number of deaths that occurred while responding to or returning from calls has averaged about 24 per year over the past 10 years and 17 per year over the past five years. Although the 2013 total is not as low as in 2011, when 10 deaths occurred, it still continues the recent trend.

Seven firefighters died at non-fire emergencies, six at the scene of motor vehicle crashes and one at a medical emergency. Four of the seven suffered sudden cardiac deaths and three were struck by vehicles.

Seven deaths occurred during training activities. Sudden cardiac death claimed five firefighters – one during a Work Capacity Test, one during physical fitness training in the fire station, one during recruit training, one while returning from a training conference and one during an unspecified fire department training exercise at a training facility. One firefighter died in a training jump when his parachute failed to open. The seventh firefighter died in a crash while returning from an off-site mandatory training session.

The remaining 10 firefighters died while involved in a variety of non-emergency-related on-duty activities. Nine of the deaths were due to sudden cardiac death and one was a suicide at the fire station. Seven of the victims were engaged in normal administrative or station duties, one was performing a safety check at an airport, one was searching for camp fires and one was searching in woods for explosives.

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.⁴

By a small margin, overexertion, stress and medical issues accounted for the largest share of deaths. Of the 32 deaths in this category, 29 were classified as sudden cardiac deaths (usually heart attacks), one was due to a cerebral aneurysm, one to a stroke, and one was a suicide. See the section below for more detail on sudden cardiac deaths.

The second leading cause of fatal injury was being caught or trapped by rapid fire progress (including flashover) and explosions, resulting in 30 deaths. Nineteen of the victims were the members of the wildland firefighting crew that became caught in rapid fire development at the Yarnell Hill Fire and another nine were victims of the fertilizer plant explosion. Two firefighters in separate incidents became caught by rapid fire progress in structure fires.

Vehicle crashes claimed 10 lives, and another six firefighters were struck and killed by vehicles. These vehicle-related deaths are discussed in detail later in this report.

Structural collapses resulted in a total of eight deaths. Four of the eight firefighters were killed in a single incident when the roof collapsed during a fire. The firefighters had responded to a fire in a motel restaurant and were in the building for firefighting operations and primary search for just a few minutes before the roof collapsed. The investigation reports on this incident are expected to be released in the summer of 2014.

Two other firefighters in separate incidents also died as a result of roof collapses. One firefighter

was killed when the floor collapsed and he fell into the basement. One victim was caught in a ceiling collapse during overhaul operations.

In separate incidents, three firefighters became lost inside structures.

Three firefighters were killed on wildland fires when they were struck by falling trees or limbs.

Three firefighters died in fatal falls – one fell from the roof of a fire-involved structure in heavy smoke; one slipped and fell in the fire station; and one fell to the ground when his parachute failed to open during training.

One firefighter was electrocuted after a storm knocked power lines onto a metal structure. One firefighter was fatally assaulted by another firefighter after returning from an emergency call.

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. In almost every year since 1977, sudden cardiac death has accounted for the largest share of the deaths annually. Due to the large number of fatalities in a single explosion in 2013, the leading nature of fatal injury last year was internal trauma and crushing, with 32 deaths.

Sudden cardiac death accounted for 29 on-duty deaths in 2013 and will be discussed in more detail in the next section.

The third leading nature of fatal injury last year was burns, with a single wildland incident accounting for 19 of these 24 deaths.

The other major category of fatal injury was asphyxiation or smoke inhalation, with eight deaths. There was one death each due to electrocution, stroke, cerebral hemorrhage, and suicide.

Sudden Cardiac Deaths

In 2013, the 29 sudden cardiac deaths with onset while the victim was on-duty is the second lowest since this study began in 1977, and the second consecutive year with fewer than 30 deaths in this category.

The number of deaths in this category has fallen significantly since 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 35 in the past decade. In spite of this reduction, sudden cardiac death still accounted for 42 percent of the on-duty deaths in the last five years. Overall, sudden cardiac death is the number one cause of on-duty firefighter fatalities in the U.S. and with two exceptions (1984 and 2013), has accounted for the single largest share of deaths in any given year.

NFPA has several standards that focus on the health risks to firefighters. For example, NFPA 1582, *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, *Fire Department Occupational Safety and Health Program*, calls for fire departments to establish a firefighter health and fitness program that meets NFPA 1583, *Health-Related Fitness Programs for Fire Fighters*, 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 the [National Volunteer Fire Council'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.

Ages of Firefighters

The firefighters who died in 2013 ranged in age from 19 to 76, with a median age of 40 years. Figure 5 shows the distribution of firefighter deaths by age and whether the cause of death was sudden cardiac death or not. This is a very different age distribution for younger firefighters than usually occurs. Fifteen of the 19 firefighters killed in the Yarnell Hill Fire were between the ages of 21 and 30, accounting for half of the deaths in the age ranges 21-25 and 26-30. As a result, the totals in those ranges are much higher than seen most years.

Sudden cardiac death accounts for a higher proportion of the deaths among older firefighters, as might be expected. Almost half of the firefighters over age 40 who died in 2013, and almost two-thirds of those over age 60, died of heart attacks or other cardiac events. The youngest victim of sudden cardiac death was aged 22. According to the [NIOSH investigation report on his death](#), his autopsy showed an enlarged heart with left ventricular hypertrophy, but his heart disease had not been

[‡] http://www.iafc.org/files/healthWell_WFI3rdEdition.pdf

[§] <http://www.healthy-firefighter.org/>

diagnosed.**

Figure 6 shows death rates by age, using combined career and volunteer firefighter fatality data for the five-year period from 2009 through 2013 and estimates of the number of career and volunteer firefighters in each age group from NFPA's 2011 profile of fire departments (the mid-year in the range).⁵

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

Fire Ground Deaths

Of the 56 fire ground fatalities, 24 were due to burns, 16 were due to internal trauma or crushing, seven to sudden cardiac death, eight to asphyxiation or smoke inhalation, and one to electrocution. Twenty-eight of the 56 deaths occurred on 10 wildland fires or a prescribed burn, 27 at 15 structure fires and one at an outside fire. As mentioned above, this is the highest number of deaths on the fire ground since 1999 (not including the deaths at the World Trade Center in 2001), and this is mainly due to the 19-fatality Yarnell Hill wildland fire and an explosion at a fertilizer plant in Texas that claimed the lives of nine firefighters.

Figure 7 shows the distribution of the 56 fire ground deaths by fixed property use. To put the impact of the major loss-of-life incidents in perspective, the distribution of fatal incidents by fixed property use is also shown in Figure 7.

In all, wildland fires accounted for half of the deaths and almost two-fifths of the fatal fires. In addition to the 19 firefighters killed at the Yarnell Hill disaster, four firefighters suffered sudden cardiac death, three were struck by a falling tree limb or snag, one was struck by a passing vehicle, and one died when his ATV rolled over.

In the single worst structure fire in 2013, nine firefighters were killed in an explosion at a fertilizer plant. (Also killed were a responding EMT and five local residents.)

