

FIRE LOSS IN THE UNITED STATES DURING 2004
FULL REPORT

Michael J. Karter, Jr.
Fire Analysis and Research Division
National Fire Protection Association

September 2005



National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471
www.nfpa.org

Abstract

U.S. fire departments responded to an estimated 1,550,500 fires. These fires resulted in 3,900 civilian fire fatalities, 17,875 civilian fire injuries and an estimated \$9,794,000,000 in direct property loss. There was a civilian fire death every 135 minutes and a civilian fire injury every 30 minutes in 2004. Home fires caused 3,190, or 82%, of the civilian fire deaths. Fires accounted for seven percent of the 22,616,500 total calls. Nine percent of the calls were false alarms; sixty-two percent of the calls were for aid such as EMS.

Keywords: fire fatalities, fire injuries, fire losses, fire statistics, region, fire department calls, intentional fires

Acknowledgements

The NFPA gratefully thanks the many fire departments that responded to the 2004 National Fire Experience Survey for their continuing efforts for providing us in a timely manner the data so necessary to make national projections.

The survey project manager and author of the report gratefully thanks the many members of NFPA staff who worked on this year's survey including Frank Deely, John Baldi, and John Conlon for editing the survey forms and their follow-up calls to fire departments; and Norma Candeloro for handling the processing of survey forms and typing this report.

For more information about the National Fire Protection Association, visit www.nfpa.org or call 617-770-3000. To learn more about the One-Stop Data Shop go to www.nfpa.org/osds or call 617-984-7450.

Copies of this report are available from:

National Fire Protection Association
One-Stop Data Shop
1 Batterymarch Park
Quincy, MA 02169-7471
www.nfpa.org
e-mail: osds@nfpa.org
phone: 617-984-7450

Copyright © 2005, National Fire Protection Association, Quincy, MA

Overview of 2004 U.S. Fire Experience

Number of Fires

- 1,550,500 fires were attended by public fire departments, a slight decrease of 2.2% from the year before.
- 526,000 fires occurred in structures, a very slight increase of 1.3%.
- 410,500 fires or 78% of all structure fires occurred in residential properties.
- 297,000 fires occurred in vehicles, a decrease of 4.8% from the year before.
- 727,500 fires occurred in outside properties, a decrease of 3.4%.
- What do these fire frequencies above mean? Every 20 seconds, a fire department responds to a fire somewhere in the nation. A fire occurs in a structure at the rate of one every 60 seconds, and in particular a residential fire occurs every 77 seconds. Fires occur in vehicles at the rate of 1 every 106 seconds, and there's a fire in an outside property every 43 seconds.

Civilian Fire Deaths

- 3,900 civilian fire deaths occurred in 2004, a very slight decrease of 0.6% or virtually no change from a year ago.
- About 82% of all fire deaths occurred in the home.
- 3,190 civilian fire deaths occurred in the home, a slight increase of 1.4%.
- 520 civilians died in highway vehicle fires.
- 80 civilians died in nonresidential structure fires.
- Nationwide, there was a civilian fire death every 135 minutes.

Civilian Fire Injuries

- 17,875 civilian fire injuries occurred in 2004, a slight decrease of 1.4%. This estimate for civilian injuries is on the low side, due to under reporting of civilian injuries to the fire service.
- 14,175 of all civilian injuries occurred in residential properties, while 1,350 occurred in nonresidential structure fires.
- Nationwide, there was a civilian fire injury every 30 minutes.

Property Damage

- An estimated \$9,794,000,000 in property damage occurred as a result of fire in 2004, a significant decrease of 20.2% from last year. This decrease reflects the Southern California Wildfires (Cedar and Old Wildfires) with an estimated property loss of \$2,040,000,000 that occurred in 2003.
- \$8,314,000,000 of property damage occurred in structure fires.
- \$5,948,000,000 of property loss occurred in residential properties.

Intentionally Set Fires

- An estimated 36,500 intentionally set structure fires occurred in 2004, a slight decrease of 2.7%.
- Intentionally set fires in structures resulted in 320 civilian deaths, an increase of 4.9% from a year ago.
- Intentionally set structure fires also resulted in \$714,000,000 in property loss, an increase of 3.2% from last year.
- 36,000 intentionally set vehicle fires occurred, an increase of 18.0% from a year ago, and caused \$165,000,000 in property damage, an increase of 25.0% from a year ago.

Number of Fires

In 2004, public fire departments responded to 1,550,500 fires in the United States, according to estimates based on data the NFPA received from fire departments responding to its 2004 National Fire Experience Survey (see Tables 1 and 2). This represents a slight decrease of 2.2% from a year ago.

There was an estimated 526,000 structure fires in 2004, a slight increase of 1.3% from last year. For the 1977-2004 period, the number of structure fires was at their peak in 1977 when 1,098,000 structure fires occurred (see Figure 1). The number of structure fires then decreased quite steadily particularly in the 1980s to 688,000 by the end of 1989 for an overall decrease of 37.3% from 1977. Since 1989, structure fires again decreased quite steadily 24.7% to 517,500 by the end of 1998 and has stayed in the 517,500 to 526,000 area from 1998 to 2004.

Fire incident rates by size of community were examined for the 2000-2004 period. (See Figure 2). The smallest communities (under 2,500 population) had the highest rate with 12.0 fires per thousand population.

Of the 2004 structure fires, 410,500 were residential fires, accounting for 78.0% of all structure fires, and a slight increase of 2.1% from a year ago. Of the residential structure fires, 301,500 occurred in one-and two-family dwellings, accounting for 57.3% of all structure fires. Another 94,000 occurred in apartments accounting for 17.8% of all structure fires.

For nonresidential structures most property type showed little or no change in 2004. The only property types with notable changes were: a decrease of 7.1% to 13,000 in public assembly properties, a decrease of 7.1% to 6,500 in institutional properties, and a 6.0% decrease to 23,500 in store and office properties..

For the 1977-2004 period, the number of outside fires were at their high in 1977 when 1,658,500 outside fires occurred. The number of outside fires decreased steadily the next six years to 1,011,000 in 1983 for a considerable decrease of 39.0% from 1977. Outside fires changed little for the rest of the 1980s except for 1988 when 1,214,000 occurred. Outside fires reached 910,500 in 1993, and stayed near the 1,000,000 level the next three years. In 1997-1998 outside fires were at the 850,000 level, went up 8.7% to 931,500 in 1999, before dropping a cumulative 9.9% in 2001-2002 to 839,000 by the end of 2002. In 2003, the number of outside fires decreased a substantial 10.3% to 753,000. and decreased another 3.4% in 2004 to 727,500. In particular, brush fires decreased 11.1% to 320,000 in 2004.

Table 1
Estimates of 2004 Fires, Civilian Deaths, Civilian Injuries
and Property Loss in the United States

	Estimate	Range ¹	Percent Change From 2003
Number of Fires	1,550,500	1,517,500 to 1,583,500	-2.2
Number of Civilian Deaths	3,900	3,500 to 4,300	-0.6
Number of Civilian Injuries	17,875	16,925 to 18,825	-1.4
Property Loss ²	\$9,794,000,000	\$9,504,000,000 to 10,084,000,000	-20.2** ³

The estimates are based on data reported to the NFPA by fire departments that responded to the 2004 National Fire Experience Survey.

¹ These are 95 percent confidence intervals.

² This includes overall direct property loss to contents, structures, vehicles, machinery, vegetation, and anything else involved in a fire. It does not include indirect losses. No adjustment was made for inflation in the year-to-year comparison.

³ This decrease reflects the Southern California Wildfires (Cedar and Old Wildfires) with an estimated total property loss of \$2,040,000,000 that occurred in 2003. Loss by specific property type for this fire was not available.

