

# Firefighter Fatalities 2007

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**In 2007, a total of 102 on-duty firefighter deaths** occurred in the U.S. This is a sharp increase over the 89 firefighter fatalities that occurred in 2006, but returns to the long-term trend of close to 100 on-duty deaths annually<sup>1</sup> Figure 1 shows firefighter deaths for the years 1977 through 2007, excluding the 340 firefighter deaths at the World Trade Center in 2001.

Of the 102 firefighters who died while on duty in 2007, 53 were volunteer firefighters, 42 were career firefighters, four were employees of state land management agencies, one was an employee of a federal land management agency, one was a contractor with a federal land management agency, and one was a member of an industrial fire brigade. This is the largest number of career firefighters to be killed in a single year since 1989 (not including the deaths at the World Trade Center in 2001). The average number of on-duty career firefighter deaths had been approximately 30 over the previous 10 years.

In 2007, there were seven multiple-fatality incidents, the most severe of which resulted in the deaths of nine career firefighters. This incident in Charleston, South Carolina, is described in the accompanying sidebar. The other six multiple-fatality incidents were all double-fatality incidents. Two firefighters were killed in a tanker (water tender) crash while responding to a fire; two in a gas explosion; and eight were killed while operating inside at four separate structure fires. More details will be presented throughout this article.

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.<sup>2</sup> A 10-year analysis showing trends in highway vehicle crashes is included. Finally, the study presents summaries of individual incidents that illustrate important problems or concerns in firefighter safety.

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; while responding to or returning from an alarm; while 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 victims include 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. NFPA recognizes that a comprehensive study of firefighter on-duty 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. 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 102 deaths by type of duty. Fire ground operations accounted for 36 deaths. That total is the fourth lowest in the past 10 years, the sixth lowest in the 31 years that we've done this study, and also close to the average number of fire ground deaths annually over the past 10 years, not including the deaths at the World Trade Center in 2001. Twenty-two of the victims were career firefighters and twelve were volunteer firefighters.<sup>3</sup> Two of the victims worked for state or federal land management agencies. The higher-than-usual number of career firefighter deaths in this category is accounted for to a large degree by the nine-fatality incident in Charleston. The average number of career firefighter deaths on the fire ground over the past 10 years is 13 per year.

There were 30 fatalities while responding to or returning from alarms. It is important to note that not all deaths in this category are the result of crashes. Twenty of the 30 occurred in collisions and rollovers, nine were due to sudden cardiac events or stroke, and one firefighter fell off a pumper inside the station after returning from a fire. Twenty-five of the victims were volunteer firefighters, four were career firefighters and one was an employee of a state land management agency. All crashes and sudden cardiac deaths are discussed in more detail later.

Thirteen deaths occurred during training activities. These included four during or while preparing for equipment drills, four while returning home from training programs, two at training classes, two during physical fitness activities or annual testing, and one during live

Figure 1 - On-Duty Firefighter Deaths - 1977 - 2007

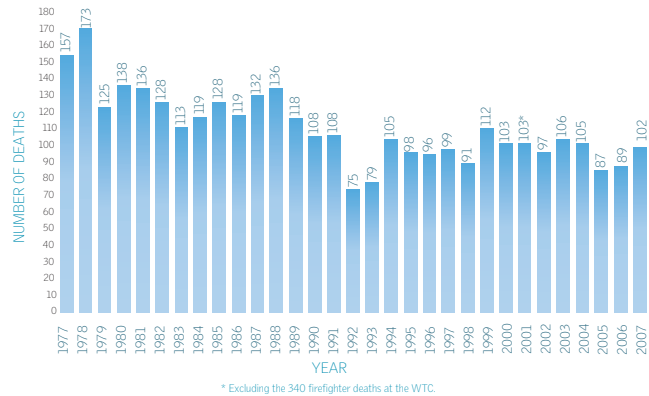
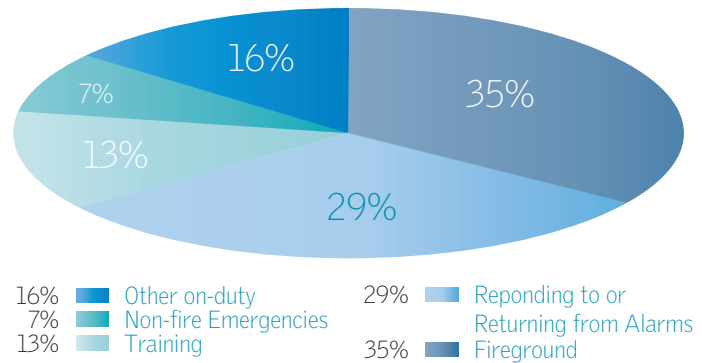


Figure 2 - Firefighter Deaths by Type of Duty - 2007



fire training. Three of the victims, including the firefighter killed in the live fire training exercise, were recruits or new hires.

Seven firefighters were killed at non-fire emergencies, including two while investigating a call about an odor of gas, and one each at scenes of a motor vehicle crash, an EMS call, a rescue in a ravine, a hazardous material spill and while attempting to rescue a drowning victim.

The remaining 16 firefighters died while involved in a variety of non-emergency-related on-duty activities. These activities included normal administrative or station duties (11 deaths), preparations for community fire prevention events (two deaths), preparing for a parade (one death), returning to base from a prescribed burn (one death) and flagging at a fire line construction project (one death).

### 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

## 2007 FIREFIGHTER FATALITIES

Figure 3 - Firefighter Deaths by Cause of Injury - 2007

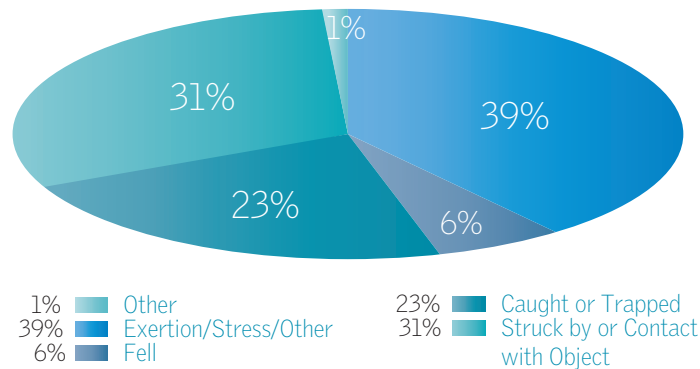
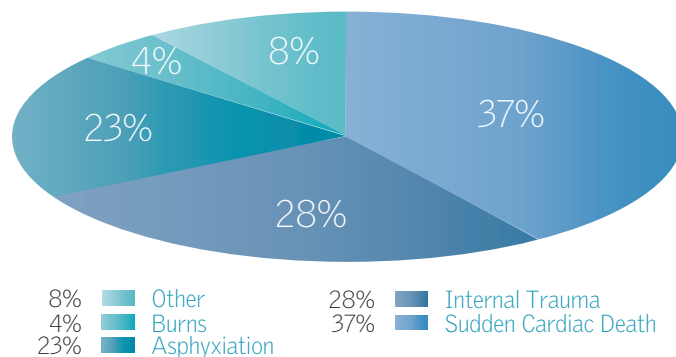


Figure 4 - Firefighter Deaths by Nature of Injury - 2007



the action, lack of action, or circumstances that resulted directly in the fatal injury.<sup>4</sup>

Deaths resulting from exertion, stress and other, often medical, issues made up the largest category of fatalities. Of the 40 deaths in this category, 38 were classified as sudden cardiac deaths, usually heart attacks, and two were due to strokes. See below for more detail on sudden cardiac deaths.

The second leading cause of fatal injury was being struck by an object or coming into contact with an object. The 32 firefighters killed included 27 in motor vehicle crashes and one struck by a motor vehicle. Those deaths are discussed in more detail in a separate section of this article. Two firefighters were struck and killed by shrapnel in a propane tank explosion. One firefighter was struck by a falling tree while training in the use of a power saw. One firefighter was struck by a wooden canopy that collapsed onto him at a structure fire.

The next leading cause of fatal injury was being caught or trapped, resulting in 23 deaths. Nine of these 23 firefighters were killed in the roof collapse at the Charleston fire. One other firefighter was killed in a roof collapse and one

was killed in a wall collapse. Eight firefighters were trapped by fire progress in five structure fires; five were asphyxiated and three were fatally burned. Three firefighters became lost inside fire-involved structures; two ran out of air, and one was fatally burned. One firefighter became trapped under water and drowned.