Another 10 of the 27 firefighter deaths at structure fires occurred in residential properties. Although residential structure fires accounted for only 18 percent of the fire ground deaths in 2013, they

** <http://www.cdc.gov/niosh/fire/reports/face201320.html>

accounted for almost two-fifths of the fatal incidents. Seven of the 10 firefighters were killed in fires in one- and two-family dwellings, two died at fires in apartment buildings and one was killed in a vacant dwelling. One of the 10 victims fell through the floor and died as a result of thermal inhalation injuries. One firefighter fell off the roof of a building. One firefighter became lost inside a dwelling and died as a result of inhalation injuries. One firefighter was killed in a structural collapse during search operations and another was killed when a ceiling collapsed during overhaul. In separate incidents, two firefighters were fatally burned when fire conditions inside the structure deteriorated rapidly. Three of the 10 firefighters suffered sudden cardiac death at the fire scene – two at separate incidents while operating pumps and one during exterior operations.

Seven firefighters were killed in three fires in assembly properties. A fire that started in a restaurant at a motel killed four firefighters when the roof collapsed. Two firefighters were killed in a fire in a function hall – the first victim became lost inside the burning structure and the second victim was a member of the Rapid Intervention Crew sent in to rescue him. Both were killed when the roof collapsed. And a firefighter operating at a fire in a restaurant died when he became lost inside and ran out of air.

One firefighter was electrocuted as he approached a storage shed that was ignited by a downed power line.

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

One firefighter was killed at the scene of an outside fire when he became pinned between his apparatus and another fire apparatus that was backing up.

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 2008 through 2012 (the 2013 results are not yet available) and from the updated firefighter fatality data for the corresponding years. The results are shown in Figure 8. Fires in vacant structures are included in the category for the intended use of the structure; for example, deaths in vacant houses are included in the residential fire category.

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 mercantile, public assembly and manufacturing properties, are more hazardous to firefighters, on average. There were 7.4 fire ground deaths per 100,000 nonresidential structure fires from 2008 through

2012, compared to 2.9 deaths per 100,000 residential structure fires. The highest death rates over the five-year period occurred in manufacturing properties. The low rate in health care and correctional 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 low rate in that five-year period for storage properties, which includes garages at dwellings, reflects the relatively small number of fatalities that have occurred in such structures in recent years. In contrast, the similar rate in educational properties is a 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 2004 through 2013, there were 19 deaths in 16 fires in vacant buildings and buildings under demolition or renovation.

Vehicle-Related Deaths

In 2013, 17 firefighters died in vehicle-related incidents, including 10 firefighters who died in vehicle crashes. Six other firefighters were struck and killed by vehicles, and one firefighter fell to his death when his parachute failed to open during a proficiency jump. There were no firefighter deaths in aircraft crashes in 2013.

Seven of the 10 firefighters who died in crashes were killed while responding to incidents and one was killed while returning from an incident. All eight were the drivers in single-fatality crashes. Three were responding to the scene of motor vehicle crashes, three were responding to structure fires, one was responding to a wildland fire and another was returning from a wildland fire.

- A firefighter responding to a wildland fire in his private vehicle was killed when his vehicle went off the road and struck a tree. The victim was wearing a seatbelt.
- A firefighter driving to a structure fire in a fire department SUV skidded on a wet curve, went off the road and struck a tree and fence. The victim was wearing his seatbelt and was not ejected. Driving too fast for conditions, which included limited visibility due to heavy rain, was cited as a cause of the crash.
- A firefighter responding in his personal vehicle to a structure fire lost control and his vehicle overturned. He was not wearing a seatbelt and was ejected. Speeding and drunk driving were factors in this crash.
- A firefighter driving a pumper to a structure fire was killed when the vehicle ran off the road, overturned and struck a utility pole. He was not wearing a seatbelt and was partially ejected.

Water shifting in the tank on a curve was cited as a factor in the crash. There was no information on speed.

- A firefighter responding to the scene of a motor vehicle crash in his personal vehicle struck another emergency responder's car as he attempted to overtake or pass the other vehicle while it was making a left turn. After striking the other vehicle, the victim's vehicle went down a ditch, hit a culvert, went airborne, landed on the roof and rolled. The victim was not wearing a seatbelt and was ejected. Failure to yield the right of way and improper passing were cited as factors in the crash.
- Another driver responding to a motor vehicle crash in his own vehicle lost control in heavy rain, crossed the centerline sideways and was broadsided by an oncoming vehicle. He was wearing a seatbelt and was not ejected. Speeding was cited as a factor in the crash.
- A third firefighter responding to a motor vehicle crash in his personal vehicle lost control on a curve in the rain, overcorrected and ran off the road, striking a concrete structure. The victim was not wearing a seatbelt and was not ejected. Speeding was cited as a factor in the crash.
- The firefighter who died in a crash while returning from a wildland fire was driving a water tender (tanker) when he hit an embankment on a steep road and overturned. There were no other details on the crash.

In the other two crashes, a firefighter riding an ATV searching for the source of a reported fire apparently jumped or was thrown from the vehicle when it started to roll on a slope. The vehicle rolled over him, resulting in fatal injuries. In the other crash, a firefighter returning on his motorcycle from off-site training crossed the centerline on a curve and struck an oncoming vehicle. No other details were reported.

Of the nine firefighters mentioned above who died in road vehicle crashes, five were not using seatbelts (three were ejected or partially ejected and two were not), two were using seatbelts (one was not ejected and there were no details on the other) and no details on seatbelt use were reported for the eighth victim. The ninth victim was riding a motorcycle. Factors reported in the crashes included excessive speed, weather conditions, intoxication, cargo shifting, failure to yield and improper passing.

Six firefighters were struck and killed by vehicles. Four were working at the scenes of motor vehicle crashes and two were operating at fires.

- One firefighter was operating at a motor vehicle crash on an icy highway when a passing tractor-trailer lost control and struck him. Actions of the driver, the weather, inadequate

protection of the highway work area and inadequate traffic management were cited as factors in the death.

- A drunk driver struck a firefighter while he was directing traffic at a crash scene on a highway.
- A firefighter was struck at a crash scene by a passing vehicle as he was putting on his personal protective equipment.
- A firefighter directing traffic 100 feet (30 meters) from a crash scene was struck from behind. He was wearing a safety vest.
- Smoke obscured visibility at the scene of a prescribed burn as a firefighter stepped out of his vehicle. He was struck by a passing vehicle. The victim was not wearing a high-visibility retroreflective vest at the time and the travel lane was not protected.
- A firefighter was retrieving his gear from the back of his rescue vehicle at a fire scene when he became pinned against the vehicle by another apparatus that was backing up. Inattention, lack of situational awareness, vehicle placement and lack of a backer guiding the apparatus were cited as factors in the incident.

NFPA publishes several standards related to road and vehicle safety issues and a new standard is currently being developed.

