

FIRE LOSS IN THE UNITED STATES DURING 2002

**Michael J. Karter, Jr.
Fire Analysis & Research Division
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471
www.nfpa.org**

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Overview of 2002 U.S. Fire Experience

Number of Fires

- 1,687,500 fires were attended by public fire departments, a decrease of 2.7% from the year before.
- 519,000 fires occurred in structures, a very slight decrease of 0.5%.
- 401,000 fires or 77% of all structure fires occurred in residential properties.
- 329,500 fires occurred in vehicles, a decrease of 6.3% from the year before.
- 839,000 fires occurred in outside properties, a decrease of 2.6%.
- What do these fire frequencies above mean? Every 19 seconds, a fire department responds to a fire somewhere in the nation. A fire occurs in a structure at the rate of one every 61 seconds, and in particular a residential fire occurs every 79 seconds. Fires occur in vehicles at the rate of 1 every 96 seconds, and there's a fire in an outside property every 38 seconds.

Civilian Fire Deaths

- 3,380 civilian fire deaths occurred in 2002, a decrease of 9.8% from a year ago, excluding the events of 9/11/01.
- About 79% of all fire deaths occurred in the home.
- 2,670 civilian fire deaths occurred in the home, a decrease of 14.1%, and the lowest figure since the NFPA changed its survey methodology in 1977.
- Nationwide, there was a civilian fire death every 156 minutes.

Civilian Fire Injuries

- 18,425 civilian fire injuries occurred in 2002, a decrease of 9.2%. This estimate for civilian injuries is on the low side, due to under reporting of civilian injuries to the fire service.
- 14,050 of all civilian injuries occurred in residential properties, while 1,550 occurred in nonresidential structure fires.
- Nationwide, there was a civilian fire injury every 28 minutes.

Property Damage

- An estimated \$10,337,000,000 in property damage occurred as a result of fire in 2002, a decrease of 2.2% from last year, excluding the events of 9/11/01.
- \$8,742,000,000 of property damage occurred in structure fires.
- \$6,055,000,000 of property loss occurred in residential properties.

Intentionally Set Fires

- An estimated 44,500 intentionally set structure fires occurred in 2002, a decrease of 2.2%.
- Intentionally set fires in structures resulted in 350 civilian deaths, an increase of 6.1% from a year ago, excluding the events of 9/11/01.
- Intentionally set structure fires also resulted in \$919,000,000 in property loss, a decrease of 9.2% from last year, excluding the events of 9/11/01.
- 41,000 intentionally set vehicle fires occurred, an increase of 3.8% from a year ago, and caused \$222,000,000 in property damage, an increase of 1.4% from a year ago.

Number of Fires

In 2002, public fire departments responded to 1,687,500 fires in the United States, according to estimates based on data the NFPA received from fire departments responding to its 2002 National Fire Experience Survey (see Tables 1 and 2). This represents a decrease of 2.7% from a year ago.

There was an estimated 519,000 structure fires in 2002, a very slight decrease of 0.5% or virtually no change from last year. For the 1977-2002 period, the number of structure fires were 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 519,000 area during 1999-2002 except for 2001.

Fire incident rates by size of community were examined for the 1998-2002 period. (See Figure 2). The smallest communities (under 2,500 population) had the highest rate with 12.2 fires per thousand population.

Of the 2002 structure fires, 401,000 were residential fires, accounting for 77.3% of all structure fires, virtually no change from a year ago. Of the residential fires 300,500 occurred in one-and two-family dwellings, accounting for 57.9% of all structure fires. Another 88,500 occurred in apartments accounting for 17.0% of all structure fires.

For nonresidential structures, all property types showed decreases in 2002. Nonresidential properties having notable decreases were: a decrease of 13.3% in institutional properties to 6,500; a decrease of 7.4% in industrial properties to 12,500; and a decrease of 6.7% in educational properties to 7,000.

For the 1977-2002 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.

Table 1
Estimates of 2002 Fires, Civilian Deaths, Civilian Injuries
and Property Loss in the United States

	Estimate	Range¹	Percent Change From 2001
Number of Fires	1,687,500	1,658,500 to 1,716,500	-2.7*
Number of Civilian Deaths	3,380	3,080 to 3,680	-9.8
Number of Civilian Injuries	18,425	17,475 to 19,375	-9.2**
Property Loss ²	\$10,337,000,000	\$10,067,000,000 to 10,607,000,000	-2.2

The estimates are based on data reported to the NFPA by fire departments that responded to the 2002 National Fire Experience Survey.