Six firefighters were killed in falls; two through holes burned in floors in structure fires, two off parked apparatus at fire stations, one from the roof of a fire-involved structure, and one from a bridge during extrication operations at a vehicle crash.

One firefighter was electrocuted at a grass fire when he touched a downed power line.

### 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. The largest number of fatalities, 38 deaths, were due to sudden cardiac death. The other major categories were internal trauma (29 deaths), asphyxiation (23 deaths) and burns (four deaths). The remaining deaths included two drownings, two deaths due to projectile wounds, two strokes, one electrocution, and one death due to crushing injuries.

### Sudden cardiac deaths

Sudden cardiac death is consistently the number one cause of on-duty firefighter fatalities in the U.S., and this was the case again in 2007. Although the number of deaths in this category has fallen since the early years of this study, from 70 in 1977 to 38 in 2007, sudden cardiac death still accounts for close to 40 percent of on-duty deaths annually.

Of the 38 victims of sudden cardiac events in 2007, post mortem medical documentation showed that 10 had severe arteriosclerotic heart disease, five were hypertensive, four were reported to have had prior heart problems, such as previous heart attacks, bypass surgery, or angioplasty/stent placement, and three were diabetic. Some of the victims had more than one condition.

Over the past 25 years, post mortem information or other details on the victims’ medical histories have been available for 720 of the 1,155 sudden cardiac death victims. Of those 720 victims, 663, or 92.1 percent, had suffered prior heart attacks, had severe arteriosclerotic heart disease, had undergone bypass surgery or angioplasty/stent placement, or were diabetic or hypertensive.

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 procedures for screening candidate firefighters and handling health problems that might arise during an individual's fire service career. NFPA 1500, *Fire Department Occupational Safety and Health Program*, calls for fire departments to establish a firefighter health and fitness program based on 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. The National Volunteer Fire Council (NVFC) developed the Heart-Healthy Firefighter Program, launched in 2003, to address heart attack prevention for all firefighters and EMS personnel, through fitness, nutrition and health awareness.

An important part of their program includes health screenings that they make available annually at several fire service trade shows around the country. The purpose of the program is to lower the incidence of cardiac-related problems in the fire service by educating firefighters and their families about nutrition, fitness and heart disease prevention. While those screenings provide valuable information to the individuals tested, they've also collected data that provides a disturbing picture of the health status of many of the nation's firefighters. The program has screened 8,000 firefighters, both career and volunteer, over the four years of the project for blood pressure, cholesterol, body fat and glucose.

Cholesterol screening done all four years of the project found high or borderline-high levels (greater than or equal to 200 mg/dl) in 37 percent of the 7,904 firefighters tested.

Blood pressure screenings from 2005 through 2007 found that 6.2 percent of the tested firefighters had Stage 2 hypertension; 28.9 percent had Stage 1 hypertension; and 48 percent were prehypertensive. Only 16.9 percent had normal blood pressure readings.

Almost all of the 5,065 firefighters tested for glucose (non-fasting) in 2006 and 2007 were found to be in the desirable range, or less than 140 mg/dl. Only 2.7 percent were found to be diabetic—that is, greater than or equal to 200 mg/dl—and 5.9 percent were found to be pre-diabetic—that is, between 140 and 199 mg/dl.

Body fat was only tested in 2005, but of the almost 2,000 firefighters tested that year, 44.7

Figure 5 - On-Duty Firefighter Deaths by Age and Cause of Death - 2007

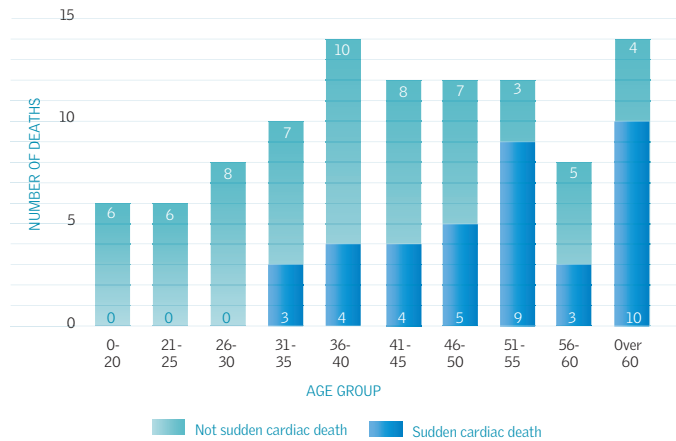
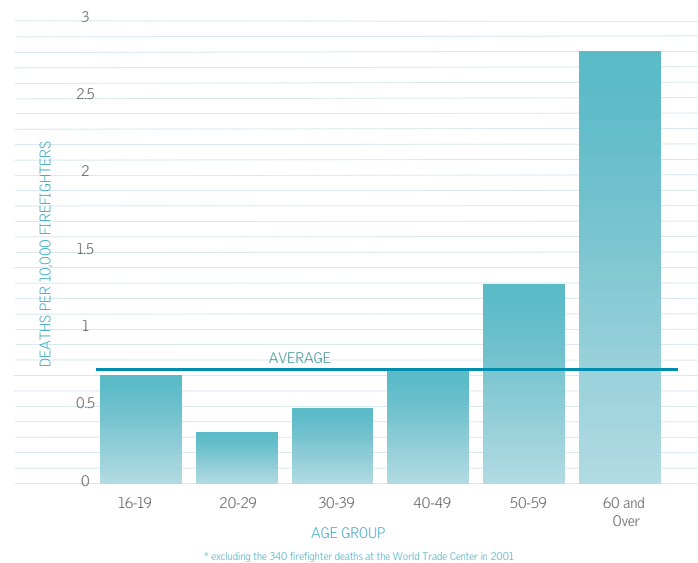


Figure 6 - On-Duty Deaths Rates per 10,000 Career and Volunteer Firefighters - 2003-2007\*



percent were found to be obese. Obesity is defined as 25 percent or more of body fat for men and 32 percent or more for women.

The testing will be offered again this year, with screenings planned for cholesterol, blood pressure, and body fat. Through this program, many firefighters have been tested more than once, have come to understand their personal level of risk, and have adopted a more heart-healthy lifestyle. More information can be found at [www.healthy-firefighter.org](http://www.healthy-firefighter.org).

#### Ages of firefighters

The firefighters who died in 2007 ranged in age from 19 to 78, with a median age of 43.5 years.

## 2007 FIREFIGHTER FATALITIES

Figure 7 - Fire Ground Deaths by Fixed Property Use - 2007\*

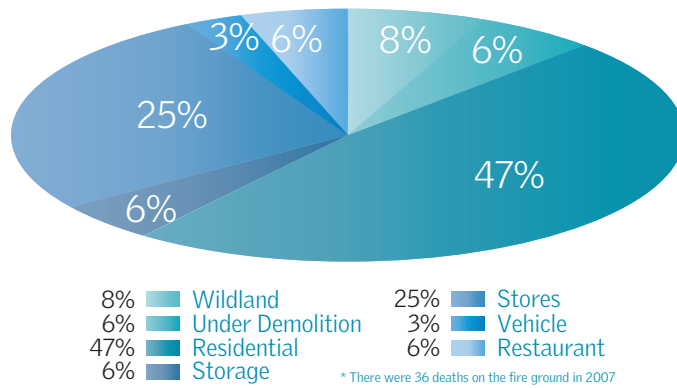


Figure 8 - On-Duty Fireground Deaths per 100,000 Structure Fires - 2002-2006

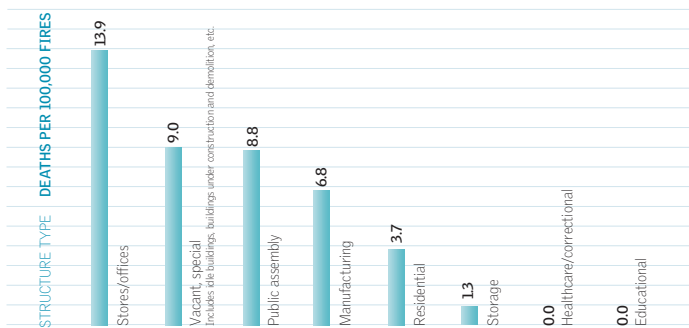


Figure 9 - Firefighter Deaths - Local Career vs. Local Volunteer - 1977 - 2007\*

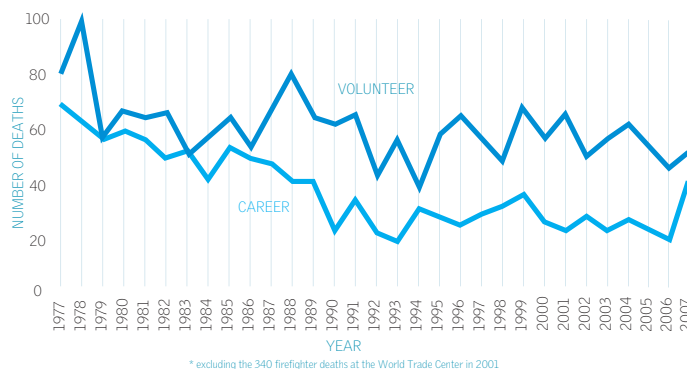


Figure 5 shows the distribution of firefighter deaths by age and cause of death (sudden cardiac death versus other causes).