**Change was statistically significant at the .01 level.

**Table 2
Estimates of 2004 Fires and
Property Loss by Property Use**

Type of Fire	Number of Fires		Property Loss ¹	
	Estimate	Percent Change from 2003	Estimate	Percent Change from 2003
Fires in Structures	526,000	+1.3	\$8,314,000,000	-4.2*
Fires in Highway Vehicles	266,500	-6.8**	969,000,000	-12.0**
Fires in Other Vehicles ²	30,500	+17.3*	335,000,000	+31.4**
Fires Outside of structures with value involved but no vehicle (outside storage, crops, timber, etc.)	69,000	+4.6	108,000,000	-33.3**
Fires in Brush, Grass Wildland (excluding crops and timber) with no value or loss involved	320,000	-11.1**	—	—
Fires in Rubbish including dumpsters (outside of structures), with no value or loss involved	194,000	+1.8	—	—
All Other Fires	144,500	+5.9	68,000,000	-4.2
Total	1,550,500	-2.2	\$9,794,000,000	-20.2** ³

The estimates are based on data reported to the NFPA by fire departments that responded to the 2004 National Fire Experience Survey.

¹ This includes overall direct property loss to contents, structure, a vehicle, machinery, vegetation or anything else involved in a fire. It does not include indirect losses, e.g., business interruption or temporary shelter costs. No adjustment was made for inflation in the year-to-year comparison.

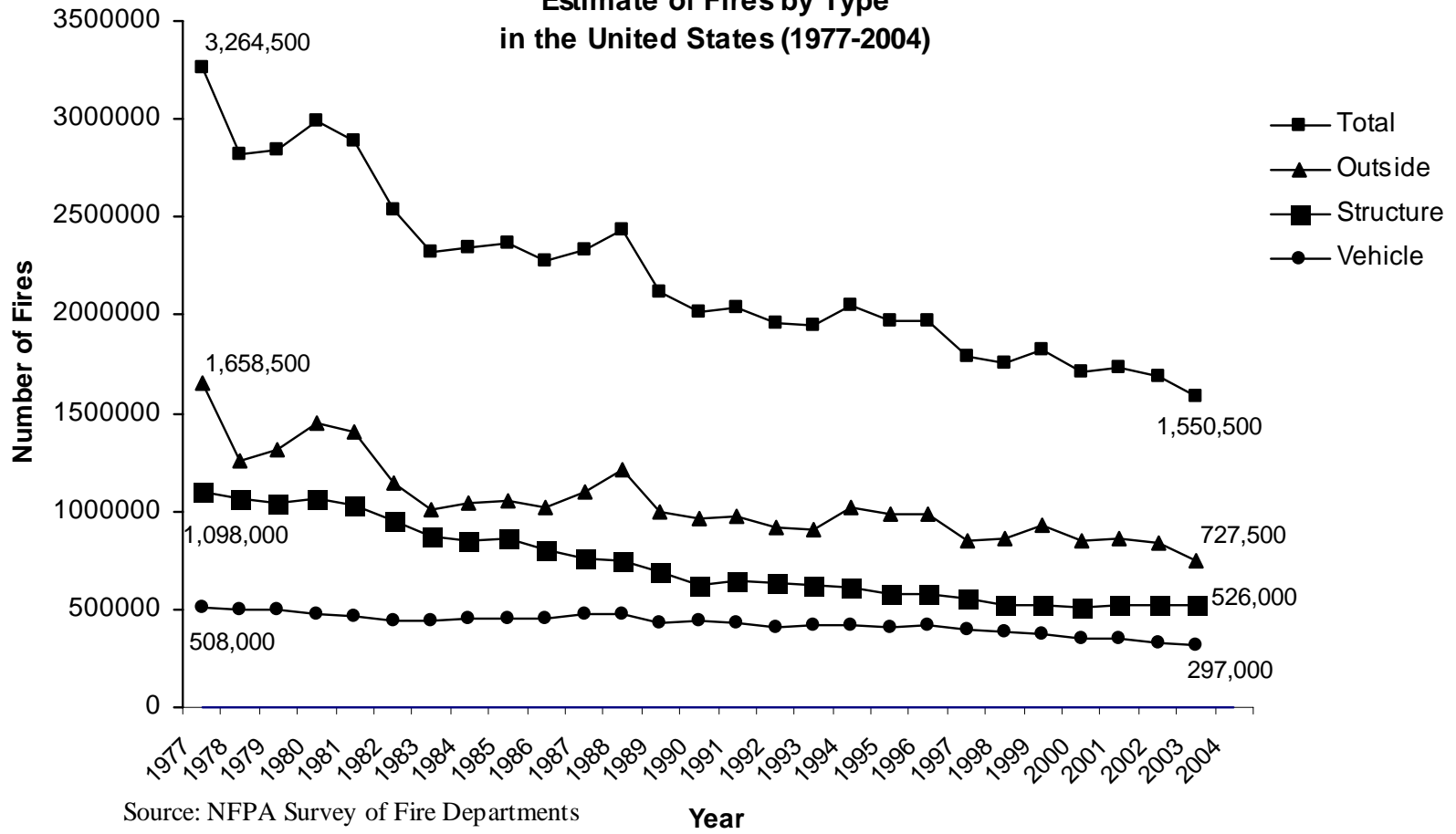
² This includes trains, boats, ships, aircraft, farm vehicles and construction vehicles.

³ This decrease reflects the Southern California Wildfires with an estimated loss of \$2,040,000,000 that occurred in 2003. Loss by specific property type for the fire was not available.

*Change was statistically significant at the .05 level.

**Change was statistically significant at the .01 level.

Figure 1
Estimate of Fires by Type
in the United States (1977-2004)



Source: NFPA Survey of Fire Departments
 for U.S. Fire Experience, (1997-2004)