- [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 Service 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, Testing, Maintenance 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 10,000 lb. gross vehicle weight (4,500 kg) rating that are specifically designed for wildland fire suppression.
- [NFPA 1091, *Standard on Traffic Control Incident Management*](#), which is currently under development, will identify the minimum job performance requirements necessary to perform temporary traffic control duties at emergency incidents on or near an active roadway. Its first edition will be published in 2015, and a proposed draft is available on NFPA's website for review.

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 formed partnerships with the IAFF, NVFC and IAFC to focus attention on safety while responding in emergency apparatus. Details can be found on [USFA's website](#).^{††}

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 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

^{††} http://www.usfa.fema.gov/fireservice/firefighter_health_safety/safety/vehicle_safety/index.shtml

NFPA-compliant personal protective clothing (turn-out gear) when directly exposed to flames, heat and 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. Although the 41 deaths of volunteer firefighters in 2013 is a sizeable increase over the number 2012, it is still substantially below the 10-year average of 47 deaths. Overall, the number of deaths of volunteer firefighters while on duty has followed a general downward trend since 1999. The 25 deaths of career firefighters is a small increase over the total in 2012, and the fourth 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 66 career and volunteer firefighters killed in 2013 is shown in Table 1.

Other Findings

Two firefighters were killed in connection with intentionally-set fires in 2013; both at the scene of structure fires. From 2004 through 2013, 41 firefighters (5.0 percent of all on-duty deaths) died in connection with intentionally-set fires. The number of these deaths annually has been dropping since 1985.

In 2013, no deaths resulted from false alarms. Over the past 10 years, 18 firefighter deaths have resulted from false calls, including malicious false alarms and alarm malfunctions.

^{##}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>

Summary

There were 97 on-duty firefighter deaths in 2013. Although this was the fifth consecutive year that the total has been lower than 100 deaths, the death toll in 2013 was far higher than in recent years. This was due almost entirely to two high-fatality incidents. With the deaths of 19 wildland firefighters, the Yarnell Hill Fire was the largest fatality incident, other than the World Trade Center in 2001, since NFPA started producing this study in 1977. And with nine firefighter fatalities, the fertilizer plant explosion in Texas ranks as the fourth-highest loss-of-life incident. Taken together, 28 of the deaths in 2013 occurred in just two fires.

With 30 deaths, 2013 was the worst year in terms of deaths related to wildland fires since 1994, when 33 firefighters were killed, including 14 in the South Canyon fire. On a positive note, there were no firefighter deaths in aircraft crashes on wildland fires in 2013.

The major incidents of 2013 notwithstanding, sudden cardiac death continues to claim a major share of the on-duty deaths annually. Progress has been made in this area, however, with 29 on-duty cardiac deaths representing the second lowest total since this study began in 1977, and the second consecutive year that the total has been below 30.

In 2013, one on-duty suicide was reported. Firefighter behavioral health is a topic that has garnered considerably more attention in recent years, particularly due to the efforts of the [Firefighter Behavioral Health Alliance](#).^{***} The Alliance recently produced a report on [behavioral health and suicide prevention](#) that was published by the National Volunteer Fire Council, with support from USFA. NFPA 1500 requires access to a behavioral health program that provides assessment, counseling and treatment for such issues as stress, anxiety, and depression.^{†††}

This NFPA study focuses on the fire deaths that are directly associated with specific on-duty activities, and does not track the effects of long-term exposure to toxic products that might occur during an individual's time in the fire service. NIOSH, however, has undertaken a multi-year study to examine the cancer risk of firefighters, using health records of approximately 30,000 current and retired career firefighters from suburban and large city fire departments. [Results of the first phase](#) were published in October, 2013.^{†††}

^{***} <http://www.ffbha.org/>

^{†††} http://www.nvfc.org/files/documents/ff_suicide_report.pdf

^{†††} http://www.cdc.gov/niosh/firefighters/pdfs/OEM_FF_Ca_Study_10-2013.pdf

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. The categories for cause of injury and nature of injury are based on the 1981 edition of NFPA 901, *Uniform Coding for Fire Protection*.
5. Michael J. Karter, Jr. and Gary P. Stein, "U.S. Fire Department Profile Through 2011," NFPA Fire Analysis and Research Division, Quincy, Massachusetts, October 2012.

Credits

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.

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 \$ 333,604.68, 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, 2013, the maximum benefit a student may receive is \$1,003 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, 2013*

| | Career Firefighters | | Volunteer Firefighters | |
|---|-----------------------------|------------------------------|-------------------------------|------------------------------|
| | Number of Deaths | Percent of Deaths | Number of Deaths | Percent of Deaths |
| Type of duty | | | | |
| Operating at fire ground | 12 | 48 % | 17 | 41 % |
| Responding to or returning from alarms | 3 | 12 | 13 | 32 |
| Operating at non-fire emergencies | 2 | 8 | 5 | 12 |
| Training | 1 | 4 | 4 | 10 |
| Other on-duty | 7 | 28 | 2 | 5 |
| TOTALS | 25 | 100 % | 41 | 100 % |
| Cause of fatal injury | | | | |
| Overexertion/stress/other related | 11 | 44 % | 16 | 39 % |
| Rapid fire progress/explosion | 1 | 4 | 10 | 24 |
| Motor vehicle crash | 1 | 4 | 7 | 17 |
| Structural collapse | 7 | 28 | 1 | 2 |
| Struck by vehicle | 2 | 8 | 3 | 7 |
| Lost inside structure | 2 | 8 | 1 | 2 |
| Fell | 1 | 4 | 1 | 2 |
| Exposed to electricity | 0 | 0 | 1 | 2 |
| Assault | 0 | 0 | 1 | 2 |
| TOTALS | 25 | 100 % | 41 | 100 % |
| Nature of fatal injury | | | | |
| Internal trauma/crushing | 6 | 24 % | 20 | 49 % |
| Sudden cardiac death | 10 | 40 | 14 | 34 |
| Asphyxiation (including smoke inhalation) | 6 | 24 | 1 | 2 |
| Burns | 2 | 8 | 3 | 7 |
| Stroke/cerebral hemorrhage | 0 | 0 | 2 | 5 |
| Suicide | 1 | 4 | 0 | 0 |
| Electrocution | 0 | 0 | 1 | 2 |
| TOTALS | 25 | 100 % | 41 | 100 % |
| Rank | | | | |
| Firefighter | 15 | 60 % | 26 | 63 % |
| Company officer | 8 | 32 | 7 | 17 |
| Chief officer | 2 | 8 | 8 | 20 |
| TOTALS | 25 | 100 % | 41 | 100 % |

| Ages of Firefighters | Career Firefighters | | Volunteer Firefighters | |
|-----------------------------|----------------------------|--------------------------|-------------------------------|--------------------------|
| | Number of Deaths | Percent of Deaths | Number of Deaths | Percent of Deaths |
| All deaths | | | | |
| 20 and under | 0 | 0 % | 2 | 5 % |
| 21 to 25 | 3 | 12 | 3 | 7 |
| 26 to 30 | 2 | 8 | 4 | 10 |
| 31 to 35 | 2 | 8 | 1 | 2 |
| 36 to 40 | 2 | 8 | 7 | 17 |
| 41 to 45 | 2 | 8 | 4 | 10 |
| 46 to 50 | 5 | 20 | 5 | 12 |
| 51 to 55 | 5 | 20 | 3 | 7 |
| 56 to 60 | 4 | 16 | 5 | 12 |
| 61 to 65 | 0 | 0 | 3 | 7 |
| Over 65 | 0 | 0 | 4 | 10 |
| TOTALS | 25 | 100 % | 41 | 100 % |