The youngest victims of sudden cardiac death were aged 34 (three firefighters). Sudden cardiac death accounts for a higher proportion of the deaths among older firefighters, as might be expected. More than half of the firefighters over age 40 and almost two-thirds of those over age 50 who died in 2007 died of heart attacks or other cardiac events.

Figure 6 shows death rates by age, using career and volunteer firefighter fatality data for the five-year period from 2003 through 2007 and estimates of the number of career and volunteer firefighters in each age group from NFPA's 2005 profile of fire departments (the mid-year in the range).<sup>5</sup>

The lowest death rates were for firefighters in their 20s. Their death rate was less than half the all-age average. Firefighters in their 30s had a death rate approximately two-thirds the all-age average. The rate for firefighters aged 60 and over was close to four times the average. Firefighters aged 50 and over accounted for two-fifths of all firefighter deaths over the five-year period, although they represent fewer than one-fifth of all firefighters.

### Fire ground deaths

Of the 36 fire ground deaths, 21 were due to asphyxiation, 7 were to sudden cardiac death, 4 were due to internal trauma, 3 were due to burns and 1 was due to electrocution. This very high number of asphyxiation deaths includes the nine fire ground deaths in Charleston.

Figure 7 shows the distribution of the 36 fire ground deaths by fixed property use. Three of the firefighters were killed on wildland fires. This is the lowest number of fire ground deaths on wildland fires since this study began in 1977. Deaths on wildland fires over the past 10 years have averaged over 10 deaths per year. Although the fire-ground-related wildland fire deaths were low in 2007, another four firefighters died while responding to or returning from wildland fires, and three of the training deaths in 2007 were related to training for wildland fire operations.

Operations at vehicle fires resulted in the death of one firefighter.

Seventeen of the 32 firefighter deaths at structure fires occurred in residential properties. Fires in single-family dwellings killed 13 firefighters, and fires in apartment buildings killed four firefighters. There were nine deaths in the furniture store in Charleston (described in the accompanying sidebar). Two firefighters were killed in a restaurant fire, and two were killed in a building undergoing demolition. There was also one death in a fire in a farm shed and one death at a fire in a detached dwelling garage.

Three of the fires, which resulted in four deaths, had automatic suppression systems. Two of the victims were killed in a high-rise fire where the sprinkler system had been shut off during demolition of the building. One firefighter suffered a fatal heart attack during suppression operations in an apartment building. The sprinklers in the building were in the corridors, but not the apartment units.

One sprinkler outside the unit of origin operated. A firefighter fell from the roof of a building with a sprinkler system that operated and was effective in controlling the spread of the fire.

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 NFPA's annual fire loss studies from 2002 through 2006 (the 2007 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 vacant buildings and some nonresidential structures, such as mercantile, public assembly, and manufacturing properties, are more hazardous to firefighters, on average. There were 6.4 fire ground deaths per 100,000 nonresidential structure fires from 2002 through 2006, compared to 3.7 deaths per 100,000 residential structure fires. The highest death rates over the five-year period occurred in stores and offices. The low rate in health care and correctional and educational buildings may reflect the fact that these occupancies are among the most regulated 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 reflects the small number of fatalities that have occurred in such structures in recent years.

### Vehicle-related incidents

In 2007, 27 firefighters died in vehicle crashes. In addition to those deaths, one other firefighter was struck and killed by a vehicle.

Nineteen of the 27 firefighters killed in crashes were responding to, or returning from, incidents when the crashes occurred. All but one were single-fatality crashes. Ten of these 19 victims were driving their personal vehicles:

- A firefighter driving to the station in response to a motor vehicle crash lost control on black ice, crossed the centerline on the two-lane road, and struck an on-coming vehicle head on. He was not wearing his seat belt and was ejected. Speed was not a factor in this crash.
- A firefighter driving to a fire swerved around a slower vehicle and lost control of his vehicle; it overturned. He was speeding, was not wearing his seat belt, and was ejected.

- A firefighter driving to the fire station in response to a brush fire came over a hill, traveling in the center of the road, swerved to avoid another vehicle that was turning into a driveway, went off the road, overcorrected, spun, struck an embankment, rolled, and struck a tree. There were conflicting reports from the police and her family as to whether she was wearing her seat belt. She was not ejected.
  - A firefighter responding to a medical call crashed his vehicle. He died of burns and smoke inhalation. No further details are available.
  - A firefighter responding in light rain to the station for a mutual aid call lost control on a curve, struck a sign post, utility pole and tree, and overturned. He was speeding, was not wearing his seat belt, and was partially ejected.
  - A firefighter responding to a call about a downed power line was killed when he struck a tree that had fallen across the road. He was wearing his seat belt. No other details are available.
  - A firefighter driving to the station too fast for conditions in response to a wildland fire failed to negotiate a curve in the road and struck an oncoming vehicle. He was not wearing his seat belt but was not ejected.
  - A firefighter responding to a motor vehicle crash on a rainy and foggy morning lost control of her vehicle on a curve, went off the road, and hit a tree. No other details are available.
  - Another firefighter responding to a motor vehicle crash was struck at a T-shaped intersection when he failed to stop and yield the right of way before turning onto the main road. He was struck by another vehicle whose driver could not stop in time to avoid him. He was not wearing a seat belt and was ejected. Driver inattention was also cited as a factor in the crash.
  - A firefighter returning from the scene of a motor vehicle crash on a borrowed motorcycle crossed the centerline on a curve, went off the road and down a ditch, and hit a tree. Excessive speed for conditions was cited as a factor in the crash.
- Seven of these 19 victims were driving or riding in pumpers or water tenders (tankers):
- The driver and passenger of a tanker responding to a structure fire on mutual aid were killed when the driver lost control of the tanker on a curve and overcorrected. The vehicle fishtailed and rolled. The tanker was carrying 1,000 gallons of water. The driver was speeding, and neither victim was wearing his seat belt. One was ejected, and the other was partially ejected.
  - A firefighter driving a pumper to a fire in a vacant building was struck by a speeding SUV

## 2007 FIREFIGHTER FATALITIES

Table 1 - Comparison of On-Duty Deaths Between Career and Volunteer Firefighters, 2007\*