**Figure 2 Fires per Thousand Population
by Size of Community (2000-2004)**

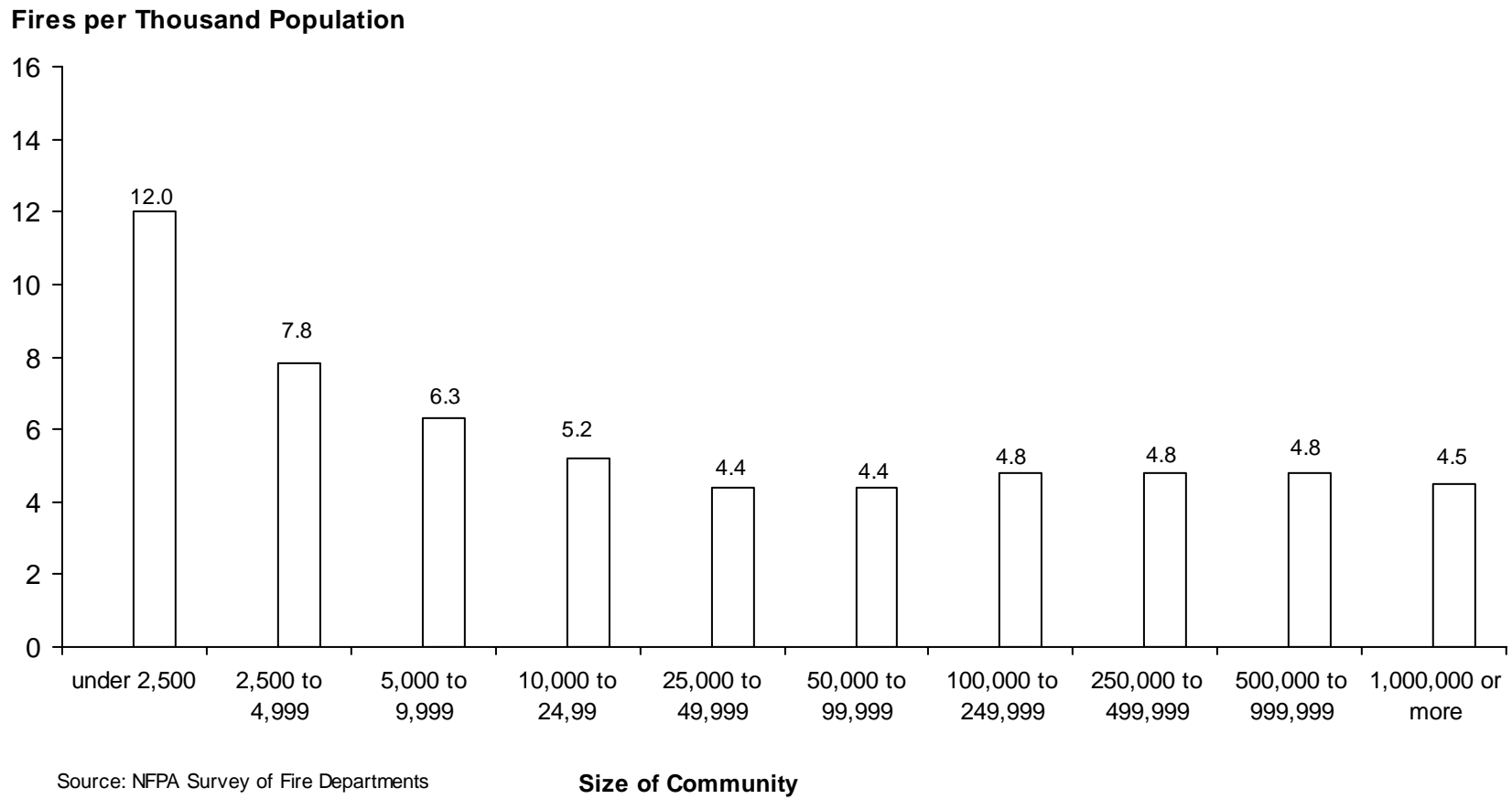


Table 3
Estimates of 2004 Structure Fires and
Property Loss by Property Use

Property Use	Structure Fires		Property Loss ¹	
	Estimate	Percent Change from 2003	Estimate	Percent Change from 2003
Public Assembly	13,000	-7.1	\$316,000,000	+4.6
Educational	7,000	0	68,000,000	-1.5
Institutional	6,500	-7.1	25,000,000	-10.7
Residential (Total)	410,500	+2.1	5,948,000,000	-2.1
One- and Two-Family Dwellings ²	301,500	+1.5	4,948,000,000	-2.1
Apartments	94,000	+2.7	885,000,000	-1.3
Other Residential ³	15,000	+11.1*	115,000,000	-8.0
Stores and Offices	23,500	-6.0	586,000,000	-18.7**
Industry, Utility, Defense ⁴	12,000	+4.3	423,000,000	-32.3**
Storage in Structures	32,000	+1.6	748,000,000	+10.8
Special Structures	21,500	0	200,000,000	+8.7
Total	526,000	+1.3	\$8,314,000,000	-4.2* ⁵

The estimates are based on data reported to the NFPA by fire departments that responded to the 2004 National Fire Experience Survey.

¹ This includes overall direct property loss to contents, structure, a vehicle, machinery, vegetation or anything else involved in a fire. It does not include indirect losses, e.g., business interruption or temporary shelter costs. No adjustment was made for inflation in the year-to-year comparison.

² This includes manufactured homes.

³ Includes hotels and motels, college dormitories, boarding houses, etc.

⁴ Incidents handled only by private fire brigades or fixed suppression systems are not included in the figures shown here.

⁵ This total figure comparison does not include the Southern California Wildfires that occurred in 2003. Loss by specific property type for this fire was not available.

*Change was statistically significant at the .05 level.

**Change was statistically significant at the .01 level.

Civilian Deaths

The 1,550,500 fires reported to by fire departments in the U.S. in 2004 resulted in an estimated 3,900 civilian deaths based on data reported to the NFPA. This is a very slight decrease of 0.6% or virtually no change from a year ago.

An estimated 3,225 died in residential fires in 2004, a slight increase of 1.9%. Of these deaths, 510 occurred in apartment fires, a substantial increase of 24.4%. Another 2,680 died in one- and two-family dwellings, a slight decrease of 2.0%. Though dwelling death rates changed little in 2004, we remain cautious because death rates can vary considerably from year to year particularly for smaller communities as we have observed in recent years.

In all, fires in the home (one- and two-family dwellings including manufactured homes and apartments) resulted in 3,190 civilian deaths, a slight increase of 1.6% from a year ago. Looking at trends in civilian deaths since 1977-78¹, several observations are worth noting (see Figure 2). Home fire deaths were at their peak in 1978 when 6,015 fire deaths occurred. Home fire deaths then decrease steadily during the 1979-82 period except for 1981, and decreased a substantial 20% during the period to 4,820 by the end of 1982. From 1982 to 1988, the number of home fire deaths stayed quite level in the 4,655 to 4,955 area except for 1984 when 4,075 fire deaths occurred. In the past fifteen years, home fire deaths moved well below the 1982-88 plateau and has stayed in the 3,145 to 3,720 area during 1991 to 2004 except for 1996, 1999 and 2002.

With home fire deaths still accounting for 3,190 fire deaths or 82% of all civilian deaths, fire safety initiatives targeted at the home remain the key to any reductions in the overall fire death toll. Five major strategies are: First, more widespread public fire safety education is needed on how to prevent fires and how to avoid serious injury or death if fire occurs. Information on the common causes of fatal home fires should continue to be used in the design of fire safety education messages. Second, more people must use and maintain smoke detectors and develop and practice escape plans. Third, wider use of residential sprinklers must be aggressively pursued. Fourth, additional ways must be sought to make home products more fire safe. The regulations requiring more child-resistant lighters are a good example, as is the recent examination of the feasibility of less

Table 4
Estimates of 2004 Civilian Fire Deaths and Injuries by Property Use

Property Use	Civilian Deaths			Civilian Injuries		
	Estimate	Percent Change From 2003	Percent of all Civilian Deaths	Estimate	Percent Change From 2003	Percent of all Civilian Injuries
Residential (total)	3,225	+1.9	82.7	14,175	+0.7	79.3
One-and-Two-Family Dwellings ¹	2,680	-2.0	68.7	10,500	+5.0	58.7
Apartments	510	+24.4	13.1	3,200	-12.3	17.9
Other Residential ²	35	+75.0	0.9	475	+11.8	2.7
Non-residential Structures ³	80	-63.6** ⁴	2.1	1,350	-11.5	7.5
Highway Vehicles	520	+14.3	13.3	1,300	-7.1	7.3
Other Vehicles ⁵	30	+50.0	0.7	200	0	1.1
All Other ⁶	45	-30.7	1.2	850	-8.1	4.8
Total	3,900	-0.6		17,875	-1.4	

Estimates are based on data reported to the NFPA by fire departments that responded to the 2004 National Fire Experience Survey. Note that most changes were not statistically significant; considerable year-to-year fluctuation is to be expected for many of these totals because of their small size.

¹This includes manufactured homes.

²Includes hotels and motels, college dormitories, boarding houses, etc.