Ages of Firefighters
Sudden cardiac deaths only

| | | | | |
|---------------|-----------|--------------|-----------|--------------|
| 21 to 25 | 0 | 0 % | 1 | 7 % |
| 26 to 30 | 0 | 0 | 0 | 0 |
| 31 to 35 | 1 | 10 | 0 | 0 |
| 36 to 40 | 1 | 10 | 1 | 7 |
| 41 to 45 | 0 | 0 | 2 | 14 |
| 46 to 50 | 3 | 30 | 1 | 7 |
| 51 to 55 | 1 | 10 | 2 | 14 |
| 56 to 60 | 4 | 40 | 3 | 21 |
| 61 to 65 | 0 | 0 | 2 | 14 |
| over 65 | 0 | 0 | 2 | 14 |
| TOTALS | 10 | 100 % | 14 | 100 % |

Fire ground deaths by fixed property use

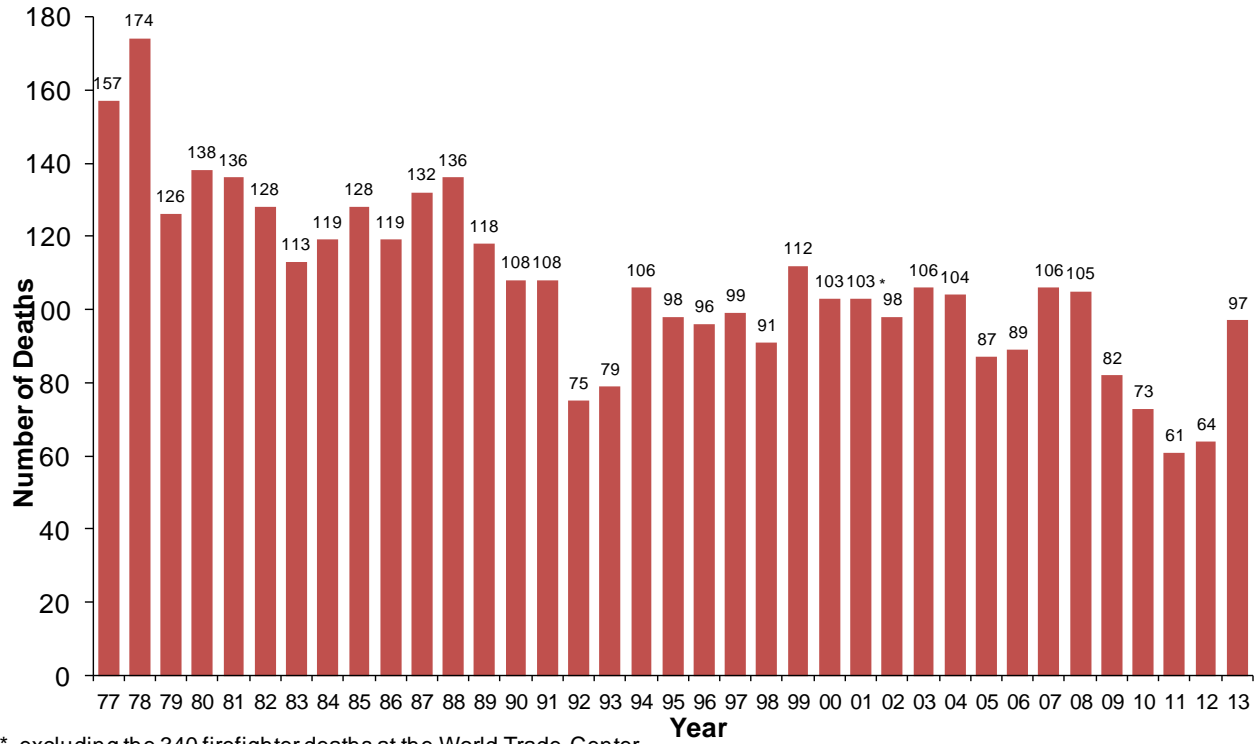
| | | | | |
|--------------------------|-----------|--------------|-----------|--------------|
| Dwellings and apartments | 2 | 17 % | 7 | 41 % |
| Storage | 0 | 0 | 1 | 6 |
| Vacant dwelling | 1 | 8 | 0 | 0 |
| Restaurant | 5 | 42 | 0 | 0 |
| Function hall | 2 | 17 | 0 | 0 |
| Manufacturing | 1 | 8 | 8 | 47 |
| Outside fire | 1 | 8 | 0 | 0 |
| Wildland fire | 0 | 0 | 1 | 6 |
| TOTALS | 12 | 100 % | 17 | 100 % |

| | Career Firefighters | | Volunteer Firefighters | |
|---|-----------------------------|------------------------------|-------------------------------|------------------------------|
| | Number of Deaths | Percent of Deaths | Number of Deaths | Percent of Deaths |
| Years of service | | | | |
| 5 or less | 5 | 20 % | 11 | 27 % |
| 6 to 10 | 3 | 12 | 6 | 15 |
| 11 to 15 | 5 | 20 | 5 | 12 |
| 16 to 20 | 2 | 8 | 6 | 15 |
| 21 to 25 | 4 | 16 | 1 | 2 |
| 26 to 30 | 3 | 12 | 3 | 7 |
| over 30 | 3 | 12 | 6 | 15 |
| Not reported | 0 | 0 | 3 | 7 |
| TOTALS | 25 | 100 % | 41 | 100 % |
| Attributes of fire ground deaths** | | | | |
| Intentionally-set fires | 2 | | 0 | |
| Search and rescue operations | 6 | | 2 | |
| Motor vehicle crashes | 1 | | 7 | |
| False alarms | 0 | | 0 | |

* This table does not include the 31 victims who were employees or contractors with state or federal land management agencies, or members of prison inmate crews.