	Career Firefighters		Volunteer Firefighters		Career Firefighters		Volunteer Firefighters		
	Number of Deaths	Percent of Deaths	Number of Deaths	Percent of Deaths	Number of Deaths	Percent of Deaths	Number of Deaths	Percent of Deaths	
<b>TYPE OF DUTY</b>					<b>AGES OF FIREFIGHTERS - SUDDEN CARDIAC DEATHS ONLY</b>				
Operating at fire ground	22	52 %	12	23 %	31 to 35	1	7 %	2	10 %
Responding to or returning from alarm	4	10	26	49	36 to 40	3	20	1	5
Other on-duty	9	21	4	8	41 to 45	3	20	1	5
Training	7	17	5	9	46 to 50	2	13	3	14
Operating at non-fire emergencies	0	0	6	11	51 to 55	3	20	2	10
<b>TOTALS</b>	<b>42</b>	<b>100 %</b>	<b>53</b>	<b>100 %</b>	56 to 60	3	20	3	14
					over 60	0	0	9	43
					<b>TOTALS</b>	<b>15</b>	<b>100 %</b>	<b>21</b>	<b>100 %</b>
<b>CAUSE OF FATAL INJURY</b>					<b>FIRE GROUND DEATHS BY FIXED PROPERTY USE</b>				
Exertion/stress/other related	15	36 %	23	43 %	Dwellings and apartments	8	36 %	9	75 %
Struck by or contact with object	7	17	20	38	Stores	9	41	0	0
Caught or trapped	18	43	5	9	Buildings under demolition	2	9	0	0
Fell	1	2	5	9	Restaurants	2	9	0	0
Exposure to electricity	1	2	0	0	Storage Facilities	0	0	2	17
<b>TOTALS</b>	<b>42</b>	<b>100 %</b>	<b>53</b>	<b>100 %</b>	Wildlands	1	5	0	0
					Vehicles	0	0	1	8
					<b>TOTALS</b>	<b>22</b>	<b>100 %</b>	<b>12</b>	<b>100 %</b>
<b>NATURE OF FATAL INJURY</b>					<b>YEARS OF SERVICE</b>				
Sudden cardiac death	15	36 %	21	40 %	5 or less	8	19	21	40
Internal trauma	5	12	19	36	6 to 10	6	14	5	9
Asphyxiation (including smoke inhalation)	13	31	8	15	11 to 15	8	19	6	11
Burns	6	14	0	0	16 to 20	8	19	2	4
Stroke/aneurysm	0	0	2	4	21 to 25	4	10	5	9
Projectile wounds	0	0	2	4	26 to 30	3	7	0	0
Drowning	1	2	1	2	over 30	2	5	12	23
Crushing	1	2	0	0	Not reported	3	7	2	4
Electrocution	1	2	0	0	<b>TOTALS</b>	<b>42</b>	<b>100 %</b>	<b>53</b>	<b>100 %</b>
<b>TOTALS</b>	<b>42</b>	<b>100 %</b>	<b>53</b>	<b>100 %</b>	<b>ATTRIBUTES OF FIRE GROUND DEATHS**</b>				
					Intentional fires	0		0	
					Search and rescue operations	5		0	
					<b>MOTOR VEHICLE CRASHES</b>	5		17	
					<b>FALSE ALARMS</b>	1		1	
<b>RANK</b>					<b>*This table does not include the seven victims who were employees of or contractors for state or federal land management agencies, or members of prison crews or industrial fire brigades.</b>				
Firefighter	26	62 %	40	75 %	<b>**Because these attributes are not mutually exclusive, totals and percentages are not shown.</b>				
Company officer	11	26	7	13					
Chief officer	5	12	6	11					
<b>TOTALS</b>	<b>42</b>	<b>100 %</b>	<b>53</b>	<b>100 %</b>					
<b>AGES OF FIREFIGHTERS - ALL DEATHS</b>									
20 and under	0	0 %	5	9 %					
21 to 25	2	5	4	8					
26 to 30	6	14	1	2					
31 to 35	5	12	4	8					
36 to 40	8	19	6	11					
41 to 45	5	12	6	11					
46 to 50	6	14	6	11					
51 to 55	6	14	5	9					
56 to 60	4	10	4	8					
Over 60	0	0	12	23					
<b>TOTALS</b>	<b>42</b>	<b>100 %</b>	<b>53</b>	<b>100 %</b>					

at an intersection. There was no information reported on seatbelt use, but the victim was ejected through the windshield and pinned beneath the truck.

- A fire officer riding as passenger in a pumper responding to a fire was killed when the driver drove through a red light, failing to yield the right of way, and collided with another responding apparatus. The vehicle, a reserve piece, was found to have faulty brakes, although they were not a factor in the crash. The victim was not wearing his seat belt and was ejected.

- A tanker overturned on a sharp left turn at a T-shaped intersection and rolled down an embankment. The tanker was a converted military surplus vehicle. No seatbelts were installed in the vehicle and the victim was not ejected.
- Another crash involving a converted tanker, this time a former fuel truck, resulted in the death of the driver when he lost control of the vehicle after coming out of a curve and overcorrected. The vehicle went off the shoulder, struck trees, and overturned. The victim was not wearing a seatbelt. Excessive



speed and driver inexperience were cited as factors in the crash.

- A firefighter driving a pumper on a call that turned out to be a false alarm lost control of the vehicle and overturned. He was wearing his seat belt and was not ejected. Excessive speed for conditions was cited as a factor in this crash.

Two fatal crashes while responding involved other fire department vehicles:

- A firefighter riding in the back seat of a ladder truck responding to a false alarm was killed when a school bus struck the truck at an intersection. The ladder truck, which was traveling through the intersection on a red light, spun and flipped, partially ejecting the victim. The bus driver failed to yield for the emergency vehicle, as other motorists at the intersection had. It was not clear whether or not the victim was wearing his seat belt. There were no children on the bus at the time of the crash.
- A fire police officer responding to a motor vehicle crash in a fire department box van collided with a propane truck and was fatally injured. According to newspaper accounts, he was making a U-turn to change directions on an interstate highway when he was struck, but there was no indication of who was at fault. The victim was not wearing a seat belt and was ejected.

Two firefighters were killed in crashes while operating over or on wildland fires:

- A contractor for a federal wildland management agency was killed when his helicopter crashed after it drifted and its main rotor blades struck a tree while he was dropping off collapsible water containers to fire ground crews in a remote area. The final NTSB report on this crash has not been released yet.
- A state wildland agency employee was killed when the bulldozer he was operating rolled over. No other details have been reported.

Three firefighters were killed in separate incidents while returning from training activities. All three were driving their personal vehicles when they crashed:

- One of the victims crossed the center line into oncoming traffic and was struck by a tractor trailer truck. He was wearing his seat belt and was not ejected. Road conditions and weather were not factors in the crash.
- One firefighter was struck on a divided highway by a tractor trailer truck that had itself been involved in a collision on the other side of the highway, traveled into the median, and through the guard rail. No details on seat belt usage were reported.

- No details have been reported on the third fatal crash returning from training activities.

The remaining fatal crashes occurred while firefighters were engaged in other on-duty activities:

- A fire chief returning from a meeting in a fire department pickup truck apparently drifted across the center line of a two-lane road, overcorrected, and veered off the road on the right, down an embankment, and into a reservoir, where he drowned in 36 feet of water. Speed was not a factor in the crash. He was found with the seat belt across his chest, but not it was not latched.
- A forestry employee returning to base from a prescribed burn in a department pickup truck crossed the center line and struck an oncoming tractor trailer truck almost head on. Both vehicles caught fire, and both drivers were killed. The victim was wearing his seat belt and was not speeding. Postmortem tests reported the presence of illegal drugs in his system.
- Another fire chief, driving to a meeting in a fire department SUV, went off the road in icy conditions and struck a tree. No other details of the incident were reported.

Of the 25 deaths in road vehicles mentioned above, 11 of the victims were not wearing seat belts (eight were ejected), five were wearing their seat belts, and one crash involved a motorcycle. Seat belt use was not reported in the other eight crashes, but two of the victims were at least partially ejected, suggesting that they were not restrained. Excessive speed was a factor in at least six of the 24 crashes, one of which resulted in two deaths. Drugs may have been a factor in one crash. Other factors reported were failure to yield, driver inexperience, and driver inattention.

Trends in road vehicle crashes from 1998 through 2007 are discussed in a separate section of this article.

One firefighter struck by a vehicle and killed was at the scene of a vehicle fire shortly after 4:00 a.m., loading hose back onto a fire apparatus in the right-hand lane of an interstate highway when he was struck by a bus traveling approximately 65 miles per hour. The bus driver had not noticed the emergency lights of the apparatus parked on the shoulder and in the right-hand travel lane or the traffic cones set up near the fire scene, and was traveling in the right-hand lane. When he tried to change lanes, he sideswiped the first apparatus and struck the firefighter. The fire department had declined traffic control during its operations because there was no traffic on the road.



## 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.

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 increases as a result. The enactment of the USA Patriot bill in 2001 increased the benefit to \$250,000. The current benefit is \$303,064, tax free.

A decedent's spouse and minor children usually are the eligible beneficiaries. Generally, 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, to the individual designated as beneficiary under the most recently executed life insurance policy on file 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.

**Line of duty disability:** 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 benefit. Students may apply for PSOEA funds for up to 45 months of full-time classes. As of October 1, 2006, the maximum benefit a student may receive is \$860 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 Program, 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 now be filed online as well, at: <https://www.psob.gov>.