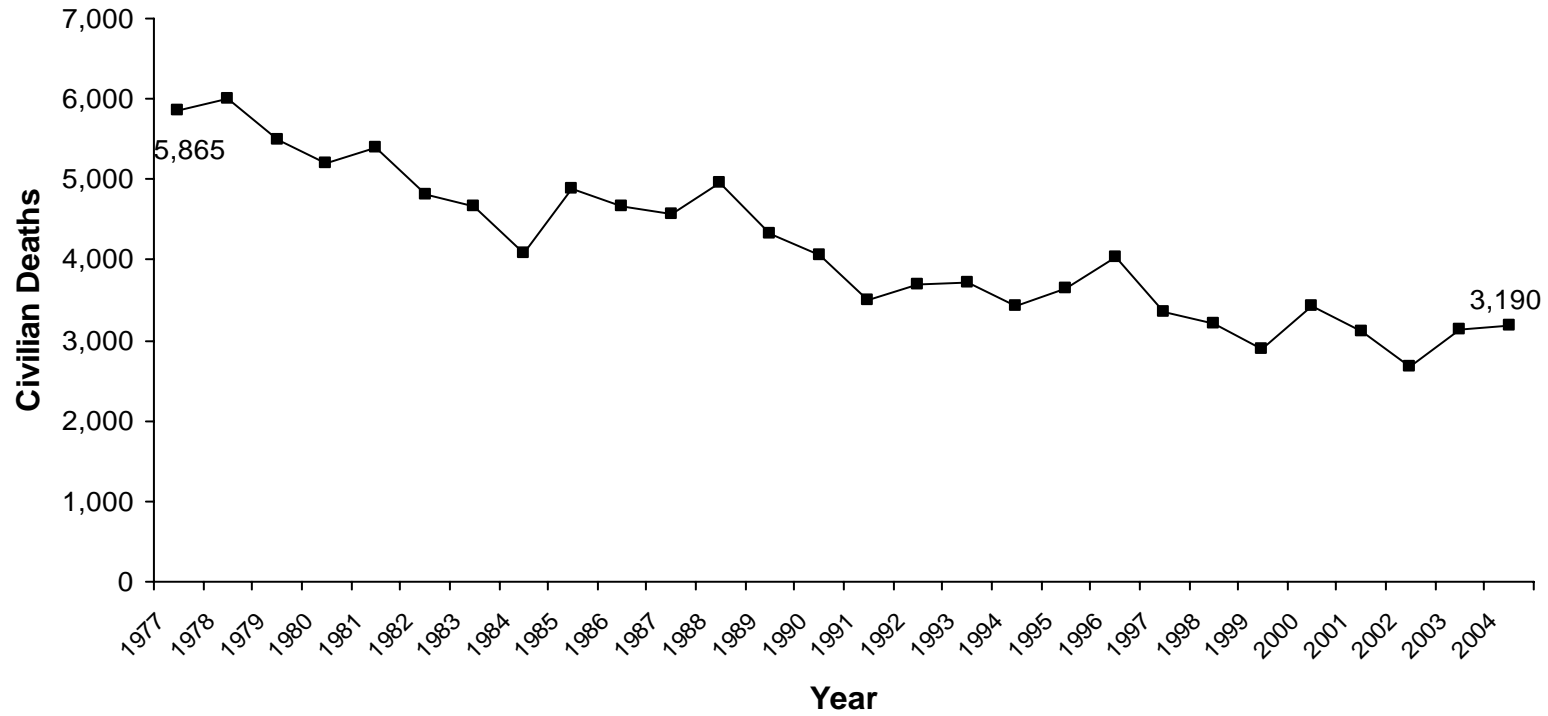
³This includes public assembly, educational, institutional, store and office, industry, utility, storage, and special structure properties.

⁴This decrease reflects 100 fire deaths in the Station Nightclub Fire in Rhode Island, and 31 deaths in two nursing home fires in Connecticut and Tennessee that occurred in 2003.

⁵This includes trains, boats, ships, farm vehicles and construction vehicles.

⁶This includes outside properties with value, as well as brush, rubbish, and other outside locations.

**Figure 3 Civilian Fire Deaths
in the Home in the United States (1977-2004)**



Source: NFPA Survey of Fire Departments
for U.S. Fire Experience (1977-2004)

fire-prone cigarettes. The wider use of upholstered furniture and mattresses that are more resistant to cigarette ignitions is an example of change that has already accomplished much and will continue to do more. Fifth, the special fire safety needs of high-risk groups, e.g., the young, older adults, and the poor need to be addressed.^{2, 3}

Also in 2004, an estimated 80 civilians died in nonresidential structure fires, a highly significant decrease of 63.6%. This decrease reflects the 100 fire deaths that occurred in the Station Nightclub Fire in Rhode Island, and 31 deaths that occurred in two nursing home fires in Connecticut and Tennessee in 2003.

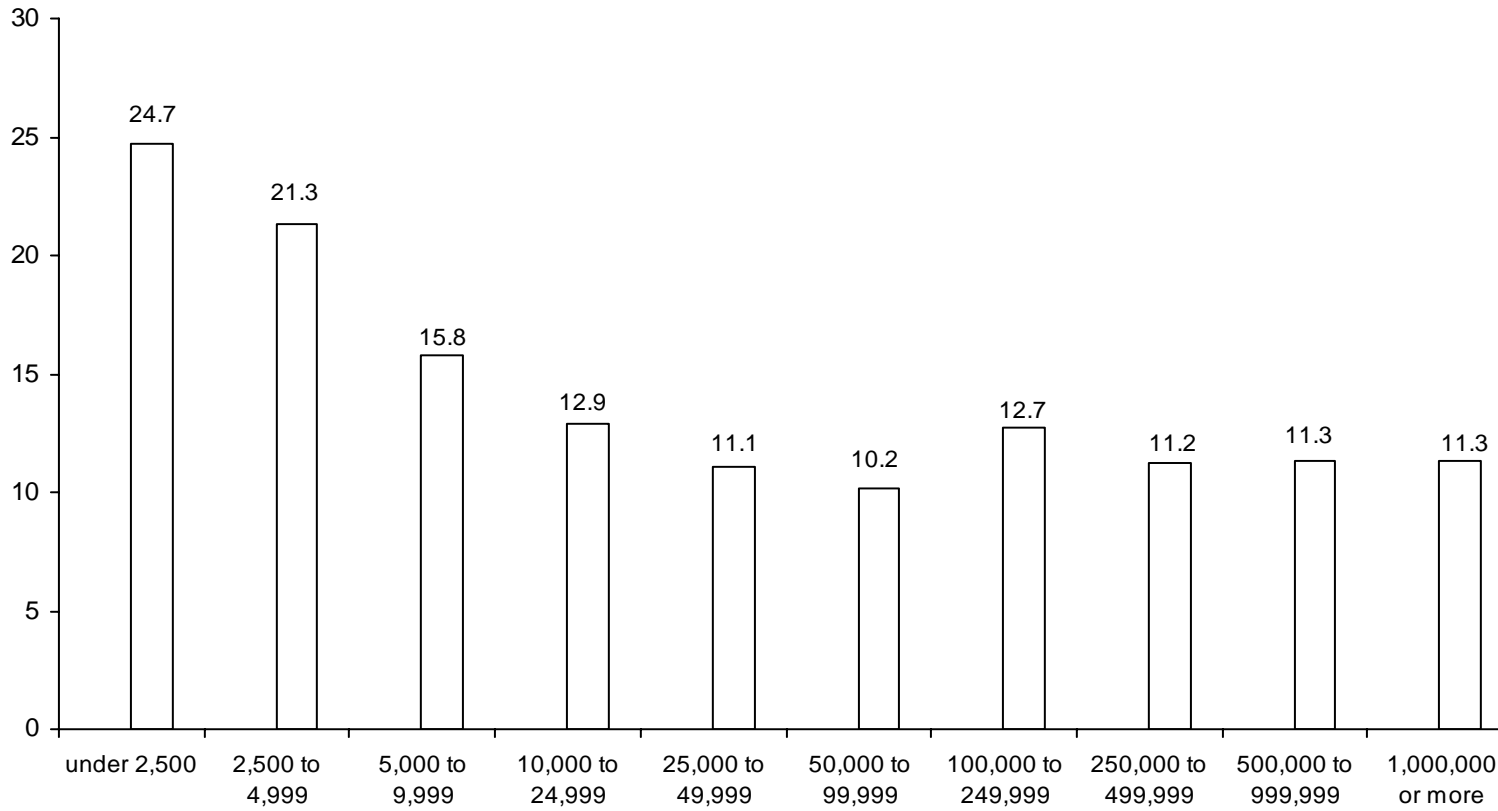
Civilian fire death rates by size of community were examined for the 2000-04 period (see Figure 4). The smallest communities (under 2,500 population) had the highest rate. The rate for communities under 2,500 population was more than twice the national average rate.