The results in the percent change from 2001 above do not include the events of 9/11/01, where 2,326 civilian deaths and 800 civilian injuries occurred, and there was \$33.8 billion in property loss.

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.

* Change was statistically significant at the .05 level..

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

**Table 2
Estimates of 2002 Fires and
Property Loss by Property Use**

Type of Fire	Number of Fires		Property Loss ¹	
	Estimate	Percent Change from 2001	Estimate	Percent Change from 2001
Fires in Structures	519,000	-0.5	\$8,742,000,000	-1.5
Fires in Highway Vehicles	307,000	-6.1*	1,184,000,000	-6.6*
Fires in Other Vehicles ²	22,500	-8.2	208,000,000	-15.1
Fires Outside of structures with value involved but no vehicle (outside storage, crops, timber, etc.)	71,000	-5.3	121,000,000	+40.7**
Fires in Brush, Grass Wildland (excluding crops and timber) with no value or loss involved	399,000	-3.6	—	—
Fires in Rubbish including dumpsters (outside of structures), with no value or loss involved	204,000	-2.2	—	—
All Other Fires	165,000	+0.6	82,000,000	-26.1
Total	1,687,500	-2.7*	\$10,337,000,000	-2.2

The estimates are based on data reported to the NFPA by fire departments that responded to the 2002 National Fire Experience Survey.

The results in the percent change from 2001 above do not include the events of 9/11/01, where there was \$33.44 billion in property loss.

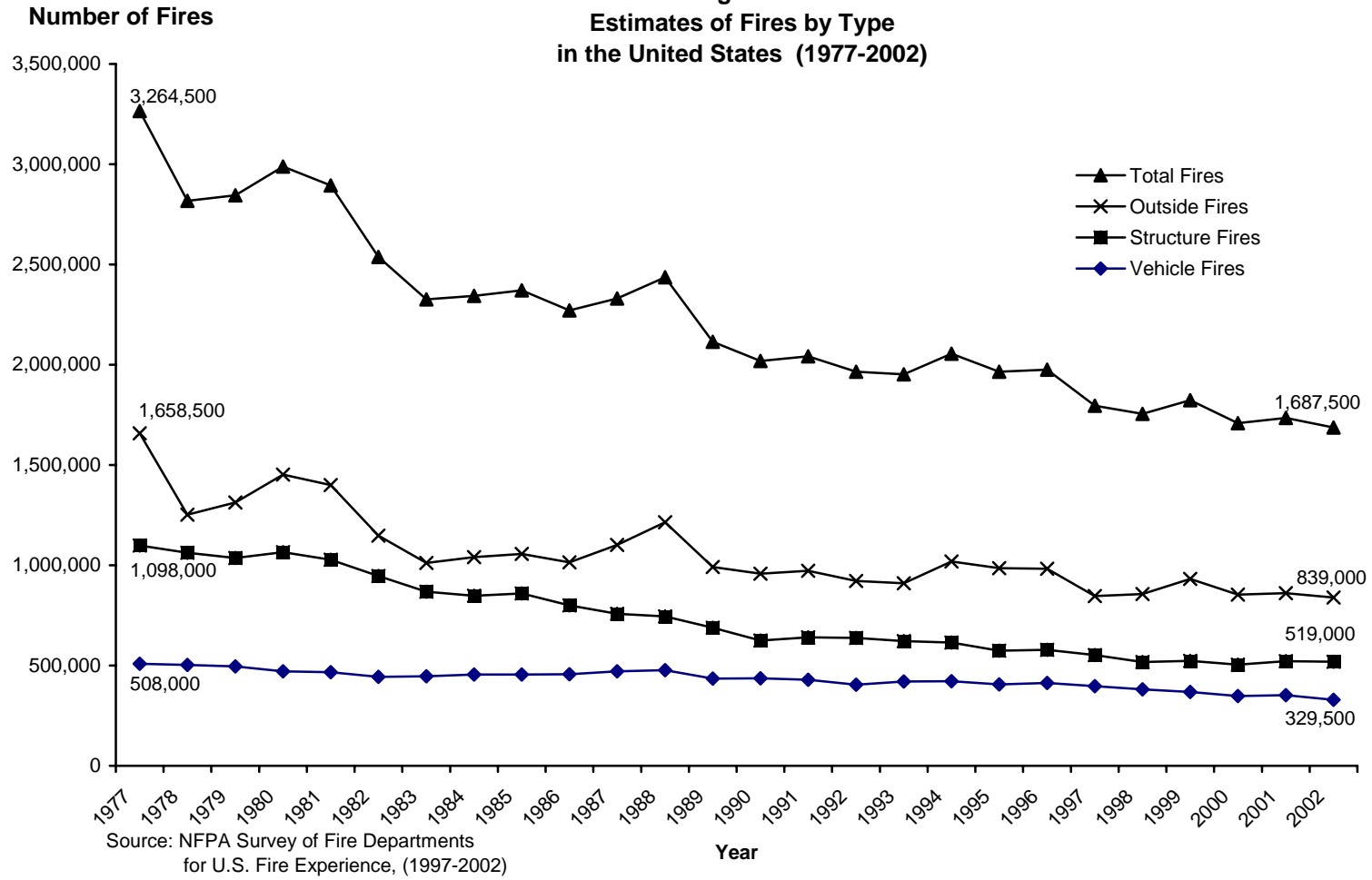
¹ This includes overall direct property loss to contents, structure, a vehicle, machinery, vegetation or anything else involved in a fire. It does not include indirect losses, e.g., business interruption or temporary shelter costs. No adjustment was made for inflation in the year-to-year comparison.