### Career and volunteer firefighter comparison

The distribution of deaths of career and volunteer firefighters from local fire departments is shown in Figure 9. While the number of volunteer firefighter deaths continued its historic fluctuation between the mid-40s and mid-60s with no clear trend, the number of career firefighter deaths jumped sharply in 2007, to the highest level since 1989 (not including the deaths at the World Trade Center in 2001). Deaths among career firefighters had been falling fairly steadily since 1985. Most, but not all, of the increase

in 2007 can be explained by the nine fatalities in Charleston, South Carolina, furniture store fire.

Over the past 10 years, there has been an average of 30 career firefighter deaths annually, so the total of 42 on-duty deaths in 2007 is well out of range for the period. Among volunteer firefighters, the 10-year average has been 57 deaths per year, with 53 in 2007.

A breakdown of the fatality experience of the 95 career and volunteer firefighters killed in 2007 is shown in Table 1.

## Other findings

From 1998 through 2007, 65 firefighters, or 6.5 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 part because of the decline in intentionally set fires over the same period. Although there had been a sharp increase reported in 2006, the two reported fatalities in 2007 continues the downward trend. One of the victims in 2007 suffered a fatal heart attack while responding on foot to a fire in a vacant building, and the other was involved in a collision while responding to a woods fire.

Two firefighters died in 2007 in crashes while responding to false alarms. Over the past 10 years, 33 firefighters have died as a result of false calls, including malicious false alarms and alarm malfunctions.

Of the 13 training-related deaths, eight were the result of sudden cardiac death, four were a result of internal trauma, and one was a result of fatal burns.

Of the seven deaths at non-fire emergencies, two were the result of sudden cardiac events, two were due to shrapnel injuries, and one each was due to stroke, internal trauma, and drowning.

## Conclusions

On-duty firefighter deaths rose in 2007, from the high 80s reported in the previous two years, to just over 100. There are a few important factors in the increase:

- The nine-fatality incident in Charleston was the largest multiple-firefighter fatality incident since September 11, 2001.
- The number of fatal crashes in 2007 (26 crashes) is tied with 1988 for the highest number of crashes in the 31 years of this study, and the number of deaths in crashes (27 deaths) is the second highest reported over those years.

There were some significant variations from the findings in recent years, mentioned earlier:

- The number of deaths in wildland fires in 2007 was much lower (3 in 2007, compared to an average of 10 over the past 10 years, and as many as 26 in a single year).
- The number of career firefighter deaths was much higher (42 in 2007, compared to a 10-year average of 30 per year).
- Seven of the victims in 2007 were not career or volunteer firefighters, compared to an average of approximately 13 annually over the past 10 years.

But the common trends held again in 2007. Sudden cardiac death, usually heart attacks, claimed the largest number of lives in the year, followed by crashes. The 2008 Fire/EMS Safety, Health and Survival Week, formerly known as

Stand Down, held in June and co-sponsored by IAFF and IAFC, recognized the range of issues affecting the health and safety of the fire service when they chose this year's theme, Committed to Long-Term Results. The activities for the week focused on three areas: vehicle safety (seat belts, stopping at red lights and stop signs, and safe driving); fitness/wellness (annual medicals and physical evaluations, the provision and opportunity to use fitness equipment, and nutrition); and implementation of NFPA 1500.

## References

1. The NFPA's files for firefighter on-duty fatal injuries are updated continually for all years.
2. 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 being struck by vehicles where the involvement of the vehicle played an integral role in the death.
3. 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.
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., "U.S. Fire Department Profile Through 2005," NFPA Fire Analysis and Research Division, Quincy, Massachusetts, October 2006. The analysis shown here assumes that the number of firefighters adequately estimates exposure and that the age distribution of career and volunteer firefighters is similar.

## Credits

This study was made possible by the cooperation and assistance of the United States fire service, the Public Safety Officers' Benefits Program of the Department of Justice, the United States Fire Administration, the National Institute for Occupational Safety and Health, 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 of NFPA's Public Fire Protection Division for his assistance on the study. 🍷

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# Firefighter Fatalities 2007

## Furniture Store Fire Kills Nine Firefighters

At approximately 7:08 pm on June 18, 2007, the Charleston, South Carolina, Fire Department began receiving 911 calls reporting a fire in the Super Sofa Store on Savannah Highway, including one from a store employee reportedly trapped in the building. The metal-frame building, which included a warehouse as well as the store, had metal roof trusses and a metal roof deck. It covered approximately 50,000 square feet (4,645 square meters).

First-arriving units saw smoke showing from the store and warehouse and located the fire in the building's loading dock area between the showroom and the warehouse. Firefighters began to search for the trapped employee, who was on the phone giving his location to a fire dispatcher, who relayed it to the crews on scene. To help the firefighters find him, he also pounded on the building's outer wall. When firefighters located the trapped man, they removed him through an opening they made in the building's outer metal skin.

Meanwhile, firefighters entered the building with hose lines to find the seat of the fire. As they fought the blaze, it grew rapidly and began spreading from the center of the building through the showroom toward the front entrance.

This rapid fire spread was quickly followed by structural collapses in the showroom, which trapped firefighters, killing nine. The cause of the fire is still listed as undetermined.

After the blaze, a blue ribbon panel from the nation's fire service was convened to look into the incident and into the Charleston Fire Department to report on lessons learned and recommend improvements.

The panel's preliminary report, released in October 2007, recommended improving training, staffing, communications, occupational health and safety, personal protective equipment, apparatus and equipment, and code enforcement. The final version of the panel's report was released on May 15, 2008.

The National Institute of Standards Technology and the National Institute of Occupational Safety and Health (NIOSH) are both looking into the fire and will issue reports in the coming months. A preliminary draft of the NIOSH report was released in early May 2008.

The fire was the worst single firefighter fatality incident since the September 11 attacks and the deadliest fire in South Carolina since 1979, when 11 people died in a blaze in the Lancaster County jail.

## Fall through floor

At 3:21 p.m. on January 3, a passerby called 911 to report a fire in a single-family home. The two-story, wood-frame structure, which was of balloon construction and covered 1,200 square feet (111.5 square meters), had no automatic detection system. No one was home at the time of the fire.

The first engine company arrived on the scene at 3:35 p.m. with an officer and two firefighters, who saw a large amount of smoke hanging close to ground with little visible fire. They also saw five firefighters who had responded directly to the scene from home or work and who were not dressed in protective ensembles. One of these firefighters informed the officer that he had pulled the electric meter.

The officer and a firefighter advanced a 1 3/4-inch (4-centimeter) hose to the doorway and forced the door open as the other firefighter operated the pump. The officer, who was wearing a protective ensemble but had no self-contained breathing apparatus (SCBA), instructed the firefighter, who was dressed in a full protective ensemble with a SCBA, to play water from the doorway on the visible fire and to stay out of the house until other fully attired crews arrived.

As the firefighter at the doorway stepped inside the building to see if he could locate any fire, he saw flames spreading up the wall to his left. When he turned to position the hose line to extinguish the flames, he stepped through the fire-weakened floor. He managed to catch himself and hold himself up in the hole by his arms.

Firefighters tried twice to reach him, but they were not wearing SCBAs and had to leave the building, overcome by smoke. During a third rescue attempt, a large piece of ceiling fell and hit the rescuer, knocking his helmet off and dislodging his face piece, which allowed burning embers to fall down his collar. He instinctively let go of his trapped colleague to remove the embers, and the man fell into the basement, where he became entangled in electrical wires.



This furniture store fire in Charleston, South Carolina killed nine firefighters.



Firefighters lowered a ladder to the basement, disentangled the trapped firefighter, and removed him from the building. He was still dressed in his full protective ensemble, but his SCBA's air cylinder was empty.

The firefighters immediately began cardiopulmonary resuscitation (CPR) and transported him by ambulance to a landing strip, where a helicopter was waiting. At the hospital, he was placed on life-support equipment but died two days later of asphyxiation.

The firefighter's equipment was examined and found to be in good condition, including his SCBA and personal alert safety system. Investigators noted that his personal alert safety system did not sound while he was in the building but did sound when it was taken off him and placed outside the building.

Investigators determined that the fire was caused by a failure in an electrical junction box and ceiling light in the basement. The fire then burned through the floor in the area of a return air duct.