Of the 3,305 civilians that died in structure fires, 320 or 9.7% died in fires that were intentionally set.

Also in 2004, 520 civilians died in highway vehicle fires, an increase of 14.3%, and the highest figure since 1999. Another 30 civilians died in other vehicle fires.

**Figure 4 Civilian Fire Deaths per Million Population
By Size of Community (2000-2004)**

Civilian Fire Deaths per Million People



Source: NFPA's Annual Survey of Fire Departments
for U.S. Fire Experience (2000-04)

Size of Community

Civilian Fire Injuries

Results based on data reported to the NFPA indicate that in addition to 3,900 civilian fire deaths, there were 17,875 injuries in 2004. This is a slight decrease of 1.4% from a year ago.

Estimates of civilian fire injuries are on the low side, because many civilian injuries are not reported to the fire service. For example, many injuries occur at small fires that fire departments do not respond to, and sometime when departments do respond they may be unaware of injured persons that they did not transport to medical facilities.

The NFPA estimates that there were 14,175 civilians injured in residential properties, a slight increase of 0.7%. Of these injuries, 10,500 occurred in one- and two-family dwellings, while 3,200 occurred in apartments.

For the 1977-2003 period, the number of civilian injuries has ranged from a high of 31,275 in 1983 to a low of 17,875 in 2004 for an overall decrease of 43%. There was no consistent pattern going up or down until 1995, when injuries fell roughly 5,000 in 1994-95 to 25,775, changed little in 1996, dropped 8% to 23,750 in 1997, changed little in 1998, dropped 5% in 1999, and then increased slightly in 2000, and then dropped 21% in 2001-2004 to 17,875 by the end of 2004.

Property Loss

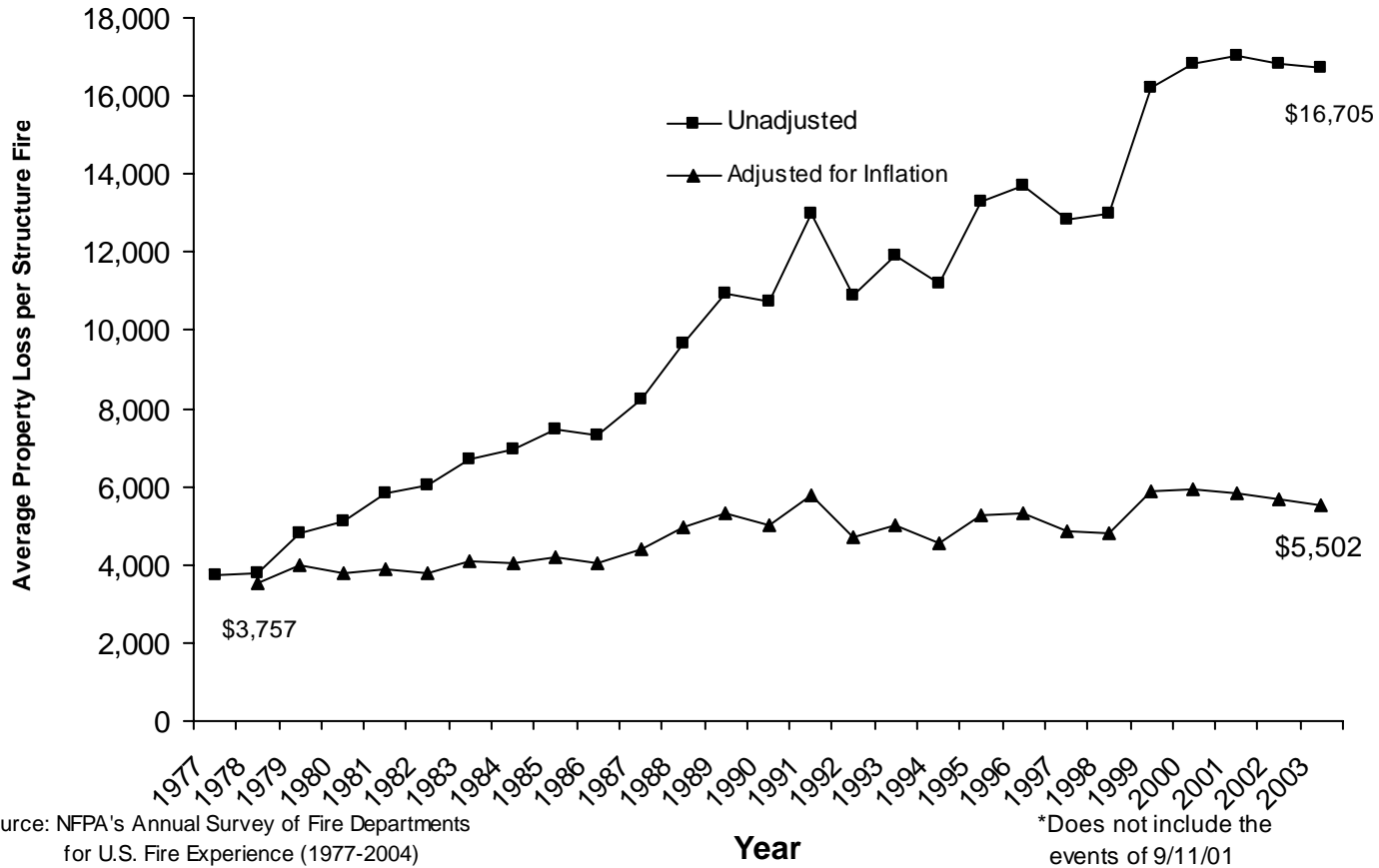
The NFPA estimates that the 1,550,500 fires responded to by the fire service caused \$9,794,000,000 in property damage in 2004. This is a substantial decrease of 20.2% from a year ago. (Most of the decrease reflects the Southern California Wildfires that occurred in 2003 with an estimated property damage of \$2,040,000,000).

Fires in structures resulted in \$8,314,000,000 in property damage, a moderate decrease of 5.3%. Average loss per structure fire was \$15,806, a decrease of 4.2%.

Over the 1977-2004 period, and excluding the events of 9/11/01, the average loss per structure fire ranged from a low of \$3,757 to a high of \$17,016 in 2001 for an overall increase of 353%. When property loss is adjusted for inflation, the increase in the average structure fire loss between 1977 and 2001 is 56%.