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

*Change was statistically significant at the .05 level.

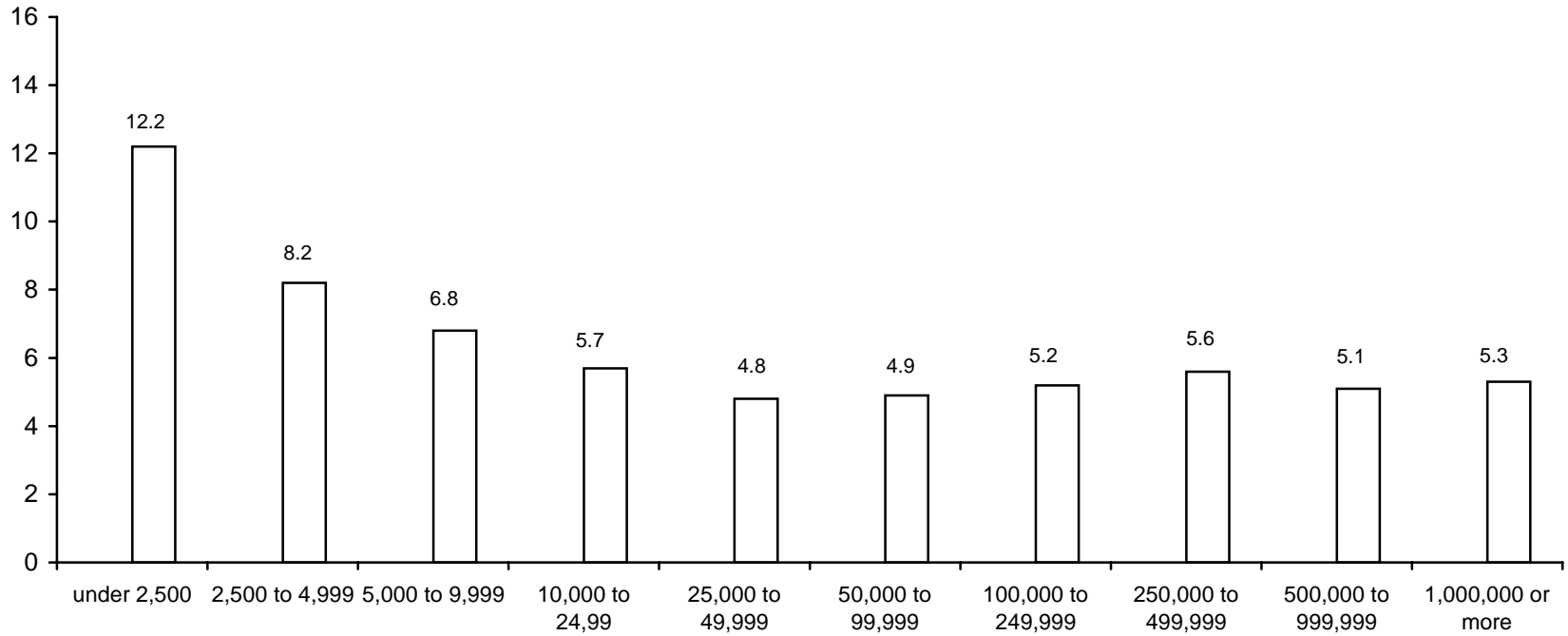
**Change was statistically significant at the .01 level.