#### **Motor vehicle crash during response**

At approximately 4:30 p.m. on February 11, an alarm was sounded for a motor vehicle crash with injuries, and a 28-year-old firefighter got into his pickup truck to respond. On the way to the scene, he entered a T-shaped intersection without stopping for the stop sign. The driver of another pickup truck traveling through the intersection with the right of way tried unsuccessfully to avoid a collision by braking, but his truck hit the firefighter's vehicle on the driver's side to the rear of the cab. The impact caused the firefighter's truck to spin around, and the driver's door opened, ejecting the firefighter, who was not wearing his seatbelt. Both vehicles came to rest off the roadway.

The unconscious firefighter suffered severe head trauma, and emergency medical technicians transported him to a local hospital. He was later flown to a medical center and placed on life support. He died 13 days later, never having regained consciousness. The cause of death was listed as severe traumatic brain injury.



# Firefighter Fatalities 2007

## Propane gas explosion at gas station

At 10:42 a.m. on January 30, the county 911 center received a telephone report of a gas leak at a convenience store and gasoline station. The center dispatched the local fire department a minute later, and two firefighter/emergency medical technicians (EMTs) in the department's EMS unit arrived at the scene at 10:47 a.m.

After parking their ambulance in front of the store, the two men walked around to the back where two 500-pound (267-kilogram) liquid propane gas (LPG) tanks were located and reported to a firefighter who had already arrived. Also behind the building were two gas company employees who were working on the tanks. The two firefighters briefly examined one of the gas company employees who complained of a thermal injury from exposure to propane, but the employee refused treatment. The firefighter in charge then directed the two firefighters to evacuate the area and keep people out of the parking lot.

The next firefighter to arrive also reported to the firefighter at the rear of the building, who told him to return to his vehicle, put on his protective ensemble, and help the other two firefighters keep people from entering the parking lot. As yet another firefighter walked toward the building, an explosion destroyed the store and gasoline pump area.

After the explosion, the bodies of the firefighter in charge and one of the firefighter/EMTs were found behind the building, as were the bodies of the two gas company employees. The other firefighter/EMT sustained minor injuries and began to triage and treat the injured until additional EMS units arrived. The firefighter who had gone to his vehicle to put on his protective ensemble was shielded by the vehicle and was not injured, but the firefighter who was walking toward the scene sustained multiple injuries.

Four employees of the store were also injured and had to be hospitalized.

The explosion is reported to have occurred less than 13 minutes after the initial 911 call. It was also reported that the gas company employees were trying to transfer propane from one 500-pound tank to the other and that the liquid withdrawal valve on the tank malfunctioned, allowing LPG to escape and ignite.

The firefighter who was in charge died of cranio-cerebral injuries from shrapnel and the firefighter/EMT died of head injuries as a result of the blast.

## Fall from roof

Firefighters responded at 5:00 p.m. on June 21 to an alarm of a fire at a four-story building that had been illegally converted from a factory to an apartment house. The structure, which was of ordinary construction and covered 7,500 square feet (697 square meters), had a wet-pipe sprinkler system but no detection system.

Arriving firefighters saw smoke and fire coming from the window of one of the fourth-story apartments. A 23-year-old firefighter with less than two years' experience was assigned to ventilate the roof. Attired in a full protective ensemble, including SCBA, he climbed the aerial ladder carrying a power saw on a strap over his shoulder in addition to his regular tools.

As he stepped off the ladder, he lost his footing and fell 60 feet (18 meters) to the sidewalk below. He was transported to the hospital, where he later died of blunt trauma to the head and torso.

Investigators determined that the fire started when an occupant tried to extinguish a cigarette on the wooden window sill. The sill smoldered for some time before igniting, and the fire spread to the rest of the wood sash. A single sprinkler activated and kept the fire from spreading to the interior from the area of origin.

## Live burn training

On February 9, a female fire recruit died in a live-fire training exercise that simulated a response to a vacant row house. The three-story row house in which the exercise took place was of ordinary construction and covered 1,200 square feet (111 square meters). The publicly owned property, which had been condemned, was an end unit in a group of three similar occupancies.

The house's third story extended from the front approximately half the building's length and ended at a stairway from the second story. A window 41 inches (1 meter) off the floor and 27 inches (0.6 meters) wide was located on the third-story landing. A lean-to roof extended from the exterior third-story wall just below the window to the

end of the second story. Several weeks before the exercise, when the building was used for training in forcible entry and horizontal and vertical ventilation, the ceilings and portions of the walls on the second and third stories were removed.

At 11:54 a.m., 22 recruits, 11 instructors and adjunct instructors, and 2 paramedics were at the site. An aerial ladder and pumper from the training academy were in front of the building with the aerial ladder positioned to the roof and the pumper connected to a nearby hydrant. Also on-scene were an ambulance and a training academy utility truck carrying extra equipment. The first-due chief officer and fire companies were there to observe and remained in service for emergencies. They were later deployed on the training exercise when conditions deteriorated and the rescue effort took place.

The recruits were organized into three engine companies and three truck companies as evenly as possible, with an adjunct instructor or training academy officer assigned to each company. While all the recruits and instructors in the fire building wore full protective ensembles and used SCBAs, many did not have personal alert safety systems (PASS).

Engine 1, with four recruits and an adjunct instructor, was assigned to enter through the front and go to the third story to extinguish any fire. They were told not to worry about fire on the second floor, as Engine 2 was assigned to the second floor and would come in right behind them. The adjunct instructor did not have a PASS or radio.

Engine 2 was also assigned four recruits with an adjunct instructor and was told to enter the rear of the building and go up the stairs behind Engine 1 to extinguish the fire on the second story. The adjunct instructor had no PASS or radio, either. The officer of Engine 3, which was to function as a rapid intervention team (RIT), had a radio.

Truck 1 was assigned to place ground ladders to the front of the fire building, then enter the building to perform search and rescue. Truck 2 was to go to the rear of the building and perform a forcible entry at ground level. The adjunct instructor of Truck 2 had a radio. The crew of Truck 3 was to climb over the aerial ladder to the adjacent roof and ventilate the fire building.

An officer and two adjunct instructors ignited

two fires in a room on the third story and six fires the second story, two in the front room, two in the room in the rear, one in the bathroom, and one in a closet. No fires were set on the first story. Wood pallets and bales of hay fueled the eight fires.

After the officer and instructors left the building, the simulated dispatch was made. An unknown amount of time passed before the crews went into the building because they were not prepared. When Engine 1 did enter the building from the front, they advanced a 1 3/4-inch (4-centimeter) hose line up the stairs to the second story. At the same time, Engine 2 brought a 1 3/4-inch hose line to the rear and waited for Truck 2 to simulate forcible entry.

When Engine 1 reached the second story, they encountered severe fire conditions that made the adjunct instructor uncomfortable about proceeding before extinguishing some of the fire. When he ordered the recruit on the nozzle to extinguish some of the fire, the nozzle's back pressure knocked her down. The instructor took control of the nozzle and extinguished the fire to a size he was comfortable with, and the crew went on toward the third story.

Engine 2 encountered debris burning in the rear room on the first level and was delayed reaching the second story as planned.

On the stairs between the second and third stories, a recruit from Engine 1 told the adjunct instructor that her legs felt as though they were burning. In response, the instructor climbed out the window of the third-story landing onto the second-story roof and helped the recruit climb out, too. The other two recruits, who were coming up the stairs, saw the recruit who had been on the nozzle trying to climb out the window. She warned them to leave the building. The two took the hose that was on the floor and still flowing water and retreated down the stairs, extinguishing the fires so they could leave the building.

On the landing, the adjunct grabbed the harness of the recruit's SCBA and tried to pull her out the window. Unfortunately, the window was too high, and she fell backwards, landing on her feet. When he grabbed her again, he noticed that her face piece was partially dislodged and her face was starting to blister. Without a radio, the adjunct instructor could only scream for help.

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As Truck 3, Engine 2, and the RIT became aware of what was going on, they started toward the third level. Members of Truck 3 who were on the third-story roof also responded to the call for help. The rescuers spent several minutes trying to pull the recruit out, during which time she lost consciousness. She was finally pushed out onto the second-story roof by members of Engine 2. Firefighters immediately began CPR and removed the recruit from the building over the aerial ladder. She was transported to the hospital, where she died of burns and asphyxia.

An investigative report listed 36 potential violations of NFPA 1403, *Live Fire Training Evolutions*.

## Fall from bridge

At approximately 1:15 a.m. on August 10, fire companies were called to a motor vehicle crash with injuries.