Of the property loss in 2004, an estimated \$5,948,000,000 occurred in residential properties, up a very slight 2.1% from a year ago. An estimated \$4,948,000,000 occurred in one- and two-family dwellings, a slight decrease of 2.1%. An estimated \$885,000,000 also occurred in apartments. Other property damage figures worth noting for 2004

**Figure 5. U.S. Average Structure Loss per Structure*
Fire in the United States (1977-2004)**



include: \$358,000,000 in industrial properties, a highly significant decrease of 42.7%; \$586,000,000 in store and office properties, a significant decrease of 18.7%; \$748,000,000 in storage properties, an increase of 10.8%; and \$25,000,000 in institutional properties, a decrease of 10.7%.

It should be kept in mind that property loss totals can change dramatically from year to year because of the impact of occasional large loss fires. The NFPA provides an analysis of these large loss fires in the November/December issue of NFPA Journal every year.

Intentionally Set Fires

Based on data reported by fire departments in the survey, the NFPA estimates there were 36,500 intentionally set structure fires in 2004, a slight decrease of 2.7% from a year ago. (Note the NFPA survey is based on the newly revised NFIRS 5.0 system. This new system has an intentionally set category which is equivalent to the old incendiary category. There is no new equivalent to the old suspicious category which has been eliminated.)

These intentionally set structure fires resulted in an estimated 320 civilian deaths, an increase of 4.9%. These set structure fires also resulted in \$714,000,000 in property loss, an increase of 3.2%.

Also in 2004, there were an estimated 36,000 intentionally set vehicle fires, a significant increase of 18.0% from a year ago. These set vehicle fires resulted in \$165,000,000, in property loss, a significant increase of 25.0%.

Table 5
Estimate of 2004 Losses in
Intentionally* Set Structure Fires

Intentionally* Set Structure Fires	Estimate	Percent change from 2003
Number of Structure Fires	36,500	-2.7
Civilian Deaths	320	+4.9
Property Loss ¹	\$714,000,000	+3.2

The estimates are based on data reported to the NFPA by fire departments that responded to the 2004 National Fire Experience Survey.

¹ This includes overall direct property loss to contents, structure, a vehicle, machinery, vegetation, or anything else involved in a fire. It does not include indirect losses, e.g., business interruption or temporary shelter costs. No adjustment was made for inflation in the year-to-year comparison.

*The NFPA Survey is based on the newly revised NFIRS 5.0 system. This new system has an intentionally set category which is equivalent to the old incendiary category. There is no new equivalent to the old suspicious category, which has been eliminated.

Region

Fire loss rates nationwide and by region⁶ can be seen in Table 6. The South had the highest fire incident rate with 6.1 fires per thousand population followed by the Northcentral (5.2) and the Northeast (5.1).

The South with 16.1 again had the highest civilian death rate per million population followed closely by the Northcentral (16.0).

The Northcentral with 75.6 had the highest civilian fire injury rate per million population, while the West had the lowest rate (47.8).

The South with \$36.3 had the highest property loss per capita followed by the Northcentral (\$33.7).

Fire incident rates by region and community size are shown in Table 7. The Northeast had the highest incident rates for communities of 50,000 to 249,999, the Northcentral had the highest rates for communities of 250,000 to 49,999, the South had the highest rate for communities of 25,000 to 49,999, and for smaller communities (population of less than 10,000 population), and the West had the highest rates for communities of 5,000 to 9,999.

Civilian fire deaths per million population are shown in Table 8. The Northeast had the highest death rate for communities of 500,000 or more, and for communities of 50,000 to 99,999, the Northcentral had the highest rates for communities of 100,000 to 249,999, the South had the highest rates for communities of 5,000 to 49,999 and for the smallest communities (populations of less than 2,500), and the West had the highest rates for communities of 2,500 to 4,999.

Civilian fire injuries per million population are shown in Table 9. The Northeast had the highest rates for communities of 50,000 to 249,999, and the smallest communities (population of less than 2,500), the Northcentral had the rates for communities of 250,000 to 499,999, communities of 25,000 to 49,999 and communities of 5,000 to 9,999, the South had the highest rates for communities of 500,000 or more, and communities of 2,500 to 4,999, and the West had the highest rates for communities of 10,000 to 24,999.

Property Loss rates per capita by community size are shown in Tale 10. The Northeast had the highest rates for communities of 50,000 to 99,999, the Northcentral had the highest rates for communities of 250,000 to 499,999, the South had the highest rates for communities of 100,000 to 249,999, communities of 10,000 to 49,999, and the smallest communities (populations of less than 2,500), and the West had the highest rates for communities of 2,500 to 9,999.

Table 6
Fire Loss Rates Nationwide and by Region, 2004

<u>Region</u>	<u>Number of Fires per Thousand Population</u>	<u>Civilian Deaths per Million Population</u>	<u>Civilian Injuries per Million Population</u>	<u>Property Loss per Capita</u>
Nationwide	5.3	13.3	60.7	\$33.2
Northeast	5.1	10.7	63.3	30.3
Northcentral	5.2	16.0	75.6	33.7
South	6.1	16.1	57.8	36.3
West	4.3	8.4	47.8	30.3

Source: NFPA's; Survey of Fire Departments for 2004 U.S. Fire Experience.

*Includes the Southern California Wildfires.

Table 7
2004 Fires per Thousand Population

Population of Community	All Regions	Northeast	Northcentral	South	West
500,000 or more	4.3	*	*	4.3	2.8
250,000 to 499,999	3.8	*	5.3	3.8	2.3
100,000 to 249,999	4.5	5.8	5.0	4.8	3.3
50,000 to 99,999	3.9	5.0	3.4	4.7	2.9
25,000 to 49,999	4.1	3.9	3.3	5.1	4.6
10,000 to 24,999	4.8	4.1	4.0	6.4	4.8
5,000 to 9,999	5.8	4.5	5.0	7.5	7.6
2,500 to 4,999	7.7	5.9	6.5	10.3	8.9
under 2,500	11.2	8.9	9.1	15.7	15.4

Source: NFPA's Survey of Fire Departments for 2004 U.S. Fire Experience.

*Insufficient data

Table 8
2004 Civilian Fire Deaths per Million Population
by Region and Size of Community

Population of Community	All Regions	Northeast	Northcentral	South	West
500,000 or more	11.0	15.1	*	12.4	6.6
250,000 to 499,999	10.6	*	15.4	9.9	7.6
100,000 to 249,999	11.2	5.5	16.3	13.7	6.0
50,000 to 99,999	10.1	16.3	8.5	12.0	6.1
25,000 to 49,999	11.3	5.8	10.0	16.1	7.1
10,000 to 24,999	11.6	7.0	10.9	18.1	5.6
5,000 to 9,999	11.6	9.5	7.4	22.5	5.8
2,500 to 4,999	23.6	20.1	27.7	16.5	30.5
under 2,500	24.3	6.2	26.9	36.6	12.4

Source: NFPA's Survey of Fire Departments for 2004 U.S. Fire Experience

*Insufficient data

Table 9
2004 Civilian Fire Injuries per Million Population
by Region and Size of Community

Population of Community	All Regions	Northeast	Northcentral	South	West
500,000 or more	68.9	*	*	62.7	46.6
250,000 to 499,999	66.6	*	83.9	74.9	42.0
100,000 to 249,999	79.9	188.1	112.1	72.5	44.5
50,000 to 99,999	71.5	123.8	76.9	63.2	46.8
25,000 to 49,999	73.9	72.3	88.4	60.4	67.4
10,000 to 24,999	61.1	60.9	69.7	42.6	77.9
5,000 to 9,999	47.4	47.1	50.9	47.1	32.2
2,500 to 4,999	56.8	39.4	50.4	82.9	81.1
under 2,500	74.7	118.3	62.9	89.5	12.4

Source: NFPA's Survey of Fire Departments for 2004 U.S. Fire Experience.