Figure 1
Estimates of Fires by Type
in the United States (1977-2002)



**Figure 2 Fires per Thousand Population
by Size of Community (1998-2002)**

Fires per Thousand Population



Source: NFPA Survey of Fire Departments
for U.S. Fire Experience, (1998-2002)

Size of Community

Table 3
Estimates of 2002 Structure Fires and
Property Loss by Property Use

Property Use	Structure Fires		Property Loss ¹	
	Estimate	Percent Change from 2001	Estimate	Percent Change from 2001
Public Assembly	14,000	-3.5	\$342,000,000	+1.8
Educational	7,000	-6.7	92,000,000	-45.9**
Institutional	6,500	-13.3	26,000,000	-3.7
Residential (Total)	401,000	+1.1	6,055,000,000	+7.3**
One- and Two-Family Dwellings ²	300,500	+1.7	5,005,000,000	+7.6*
Apartments	88,500	+0.6	926,000,000	+7.2
Other Residential ³	12,000	-7.7	124,000,000	-2.4
Stores and Offices	24,000	-5.9	604,000,000	-15.5*
Industry, Utility, Defense ⁴	12,500	-7.4	658,000,000	-23.3**
Storage in Structures	32,000	-4.5	627,000,000	-32.6
Special Structures	22,000	-4.4	338,000,000	+73.3**
Total	519,000	-0.5	\$8,742,000,000	-1.5

The estimates are based on data reported to the NFPA by fire departments that responded to the 2002 National Fire Experience Survey.

The results in the percent change from 2001 above do not include the events of 9/11/01, where there was \$33.44 billion in property loss.

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.

*Change was statistically significant at the .05 level.

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

Civilian Deaths

The 1,687,500 fires reported to by fire departments in the U.S. in 2002 resulted in an estimated 3,380 civilian deaths based on data reported to the NFPA. This is a decrease of 9.8% from a year ago, excluding the events of 9/11/01, where 2,451 civilian deaths occurred. The nature of this decrease is better understood when results are examined by property type.

An estimated 2,695 civilians died in residential fires in 2002, a decrease of 14.2%. Of these deaths, 390 occurred in apartment fires, a decrease of 15.2%. Another 2,280 civilians died in one- and two-family dwellings, a decrease of 14.0%. This is 370 fewer than in 2001, and the lowest figure since the NFPA changed its survey methodology in 1977. Most of the decrease is due to a 25% drop in the death rate for communities that protect communities of 10,000 to 24,999, and a 45% drop in the death rate for departments that protect the smallest communities (populations of less than 2,500). Though encouraged by this drop in 2002, we must remain cautious because death rates can vary considerably from year to year, particularly for smaller communities. We will closely monitor this to see if it is a one year anomaly or the start of a new trend.

In all, fires in the home (one- and two-family dwellings and apartments) resulted in 2,670 civilian deaths, a decrease of 14.1% from a year ago. Looking at trends in civilian deaths since 1977-78¹, several observations are worth noting (see Figure 3). Home fire deaths were at their peak in 1978 when 6,015 fire deaths occurred. Home fire deaths then decreased 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 thirteen years, home fire deaths moved well below the 1982-88 plateau and has stayed in the 3,110 to 3,720 area during 1991 to 2002 except for 1996, 1999, and now 2002 with 2,670 deaths.