After firefighters removed the victim from the vehicle, the driver's side of which was pinned against the side of the bridge, they began spreading an absorbent material to clean up oil and gasoline that was leaking from the vehicle. A lieutenant climbed on the hood of the car to try to reach the keys in the ignition. He wanted to make certain that the ignition was off to prevent a spark from causing a fire.

As he reached through the driver's side window, he lost his balance and fell off the bridge to the ground 40 feet (12 meters) below. He died on the scene of blunt force injuries.

## Struck by motor vehicle

One firefighter was killed while working the scene of a tractor-trailer fire on a four-lane interstate highway at 3:00 a.m. on July 27. The fire started when the tractor-trailer's brakes locked, causing its rear tires to ignite, and fire spread to the body of the trailer before it was extinguished.

When the fire companies' three emergency vehicles arrived at the scene, they found the tractor-trailer parked on the shoulder. Two of the vehicles parked on the shoulder behind the tractor-trailer, while the other parked in the travel lane between the other two, all with their emergency lights on. The firefighters set up orange cones to divert traffic to lane two of the highway.

After extinguishing the fire, the firefighters were putting their equipment away when a bus traveling at an estimated 65 miles (104 kilometers) per hour in lane one veered to the left through the cones to avoid hitting the emergency vehicle. The bus sideswiped the apparatus parked in lane one

A bus (foreground) hit and killed a firefighter who was putting equipment back into the driver's side compartment of his vehicle.





and hit a 43-year-old firefighter who was putting a hose back into a driver's side compartment. The firefighter was thrown approximately 230 feet (984 meters) and died instantly.

### **Electrocuted at a grass fire**

A fire lieutenant was electrocuted on September 24 at the scene of a grass fire, which started when a tractor-trailer knocked down a utility pole supporting energized electrical power lines as it turned around on a road that was closed for construction.

A passerby called 911 at 2:00 p.m. to report the wind-driven fire, which was burning near a residential area, and fire companies were dispatched to the scene. A fire lieutenant dressed in protective trousers with knee-high fire boots and leather gloves was operating a hose line when he touched the power line. A firefighter working in the area spotted the downed lieutenant and, with another firefighter, pulled him away from the power line.

The firefighters began performing CPR on the lieutenant in an attempt to save his life. The lieutenant was in critical condition as he was taken by air ambulance to a regional medical center where he died within the hour. Cause of death was electrocution.

### **Physical fitness evaluation**

On April 25 at 2:30 p.m. a fire captain died when participating in an annual physical fitness and job task evaluation. All members of the fire department's suppression force are required to take part in the evaluation. Personnel are not allowed to participate if their systolic blood pressure is 150 and above or their diastolic blood pressure is 100 and above during a screening immediately prior to the evaluation.

The 56-year-old engine company fire captain with 22 years of service was participating in a part of the program that required him to walk at a rapid rate for thirty minutes. The walk was being held at a local university's track. The fire captain dressed in a tee shirt and gym shorts was well into his walk when he collapsed. On-scene fire department medical personnel began life-saving measures and transported him to the hospital where continuing efforts to resuscitate him failed and he was pronounced dead approximately thirty minutes from the time he collapsed. The cause of death

was listed as complications of atherosclerotic cardiovascular disease.

### **Motor vehicle crash while responding**

At about noon on March 24, two firefighters were killed while responding to a fire on a mutual aid call. The two firefighters were riding in the tanker while other firefighters followed in their privately owned vehicles. The driver of the tanker was 45 years old. The other firefighter riding in the passenger seat was 19 years old. Neither was wearing the seatbelts provided.

The 1000-gallon (3,785-liter) tanker was responding on a two-lane highway under good weather conditions and a dry road. It was reported that the tanker was traveling at an estimated speed of 50 miles (80 kilometers) per hour in a 45 mile-an-hour (72 kilometer-an-hour) speed zone when moving out of a slight left-hand curve. The driver braked and steered to the left, crossing the yellow double centerline. The driver then steered to the right, overcorrecting, and causing the apparatus to begin to skid sideways. It went off the right-hand side of the road before skidding back on the road and overturning. It rolled three or four times traveling 55 feet (17 meters), before coming to a rest on its roof across the highway. The driver was ejected from the truck as it rolled and the passenger was trapped in the cab. Both firefighters were pronounced dead at the scene of the crash. Cause of death for both firefighters was blunt force trauma.

The fire that the firefighters were responding to was an uninhabited manufactured home that was completely destroyed.

### **Helicopter crash**

On July 23 at 11:00 a.m., a helicopter went down in a remote and heavily wooded area approximately 12 miles from its base camp. The helicopter, piloted by a contract pilot, was to drop off water blivets (bladders) so firefighters on the ground fighting a complex of fires would have fresh drinking water. The blivets were suspended beneath the helicopter on a 150-foot (46-meter) line.

A number of firefighters witnessed the crash. They reported that as the helicopter set the blivets down on the ground, it drifted to the right and the main rotor blades came in contact with a tree.



# Firefighter Fatalities 2007

The 150-foot (46-meter) line along with the blivets remained attached to the helicopter as it made a turn to the left, hesitated and then flew down hill. The helicopter was destroyed when it crashed into the heavily forested area and a postcrash fire consumed the helicopter's cabin area. No abnormal engine sounds were heard during the event and the investigation into the crash is on-going.

## Heart attack at fire

On February 19 a 44-year-old acting lieutenant with 20 years of service died during a fire in an apartment building. At 8:00 a.m. the acting lieutenant reported for work and checked his equipment and filled out the daily paper work required of that position. During the morning, he and his crew participated in a bladder cancer screening. At 12:30 p.m. they were dispatched to a fire in a two-story, residential structure where they searched for victims, ventilated, and helped to extinguish the fire.

At 4:40 p.m. they were dispatched to their second fire of the day. The fire was in an eight-story, apartment building of fire resistive construction.

On arrival, the acting lieutenant observed a large volume of black smoke coming from windows on the sixth story. The acting lieutenant and one firefighter dressed in full protective ensembles with SCBAs climbed the six flights of stairs at a rapid pace. Reaching the sixth-story they entered the smoke-filled fire apartment and began a search for victims, ventilating at the same time. Thirty minutes into the fire, the acting lieutenant collapsed as he walked out of the apartment.

CPR was immediately started and a defibrillator was used. The acting lieutenant remained asystolic throughout the transport to the hospital and was pronounced dead upon arrival. The cause of death was listed as ischemic heart disease.

## Lost inside fire building

On April 16 at 6:00 a.m. numerous 911 calls were placed to the fire department to report a structure fire. Five minutes after dispatch, arriving companies observed a large amount of fire on the exterior left-rear corner of the building. Winds of 25 miles (40 kilometers) per hour with gusts up to 48 miles (77 kilometers) per hour were prevalent at the time of

the fire and caused rapid spread of fire, heat, and smoke throughout the structure within minutes.

The structure was a large, two-story, single-family dwelling with 5,000 square feet (464.5 square meters) of ground floor area. It was constructed of lightweight wood-truss construction. The officers of the first engine and truck companies made independent size-ups and met in the front of the building. They both observed a vehicle in the driveway and vehicles on the street in front of the house. No interior lights were on and given the early morning hour, an occupant rescue situation was suspected. A second alarm was requested as a result.

The members of the first engine and truck company dressed in full protective ensembles with SCBA and entered the building. The engine company advanced a 2 1/2-inch (6-centimeter) hose and the truck performed a primary search of the first level. The windows were still in place and the interior conditions had little smoke and no heat. The companies proceeded to the second story where they encountered smoke banked down 3 to 4 feet (1 to 1.2 meters) from the ceiling.

The officer and one of the firefighters of the truck company were in the process of searching the master bedroom when conditions rapidly deteriorated to thick black smoke with no visibility and high heat conditions. They began to evacuate the bedroom area to exit the building. The officer crawled into the hallway and became entangled with a table. The entanglement caused the officer to fall down 5 to 6 stairs to a curve in the staircase. The officer called out to the firefighter, who stated he was having trouble finding the staircase.