*Insufficient data

Table 10
2004 Property Loss per Person
by Region and Size of Community

Population of Community	All Regions	Northeast	Northcentral	South	West
500,000 or more	\$27.9	*	*	\$33.0	\$28.3
250,000 to 499,999	32.6	*	\$42.3	30.7	24.7
100,000 to 249,999	33.6	*	30.3	41.9	22.3
50,000 to 99,999	28.9	\$39.2	28.5	33.1	19.4
25,000 to 49,999	31.9	29.6	27.9	35.7	35.2
10,000 to 24,999	37.0	33.4	38.6	40.0	25.3
5,000 to 9,999	50.0	43.8	53.7	42.5	59.5
2,500 to 4,999	69.2	59.2	62.4	79.1	80.2
under 2,500	81.7	57.7	70.3	109.4	68.4

Source: NFPA's Survey of Fire Departments for 2004 U.S. Fire Experience.

*Insufficient data

Average Fire Experience

Average fire experience by community size for all fires and residential properties can be seen in Tables 11 and 12.

Table 11
Average 2004 Fire Experience by Size of Community

Population of All Community	Total Fires	Structure Fires	Civilian Deaths	Civilian Injuries	Property Loss
1,000,000 or more	7,565	2,288	22.71	104.20	\$55,544,500
500,000 to 999,999	2,998	1,059	7.52	46.50	23,556,900
250,000 to 499,999	1,359	514	3.72	23.44	12,171,300
100,000 to 249,999	655	234	1.71	12.04	5,118,300
50,000 to 99,999	278	103	0.71	5.01	2,037,700
25,000 to 49,999	140	50	0.41	2.51	1,269,000
10,000 to 24,999	73	26	0.20	0.92	752,700
5,000 to 9,999	40	14	0.10	0.33	495,400
2,500 to 4,999	27	8	0.11	0.20	240,000
under 2,500	12	3	0.03	0.08	83,800

Source: NFPA's Survey of Fire Departments for 2004 U.S. Fire Experience

Table 12
Average 2004 Residential Fire Experience by Size of Community

Population of Community	Number of Fires	Civilian Deaths	Civilian Injuries	Property Loss
1,000,000 or more	1,655	19.57	83.0	\$23,678,400
500,000 to 999,999	915	5.95	36.38	13,980,200
250,000 to 499,999	446	3.39	19.52	6,965,000
100,000 to 249,999	195	1.63	9.13	3,126,500
50,000 to 99,999	83	0.62	3.88	1,195,300
25,000 to 49,999	40	0.30	2.00	588,800
10,000 to 24,999	21	0.18	0.73	322,000
5,000 to 9,999	11	0.08	0.21	187,200
2,500 to 4,999	6	0.09	0.11	131,000
under 2,500	2	0.02	0.04	46,000

Source: NFPA's Survey of Fire Departments for 2004 U.S. Fire Experience

Fire Department Responses

In all, fire departments responded to the following estimated number of fires and other incidents in 2004.

	Number	Percent Change From 2003
Fire Incidents	1,550,500	-2.1
Medical Aid Responses (Ambulance, EMS, Rescue)	14,100,000	+3.4
False Alarms	2,106,000	-3.8
Mutual Aid or Assistance Calls	984,000	-0.3
Hazardous Material Responses (Spills, Leaks, etc.)	354,000	+1.3
Other Hazardous Responses (arcing wires, bomb removal etc.)	671,000	+1.6
All Other Responses (smoke scares, lock-outs, etc.)	2,851,000	-5.1
Total Incidents	22,616,500	+0.9

A further breakdown on false responses was collected on the 2004 surveys and the results can be seen in Table 13.

Table 13
Estimates of False Alarms by Type, 2004

	Estimate	Percent Change From 2003	Percent of All False Alarms
Malicious, Mischievous False Call	249,000	-17.3	11.8
System Malfunction	739,500	-7.0	35.1
Unintentional Call	801,500	+3.7	38.1
Other False Alarms (Bomb Scares, etc.)	316,000	-1.3	15.0
Total	2,106,000	-3.8	

Source: NFPA's Survey of Fire Departments for 2004 U.S. Fire Experience

SURVEY METHODOLOGY

Each year, based on a sample survey of fire departments across the country, the NFPA estimates the national fire problem as measured by the number of fires that public fire departments attend, and the resulting deaths, injuries and property losses that occur. This report summarizes key findings based on the NFPA Survey for 2004 Fire Experience. This section explains the major steps in conducting the 2004 survey.

Sample Selection

The NFPA currently has 30,542 public fire departments listed in the US in its Fire Service Inventory (FSI) file. Based on desired levels of statistical precision for the survey results and the staff available to process, edit, and follow up on the individual questionnaires the NFPA determined that 3,000 fire departments were a reasonable number for the 2004 sample.

Because of the variation in fire loss results by community size, fire departments were placed in one of the following 10 strata by size of community protected:

- 1,000,000 and up
- 500,000 to 999,999
- 250,000 to 499,999
- 100,000 to 249,999
- 50,000 to 99,999
- 25,000 to 49,999
- 10,000 to 24,999
- 5,000 to 9,999
- 2,500 to 4,999
- Under 2,500

Sample sizes for the individual strata were chosen to ensure the best estimate of civilian deaths in one- and two-family dwellings, the statistic that most aptly reflects the overall severity of the fire problem. All departments that protect 100,000 people or more were included. These 319 departments in the four highest strata protect 106,210,000.

For the remaining six population strata, assuming response rates similar to the past two years for the four highest strata, a total sample of 2,840 was indicated. Sample sizes for individual strata were calculated using a methodology that assured optimum sample allocations⁵. Based on the average variation in civilian deaths in one- and two-family dwellings by stratum for the last two years and on the estimated number of fire departments, appropriate relative sample weights were determined. Then the corresponding sample sizes by stratum were calculated. The sample size by stratum was

then adjusted based on the response rates from the last two years' returns. A sample size of 12,773 was found to be necessary to obtain the desired total response of 3,000 fire departments. For all strata, where a sample was necessary, departments were randomly selected.

Data Collection

The fire departments selected for the survey were sent the 2004 NFPA Fire Experience Questionnaire during the 2nd week of January 2005. A second mailing was sent in mid-March to fire departments that had not responded to the first mailing. A total of 2,830 departments responded to the questionnaire 2,190 to the first mailing and 640 to the second.

Table 14 shows the number of departments that responded by region and size of community. The overall response rate was 22%, although response rates were considerably higher for departments protecting larger communities than they were for departments protecting smaller communities. The 2,830 departments that did respond protect 106,772,800 people or 36% of the total U.S. population.

After the NFPA received the surveys, technical staff members of the Fire Analysis and Research Division reviewed them for completeness and consistency. When appropriate, they followed up on questions with a telephone call.

After the edit, procedures were completed; the survey data were keyed to a computer file, where additional checks were made. The file was then ready for data analysis and estimation procedures.

Estimation Methodology

The estimation method used for the survey was ratio estimation, with stratification by community size. For each fire statistic a sample loss rate was computed for each stratum. This rate consisted of the total for that particular statistic from all fire departments reporting it, divided by the total population protected by the departments reporting the statistic. Note that this means that the departments used in calculating each statistic could be different, reflecting differences in unreported statistics. The sample fire loss rates by stratum were then multiplied by population weighing factors to determine the estimates were combined to provide the overall national estimate.