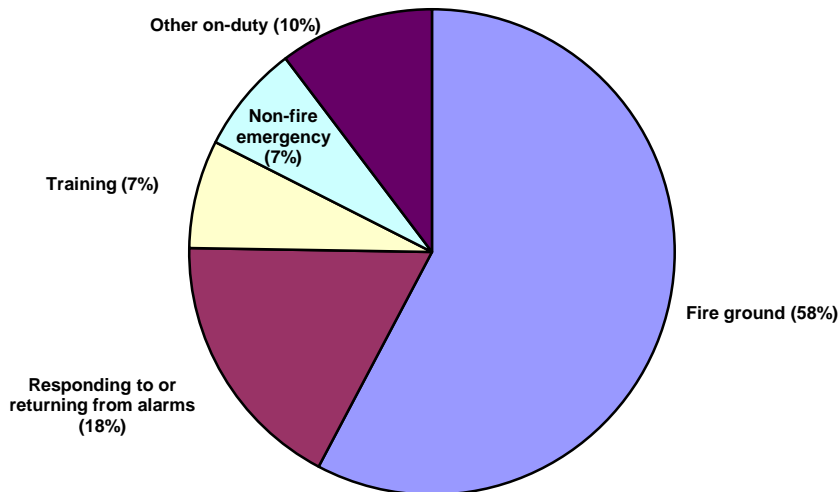
** Because these attributes are not mutually exclusive, totals and percentages are not shown.

**Figure 1
On-Duty Firefighter Deaths - 1977-2013**

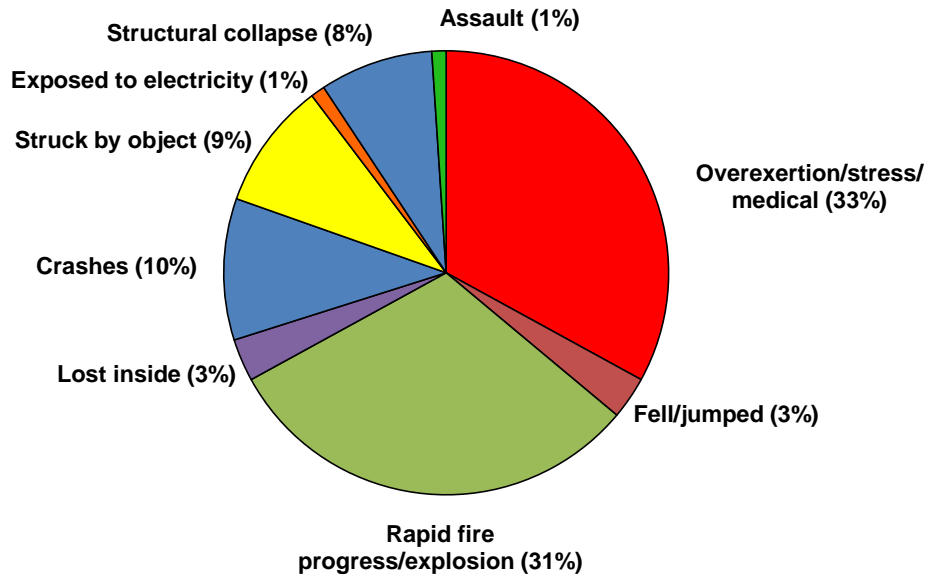


* excluding the 340 firefighter deaths at the World Trade Center

**Figure 2
Firefighter Deaths by Type of Duty -- 2013**



**Figure 3
Firefighter Deaths by Cause of Injury -- 2013**



**Figure 4
Firefighter Deaths by Nature of Injury -- 2013**

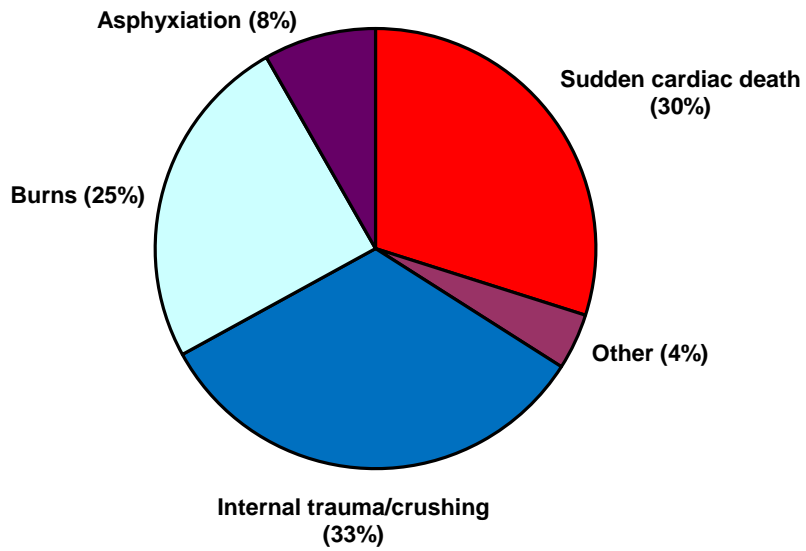


Figure 5
Firefighter Deaths by Age and Cause of Death -- 2013

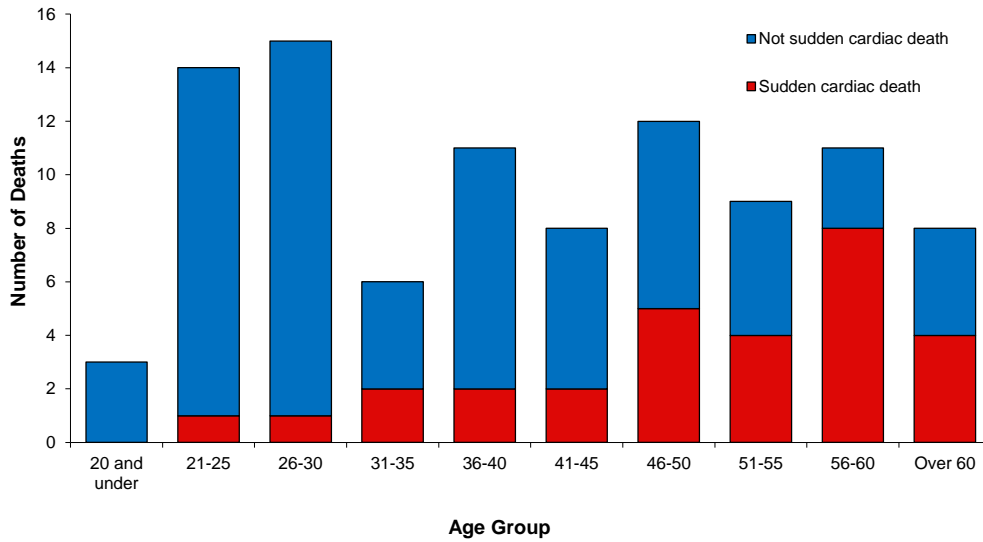


Figure 6
On-Duty Death Rates per 10,000 Career and Volunteer Firefighters
2009-2013