The engine and a rescue company located the officer and were able to bring him to the front yard. Learning that a firefighter was trapped inside, a Mayday was sounded. Multiple rescue attempts were made to ascend the stairs despite the heat and fire conditions. The on-scene fire companies working to bring the fire under control reentered the structure and searched until they found the body of the firefighter in the master bedroom. The cause of death was listed as thermal and inhalation injuries. As a result of this tragic incident a number of improvements in the fire department's operations have been proposed. 🔥

# Firefighter Fatalities 2007

## Deaths in road vehicle crashes, 1998 to 2007

**CRASHES, INCLUDING COLLISIONS AND ROLLOVERS,** consistently account for the second largest share of firefighter deaths, overall. The 148 deaths of on-duty firefighters in 133 road vehicle crashes over the past 10 years are shown in Figure A. The number of deaths annually ranged from a low of 10 in 1998 and 2006 to a high of 25 in 2003 and 2007.

Almost all the crashes were single-fatality incidents. One crash each killed three, five, and eight firefighters, all employees of or contractors for federal land management agencies. There were two two-fatality crashes; the victims were volunteer firefighters.

Overall, more than two-thirds of the victims (101 firefighters) in these crashes were volunteer firefighters. Fifteen percent (22 firefighters) were career firefighters, and the remaining 25 victims (16.9 percent) were contractors for, or employees of, state and federal land management agencies or the military. Of the 148 victims, 110 were driving, and 38 were passengers.

### Types of Duty

Four of five of the crashes and fatalities occurred while firefighters were responding to, or returning from, alarms (106 crashes, 119 deaths). Of these 119 victims, 102 were responding to emergencies at the time of the crashes; 29 to structure fires; 26 to grass, brush or wildland fires; 15 to medical calls; 13 to motor vehicle crashes; 5 to false alarms; 2 each to outside fires and vehicle fires; and the other 10 to a variety of emergencies. Fifteen of these 102 crash deaths occurred during mutual-aid responses (11 to structure fires; 3 to brush, grass, or wildland fires; and 1 to an outside fire). The other 17 victims were killed in 10 crashes while they were returning from emergency calls. This includes one crash where eight firefighters returning from a wildland fire died.

Five deaths occurred during emergency operations, four of them on two wildland fires when vehicles rolled down ravines and one during an EMS call. Nine deaths were related to training activities, but only one occurred during driver training. The other eight crashes occurred while the victims were driving to or from training exercises or courses.

The remaining 15 deaths occurred during a variety of other types of on-duty, non-emergency activities.

Of the 148 victims, 16 were chief officers. All were driving the vehicle when they were killed. Ten were driving fire department apparatus, four were driving other fire department vehicles, and

two were driving their personal vehicles. Ten were responding to alarms (four structure fires; two brush, grass or wildland fires; one EMS call and three other types of emergency calls), and one was returning from a structure fire. Five were engaged in other on-duty activities; two were driving to meetings, one was returning from a meeting, one was going to get a vehicle inspection sticker for the fire apparatus, and one was driving to a controlled burn.

### Types of vehicles involved

One-third of the crashes, resulting in 50 deaths involved firefighters' personal vehicles, and all of them were single-fatality incidents. Twenty-eight crashes resulting in 30 deaths involved pumpers. Another 28 incidents that involved water tenders (tankers) also resulted in 30 deaths. Six firefighters were killed in single-fatality crashes involving ambulances or rescue vehicles, and three were killed in single-fatality crashes involving ladder trucks. The remaining 29 deaths occurred in 18 crashes of other types of public safety vehicles. This includes eight deaths in a van returning from a wildland fire and five deaths in a van responding to a wildland fire.

Of the 114 victims for whom information about seat belt use was reported, 67 percent were known to not be wearing seat belts or using restraint systems.

### Factors in the crashes

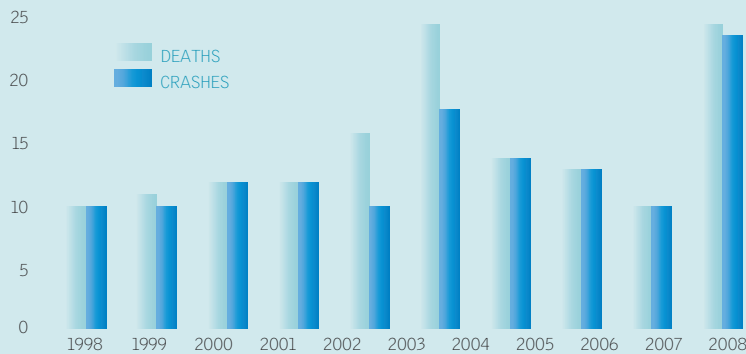
Thirty-five of the crashes occurred on curves in the road, often when drivers failed to negotiate the turn and the apparatus wheels went off the pavement. These crashes resulted in 37 deaths. In 32 of these crashes, the firefighters were responding to alarms. In two cases, the firefighters were returning from calls, one on his motorcycle. One firefighter was involved in a driver training exercise when he crashed on a curve. The vehicle's brakes were found to be defective.

Twenty-three single-fatality crashes occurred at intersections. In 21 of these 23 crashes, the victims were responding to alarms. One victim was on his way to a meeting when he was broadsided by another driver who ran a stop sign, and another was killed when a vehicle involved in a separate collision landed on his car.

Three single-fatality crashes occurred at grade-level railroad crossings when fire apparatus were struck by trains. One of the firefighters was responding to a medical call and did not stop at the crossing. Another was driving a tanker back from a

# Firefighter Fatalities 2007

Figure A - Fatal Road Vehicle Crashes 1998-2007



training exercise and was struck at a private railroad crossing. The third, returning from a false alarm, was attempting to drive the fire apparatus around a crossing gate when he was struck by the train.

Excessive speed for the road conditions or exceeding the speed limit was a factor in 48 of the crashes, which resulted in 50 deaths. Wet or icy roads contributed to 31 crashes. In five crashes, the drivers were intoxicated, and drugs or alcohol were possible factors in two of the other fatal crashes. Operator error, including failure to stop at traffic signals, driver inattention, and poor fire apparatus maintenance were factors in several of the crashes.

### Other victims of fire department vehicle crashes

According to NFPA's most recent statistics, there were approximately 16,000 collisions in 2006 involving fire department apparatus responding to, or returning from, incidents, resulting in 1,250 firefighter injuries.<sup>1</sup>

Firefighters are not the only victims in these crashes. National Highway Traffic Safety Administration (NHTSA) reports show that, from 1997 through 2006, 94 of the victims in fatal collisions involving a fire apparatus in emergency use (operating lights and sirens) and another vehicle were occupants of the other vehicle, while nine were firefighters. In other multiple vehicle crashes where the fire apparatus was not in emergency use, 33 of the victims were occupants of the other vehicles and one was a firefighter. Over that period, crashes involving fire department apparatus killed 21 pedestrians and five bicyclists.<sup>2</sup>

### Reducing firefighter crash deaths

Deaths in crashes continue to account for a significant proportion of the annual fatalities. NFPA publishes several standards related to road safety issues. NFPA 1002, *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, *Fire Service Vehicle Operations Training Program*, provides for the development of a written vehicle operations training program, including organizational procedures for training, vehicle maintenance, and identifying equipment deficiencies. NFPA 1911, *Inspection, Testing, Maintenance and Retirement of In-Service Automotive Fire Apparatus*, details a program to ensure that fire apparatus are maintained to keep them in safe operating condition.

Taking into account that personal vehicles were the vehicles most frequently involved in road crashes, the latest edition of NFPA 1500, *Fire Department Occupational Safety and Health Program*, added a requirement that, when members are authorized to respond to incidents or fire stations in private vehicles, the fire department must establish rules, regulations, and procedures relating to their operation in an emergency mode at least equal to the provisions regulating fire department vehicle operations.

NFPA 1500 includes 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 seat belts before drivers move the apparatus, and drivers must obey all traffic signals and signs and all laws and rules of the road, coming to a complete stop when encountering red lights, stop signs, stopped school buses with flashing warning lights, blind intersections and other intersection hazards, and unguarded railroad grade crossings. Passengers must be seated and belted securely and must not release or loosen seat belts for any reason while the vehicle is in motion.

In related efforts, the USFA has formed partnerships with the International Association of Fire Fighters, the National Volunteer Fire Council, and the International Association of Fire Chiefs to focus attention on safety while responding in emergency apparatus. Details can be found at [www.usfa.dhs.gov/fireservice/research/safety/vehicle.shtm](http://www.usfa.dhs.gov/fireservice/research/safety/vehicle.shtm).

1. Karter, Jr., Michael J. and Molis, Joseph L., "Firefighter Injuries in the United States," NFPA, November 2007.

2. See Table 62 of the National Highway Traffic Safety Administration Traffic Safety Facts reports for 1997 through 2006.