If this method of estimation is to be effective, estimates of the total number of fire departments and the total population protected in each stratum must be accurate. The NFPA makes every effort to ensure that this is the case. The population weights used for

Table 14
Number of Fire Departments Responding to 2004 NFPA Survey, by
Region and Community Size

Population of Community	All Regions	Northeast	Northcentral	South	West
1,000,000 or more	9	2	1	4	2
500,000 to 999,999	28	1	1	16	10
250,000 to 499,999	29	1	7	12	9
100,000 to 249,999	108	8	21	44	35
50,000 to 99,999	229	26	76	79	48
25,000 to 49,999	210	22	89	69	30
10,000 to 24,999	423	85	168	119	51
5,000 to 9,999	524	108	232	134	50
2,500 to 4,999	434	72	190	124	48
Under 2,500	836	127	420	190	99
TOTAL	2,830	452	1,205	791	382

the national estimates were developed using the NFPA FSI (Fire Service Inventory) File and U.S. Census population figures.

For each estimate, a corresponding standard error was also calculated⁶. The standard error is a measure of the error caused by the fact that estimates are based on a sampling of fire losses rather than on a complete census of the fire problem. The standard error helps in determining whether year-to-year differences are statistically significant. Differences that were found to be statistically significant were so noted in tables. Property loss estimates are particularly prone to large standard errors because they are sensitive to unusually high losses, and, as a result, large percentage differences from year to year are not always statistically significant. In 2004, for instance, property damage in storage properties was estimated to be \$748,000,000. This represented an increase of 10.8% from the year before, but was found not to be statistically significant.

In addition to sampling errors, there are nonsampling errors. These include bases of the survey methodology, incomplete or inaccurate reporting of data to the NFPA, differences in data collection methods by the fire departments responding. As an example of a nonsampling error, most of the fires included in the survey took place in highly populated residential areas, because the fire departments selected for the surveys are primarily public fire departments that protect sizable residential populations. Fires that occur in sparsely populated areas protected primarily by State and Federal Departments of Forestry are not likely to be included in the survey results.

The editors of survey data attempted to verify all reported civilian deaths in vehicle fires. They contacted most of the fire departments that reported fire-related deaths in vehicles and found that many of the deaths were indeed the results of fire. In some instances, however, impact was found to have been the cause of death. This effort can have a considerable impact on the estimates.

The results presented in this report are based on fire incidents attended by public fire departments. No adjustments were made for unreported fires and losses (e.g., fires extinguished by the occupant). Also, no adjustments were made for fires attended solely by private fire brigades (e.g., industry and military installations), or for fires extinguished by fixed suppression systems with no fire department response.

Fire Experience of Nonrespondents

A telephone follow-up was made to a sample of nonrespondents to determine whether fire departments that did not respond to the survey experienced fire loss rates similar to those that did respond. This would help the NFPA determine whether we received questionnaires only from departments that had experienced unusually high or low fire losses.

The sample of nonrespondents selected was proportional by state and population of community to the original sample selected for the survey. As a result of these efforts, 159 fire departments were successfully contacted and answered some of the questions about their fire experience.

Table 15 compares fire loss rates for both respondents and nonrespondents. For communities of 100,000 to 249,999, the nonrespondent rate was 20% higher for civilian deaths, the respondent rate was 10% higher for property loss, and the rates were similar for fires.

For communities of 50,000 to 99,999, the nonrespondent rate was 10% higher for fires, and 9% higher for property loss, while the respondent rate was 34% higher for civilian deaths, (None of these results were statistically significant).

For communities of 25,000 to 49,999, the nonrespondent rate was 16% higher for fires, and 24% higher for property loss, while the respondent rate was 78% higher for civilian deaths (None of these results were statistically significant).

For communities of 10,000 to 24,999, the nonrespondent rate was 13% higher for fires, and 39% higher for civilian deaths, while the respondent rate was 30% higher for property loss. (None of these results were statistically significant).

For communities of 5,000 to 9,999, the nonrespondent rate was 17% higher for fires, and 74% higher for deaths, while the respondent rate for property loss was 171% higher, (Only the result on property loss was statistically significant).

Table 15
A Comparison of Respondents and Nonrespondents*
to the 2004 NFPA Survey by Community Size

Population of Community	Number of Fires (Per Thousand Population)				Civilian Deaths (Per Million Population)				Property Loss (Per Capita)			
	Respondents		Nonrespondents		Respondents		Nonrespondents		Respondents		Nonrespondents	
	n	Rate	n	Rate	n	Rate	n	Rate	n	Rate	n	Rate
100,000 to 249,999	90	4.5	22	4.4	103	11.2	21	13.5	60	33.6	14	30.5
50,000 to 99,999	208	4.0	31	4.4	225	10.2	30	7.6	102	28.9	25	31.6
25,000 to 49,999	196	4.1	28	4.8	206	11.3	24	6.3	75	36.4	12	45.2
10,000 to 24,999	388	4.8	47	5.4	415	11.7	45	16.4	137	50.9	23	39.0
5,000 to 9,999	509	5.8	23	6.8	520	12.7	24	17.1	190	71.4	12	26.3

*Some departments did not return the questionnaire. A sample of these nonrespondents was contacted by telephone and questioned about their 2004 fire experience.

Note: "n" refers to the number of departments reporting the statistic.

Definition of Terms

Civilian: The term “civilian” includes anyone other than a firefighter, and covers public service personnel such as police officers, civil defense staff, non-fire service medical personnel, and utility company employees.

Death: An injury that occurred as a direct result of a fire that is fatal or becomes fatal within one year.

Fire: Any instance of uncontrolled burning. Includes combustion explosions and fires out on arrival. Excludes controlled burning (whether authorized or not), over pressure rupture without combustion, mutual aid responses, smoke scares, and hazardous responses (e.g., oil spill without fire).

Injury: Physical damage that is suffered by a person as a direct result of fire and that requires (or should require) treatment by a practitioner of medicine (physician, nurse, paramedic, EMT) within one year of the incident (regardless of whether treatment was actually received), or results in at least one day of restricted activity immediately following the incident. Examples of injuries resulting from fire are smoke inhalation, burns, wounds and punctures, fractures, heart attacks (resulting from stress under fire condition), strains and sprains.

Property Damage: Includes all forms of direct loss to contents, structure, machinery, a vehicle, vegetation or anything else involved in the fire but not indirect losses, such as business interruption or temporary shelter provisions.

Structure: An assembly of materials forming a construction for occupancy or use in such a manner as to serve a specific purpose. A building is a form of structure. Open platforms, bridges, roof assemblies over open storage or process areas, tents, air-supported, and grandstands are other forms of structures.

Vehicles, Highway and Other: Fires in these instances may have been associated with an accident, however, reported casualties and property loss should be the direct result of the fire only. Highway vehicles include any vehicle designed to operate normally on highways, e.g., automobiles, motorcycles, buses, trucks, trailers (not mobile homes on foundations), etc. Other vehicles include trains, boats and ships, aircraft, and farm and construction vehicles.

Footnotes

1. Note that the NFPA changed its survey methodology in 1977-78, and meaningful comparisons cannot be made with fire statistics estimated before 1977.
2. John R. Hall, Jr., *Characteristics of Home Fire Victims Including Age and Sex*, June 2004, Quincy: National Fire Protection Association, Fire Analysis and Research Division.
3. Rita F. Fahy and Alison L. Miller, "How Being Poor Affects Fire Risk", *Fire Journal*, Vol. 83, No. 1 (January 1989), p. 28
4. As defined by the U.S. Bureau of the Census, the four regions are: Northeast: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. Northcentral: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. South: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. West: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming.
5. Steve K. Thompson, *Sampling*, John Wiley, New York, NY, 1992, pp. 107-111.
6. William G. Cochran, *Sampling Techniques*, John Wiley, New York, NY, 1977, pp. 150-161.