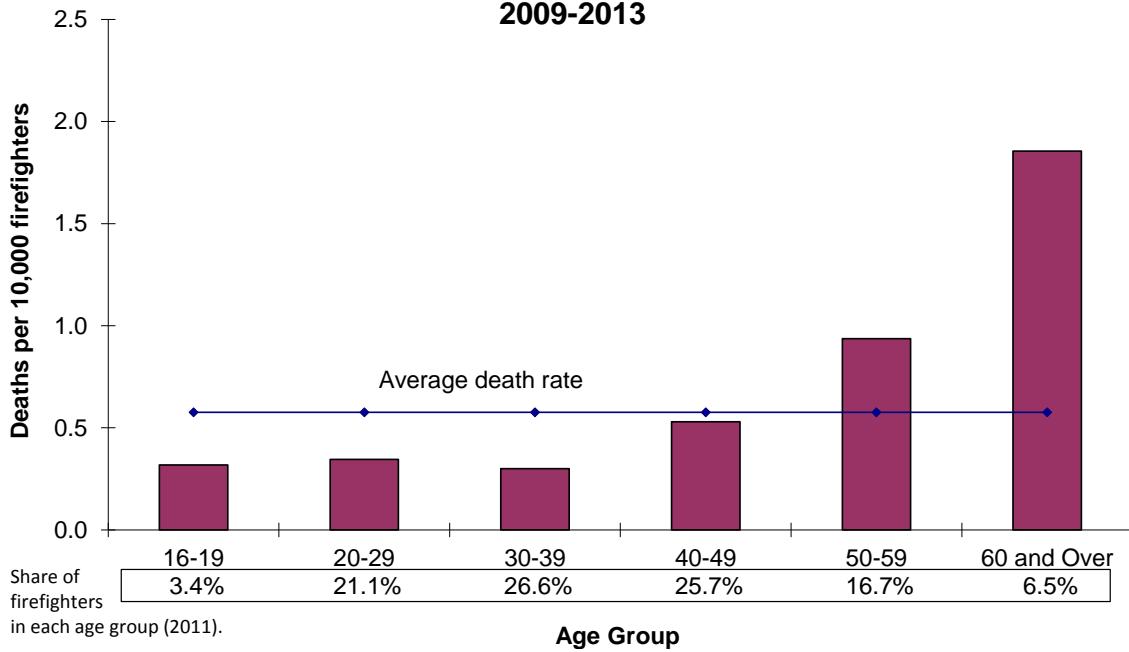


Figure 7
Fire Ground Deaths by Fixed Property Use-2013

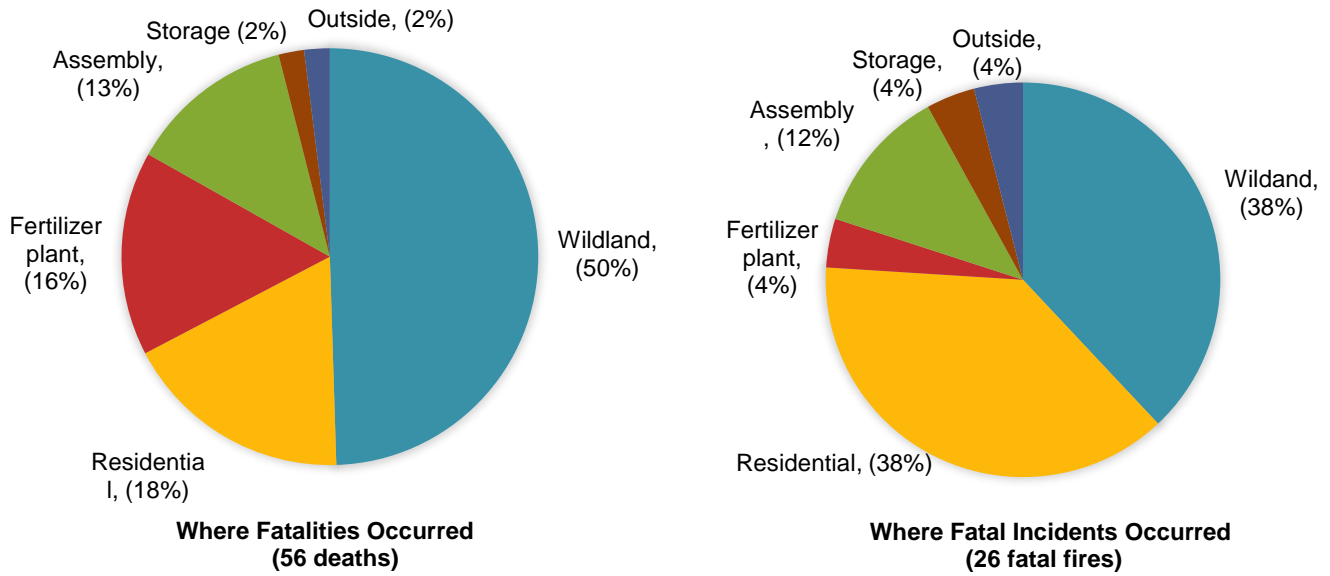


Figure 8
On-Duty Fire Ground Deaths per 100,000 Structure Fires 2008-2012

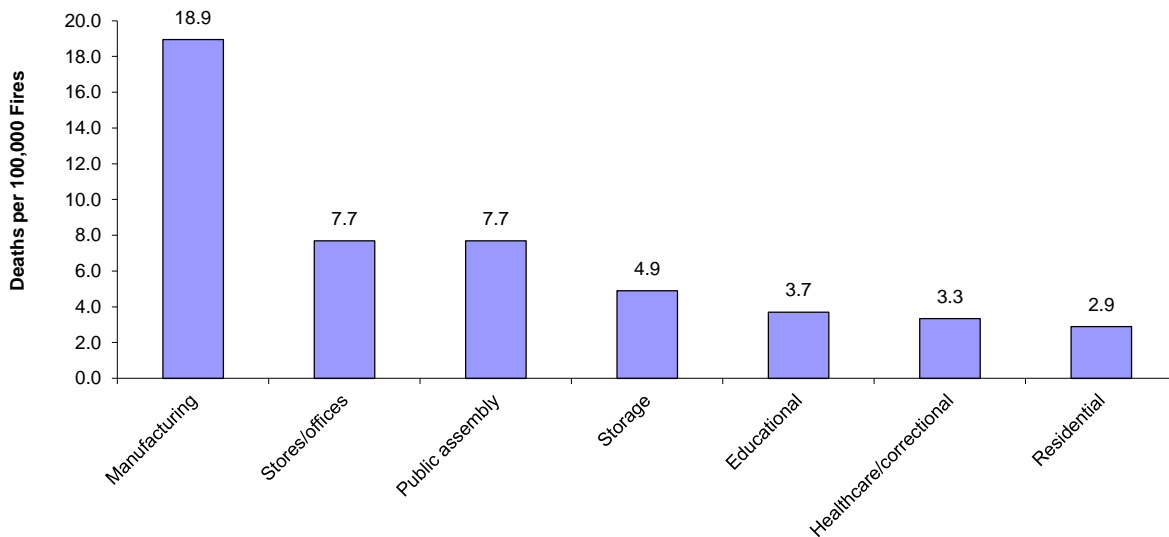
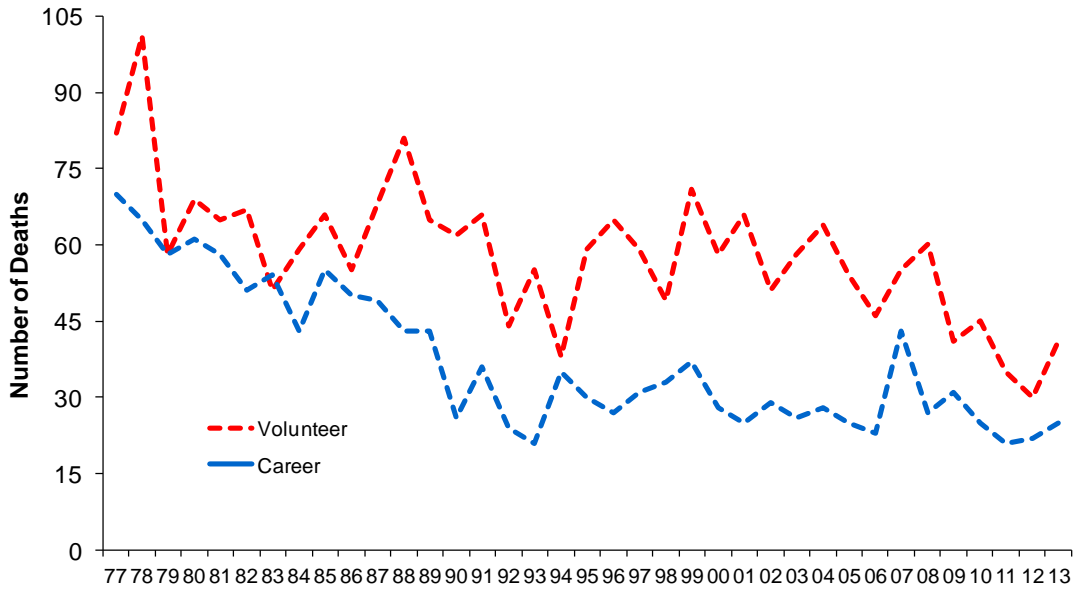


Figure 9
Career and Volunteer Firefighter Deaths
1977 - 2013*



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

2013 Selected Firefighter Fatality Incidents

Inspections

On January 8, at 5:30 p.m., a 33-year-old fire captain suffered sudden cardiac death as he conducted a routine inspection at the airport where he worked, looking for wildlife and inoperable lights on the runways and perimeter of the facility.

The captain, who was six feet, three inches (1.8 meters) tall and weighed 290 pounds (131 kilograms), suffered from high blood pressure that was controlled by medication. When he collapsed after stepping out of his pickup truck to shoot a deer near the runway, the firefighter accompanying him immediately notified the dispatch center and began cardiopulmonary resuscitation.

Eleven minutes later, an ambulance arrived and advanced life support was started. The captain was intubated, and a cardiac monitor was applied. Because he was in ventricular fibrillation, EMTs administered three shocks and gave him cardiac resuscitation medications through an inserted intravenous line. EMTs continued their resuscitation efforts as they transported him to a hospital and after they arrived in the emergency room. However, there was no change in the captain's condition, and he was pronounced dead eight minutes later.

NIOSH investigated this incident and offers recommendations on its website at www.cdc.gov/niosh/fire/reports/face201303.html.

Floor collapse

At 10:45 p.m. on January 21, fire companies were dispatched on mutual aid to a single-family house fire that began in a small, unattached wooden shed where the occupants kept rabbits. The fire started when three heating lamps used to keep the rabbits' water from freezing came into contact with combustibles and spread to the house, which was 10 feet (3 meters) away.

A 34-year-old fire captain and a 28-year-old fire lieutenant, dressed in full personal protective equipment (PPE) including self-contained breathing apparatus, were advancing a 1 ½-inch (3.8-centimeter) hand line into the house when the floor collapsed beneath them. The captain fell into the basement, and lieutenant fell partially through but was able to escape.

The lieutenant reentered the building with other firefighters to rescue the captain, but their initial attempts were unsuccessful due to fire conditions and the captain's location. By the time the firefighters removed the captain, they noted that his PPE was burned and his face piece had melted.

He and the lieutenant were transported to a hospital where the captain was pronounced dead of an acute ventricular arrhythmia due to an acute thermal inhalation injury. The lieutenant sustained non-life threatening burns to his hands and arms.

Altercation

On February 14, after returning to the fire station from an emergency medical call at 3:30 am, a 60-year-old fire captain became involved in a physical altercation with the driver of the fire engine over where the engine should be parked in the apparatus bay. The captain fell, striking his head on the concrete floor. He was treated and transported to a medical center, then flown to a hospital where he died due to head trauma.

The captain had joined the fire department six years earlier after retiring from law enforcement and was the fire department's chaplain.

Aneurysm

On February 21, a 55-year-old fire/police officer with five years of service responded to the scene of a motor vehicle crash in her own car. Shortly after she got out of her automobile and put on her reflective vest and helmet, she collapsed as a result of a ruptured cerebral aneurysm. EMTs immediately gave her medical attention, and she was transported to a hospital where she died the following evening as a result of the aneurysm.

Fall from roof

At 5:45 p.m. on April 6, the fire department was dispatched to a fire in a three-story building of mixed occupancy, with retail stores on the first floor and apartments above. Initially, the ladder company, headed by a 53-year-old fire captain with 30 years' service, was assigned as a Rapid Intervention Team. Later, they were ordered to the roof to conduct ventilation operations.

Attired in full PPE, the firefighters made their way to the roof of a building that was attached to the fire building from which they would move to the roof of the burning building to make a trench cut—a ventilation cut extending from eave to eave to reduce horizontal fire spread and mushrooming—to reduce the chances of fire spread from the building of origin to the exposed structure. The captain, who was directing operations on the roof, reported copious amounts of thick smoke and told the incident commander that they were making their way to the roof of the fire building to start the ventilation operations.

With smoke obscuring his vision, the captain inadvertently stepped off the roof and fell 20 feet (6 meters) to the roof of a single-story section of the fire building. Firefighters started rescue attempts immediately, but the captain's location and the fire conditions made getting to him difficult. Eventually, the firefighters had to breach a brick wall into a collapsed area of the fire building to reach the man.

His body was recovered and transported to a hospital. The cause of death was multiple blunt impact injuries.

Crash

On April 7, a 47-year-old assistant fire chief with 16 years' service died when he lost control of the SUV he was driving as he responded to a house fire during a severe thunderstorm. When the chief entered a left-hand turn, the department's SUV skidded on the wet pavement and slid off the right side of the road, striking a fence and crashing head-on into a tree.

Crews responding to the 9:30 p.m. fire behind the chief stopped, extricated him, and began treating him. He was transported to a hospital, where he succumbed to his injuries. Nature of death was blunt force trauma.

The fire department investigative report cited heavy rains with flash flooding, poor visibility, and driving too fast for the road conditions as the causes of the crash. The chief was wearing a seatbelt at the time of the crash.

Pinned between vehicles

On May 18, fire companies were dispatched at 5:20 p.m. to what turned out to be a mulch fire that had spread to a building at a mulch yard. One of the first-arriving apparatus was a rescue truck, which the driver parked on the side of the road heading north. He and his partner then got out of the truck and walked toward the rear of the vehicle to get their PPE out of the end compartments. At about the same time, an engine company arrived with orders to help another engine company lay a feeder line due to the distance of the hydrant from the fire.

As the rescue truck driver stood in the road next to the truck putting on his PPE, the engine, which had no spotter, backed north along the road where the rescue vehicle was parked. The rescue truck driver's partner, who was walking to the rear of the rescue vehicle on the passenger side, saw that the engine was backing too close to the rescue vehicle and shouted to the driver of the engine to stop, but it was too late. The engine pinned the rescue truck driver between the two vehicles.

Due to the victim's position, it was impossible to move the engine or the rescue truck without causing further injury, so firefighters used air bags and hydraulic spreaders and rams to free him. When the 15-minute process was over, he was treated and transported to a hospital, where surgery was performed. He died the following morning from multiple blunt force injuries.

The following contributing factors were cited as having played a major part in the accident: the engine driver did not use any help in the backing the engine up, those involved were not paying attention to what was going on around them, and there were no readily available hydrants. Speed was not considered excessive, and no civil or criminal offenses are pending.

Struck by object

At 5 p.m. on June 10, at 11 a.m., a 28-year-old firefighter with 10 years' service was helping construct a fire line at a forest fire when he was hit on the back of the neck by a tree limb that had fallen 60 feet (18 meters). The victim was part of a three-person team of smoke jumpers that had parachuted into the fire area from an airplane at 11 o'clock that morning.

The victim was treated by the firefighters at the scene and flown to a hospital where continuing efforts failed to revive him.

Suicide

On June 18, a 24-year-old firefighter/EMT with 4 years' service was found dead at the fire station where she was assigned. An investigation determined that she had committed suicide as a result of personal issues.

Rapid fire spread

On July 13, the fire department responded to a 5:25 p.m. mutual aid call for a fire in a single-story, wood-frame, single-family house with flames showing. As soon as two fire lieutenants responding as an engine company arrived, they put on their PPE and reported to the incident commander.

The fire chief instructed them to enter the building through a basement door at the rear of the building. However, their entrance was delayed because the door was locked, and the 1 ½-inch (3.8-centimeter) hand line that was deployed was too short.

When they were finally ready to enter the building, the lieutenants and the fire chief performed a satisfactory radio check. One of the lieutenants also ordered a firefighter to place a vent fan at the door and to stand by and listen for them. The two lieutenants then put their face pieces on and entered the building with forcible entrance tools and the hand line.

Inside the basement, the two encountered dense gray smoke 2 to 3 feet (0.5 to 1 meters) off the floor with very little heat. With visibility good for approximately 6 feet (2 meters), they crawled further, still unable to see the fire, until visibility was reduced to 2 feet (0.5 meters). As they continued crawling forward and to the right, the heat increased a little, but, as they radioed the chief, they still could not find any fire. When the chief told them that he thought the fire was on the first level, they let him know that they were going to leave the basement.

As the two lieutenants started out of the building, they saw an orange glow overhead, and the lieutenant on the nozzle applied water as a straight stream. At the same time, the chief ordered them to get out.

By this time, the smoke had turned black and visibility had dropped to zero. Thinking that the fire was going to flash over, the two men dropped the hose in an attempt to get out of the building faster. The lieutenant who had operated the nozzle passed the other lieutenant and became lost. Looking back, the second man saw the fire getting larger and picked up the hose again, changing the nozzle setting to a spray and discharging water over his head. As the fire receded, he followed the hose toward the exit, where firefighters outside grabbed him and pulled him out of the building.

The firefighters yelled to the other lieutenant so he would know which direction to go, and he eventually made it close enough to the exit that they could pull him out, too. Both lieutenants were taken to a hospital, where the man who had become lost was placed into a medically induced coma. He had sustained burns to 50 to 75 percent of his body and died a week later from sepsis. The other lieutenant sustained non-life threatening injuries.

The fire was determined to have started in debris behind a clothes dryer in the home's basement.

ATV crash

On August 30, a fire captain and two other firefighters were assigned to patrol a forest at 7 a.m. to see if they could locate the area where smoke had been reported the night before. Dressed in required PPE, including full-face protective helmets, each man drove a four-wheel-drive, alternative terrain vehicle (ATV) weighing 600 pounds (272 kilograms) in different directions to cover more ground. The three kept in contact using department radios.

At 1:44 p.m., smoke from a new fire was reported, and they agreed to respond to that location. That was the last understandable communication from the captain. After two hours with no contact, the fire department began a search that lasted a week before his body was found, trapped under the ATV he had been using.

Investigators examining the area determined that he had tried to negotiate a short, 30-degree incline, during which the ATV had overturned. The captain either jumped or was thrown from the ATV, which rolled over him, hit a tree, and fell back on him. He died of asphyxiation.

Training

At 1 p.m. on September 27, a 40-year-old wildland firefighter with 11 years' service died during a training session when his parachute failed to open after he jumped from a plane at 6,000 feet (1,829 meters). The training session entailed jumping from the plane as one would during a regular response to an emergency in a remote area. Participating firefighters have to jump at least once every two weeks during the fire season to maintain their certification.

The firefighter, who was second to leave the plane, was pronounced dead at the scene by a paramedic who arrived by helicopter. An ongoing investigation is focusing on his parachute and why it failed to open.

Fall

On December 12 at 12:30 a.m., a 72-year-old firefighter with 28 years' service fell from the running board of the pumper as he repacked a hose after returning to the fire station after extinguishing a fire in a single-family house. He struck the back of his head on the apparatus bay floor. Alert and in little pain, he was transported to a hospital for a CAT scan. The scan revealed that he had bleeding on his brain, and surgery was performed to release the pressure. In spite of the medical attention he received, the firefighter died three days later. The nature of death was trauma.

Responding

On December 14, a 25-year-old firefighter with 3 months' service was driving to the fire station to respond to a motor vehicle crash when his vehicle crossed over the center line after entering a curve. He overcorrected and lost control of the vehicle, which ran off the right side of the road, hit a large block of concrete, and overturned.

He was treated and transported to a hospital, where he was pronounced dead as a result of internal trauma. Speed and a wet roadway were cited as factors causing the crash. He was not wearing a seatbelt but was not ejected from the vehicle.

Ceiling collapse

On December 15 at 12:30 a.m., the fire department was called to a fire in a single-family, wood-frame house that had been vacant for 10 years. The fire had been intentionally set in the laundry room and had spread throughout the rear of the structure before they arrived.

After the firefighters, dressed in full PPE, searched the building for victims and knocked the fire down, they began overhaul operations. A fire lieutenant with 12 years' service was instructing a new firefighter on overhauling techniques when a large section of the ceiling fell on the two of them. The firefighter was able to escape, but the lieutenant was trapped under the debris.

He was removed from the building and transported to a hospital where he died of crushing injuries to his chest. Two men have been arrested for murder and arson, and are awaiting trial.