With home fire deaths still accounting for 2,670 fire deaths or 79% 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

Table 4
Estimates of 2002 Civilian Fire Deaths and
Injuries by Property Use

Property Use	Civilian Deaths			Civilian Injuries		
	Estimate	Percent Change From 2001	Percent of all Civilian Deaths	Estimate	Percent Change From 2001	Percent of all Civilian Injuries
Residential (total)	2,695	-14.2*	79.7	14,050	-9.8*	76.3
One-and-Two-Family Dwellings ¹	2,280	-14.0	67.5	9,950	-12.7	54.0
Apartments	390	-15.2	11.5	3,700	-2.6	20.1
Other Residential ²	25	-16.7	0.7	400	+6.7	2.2
Non-residential Structures ³	80	0	2.4	1,550	-6.1	8.4
Highway Vehicles	540	+14.9	16.0	1,700	-2.9	9.2
Other Vehicles ⁴	25	+66.7	0.7	125	-28.6	0.7
All Other ⁵	40	0	1.2	1,000	-13.0	5.4
Total	3,380	-9.8		18,425	-9.2**	

Estimates are based on data reported to the NFPA by fire departments that responded to the 2002 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.

The results in the percent changes from 2001 above do not include the events of 9/11/01, where 2,451 civilian deaths and 800 civilian injuries occurred.

¹ This includes manufactured homes.

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

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

⁴ This includes trains, boats, ships, farm vehicles and construction vehicles.

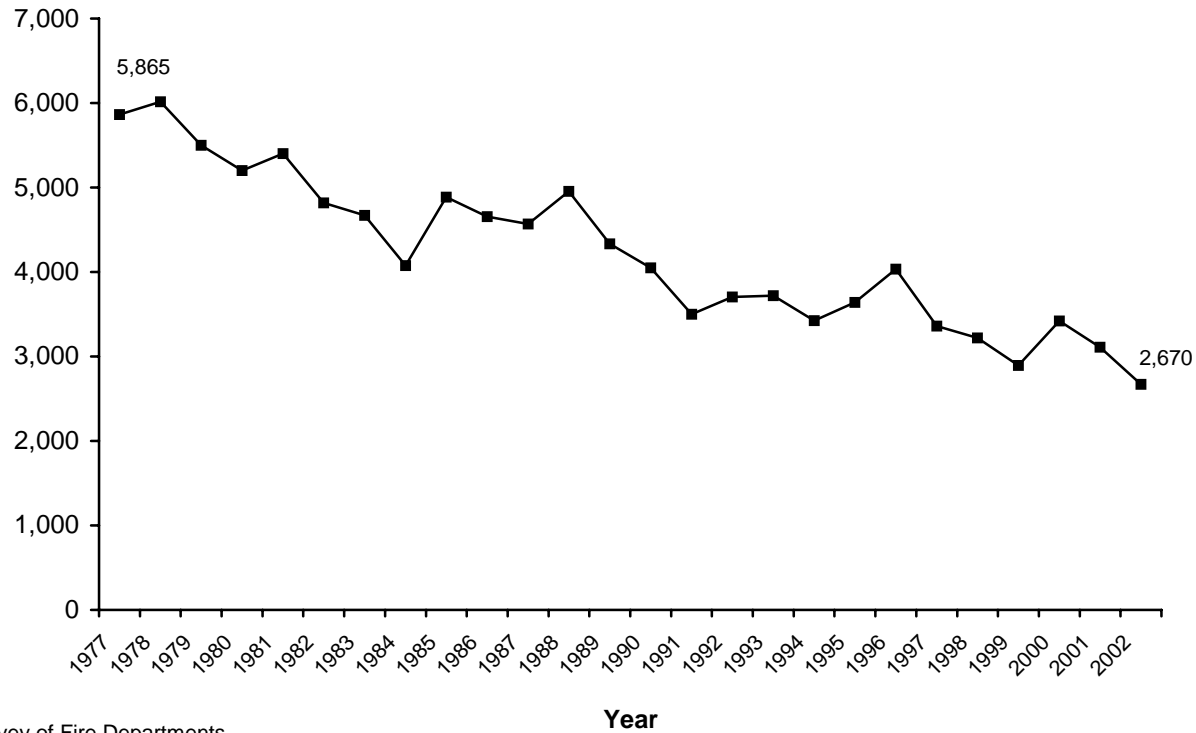
⁵ This includes outside properties with value, as well as brush, rubbish, and other outside locations.

*Statistically significant at the .05 level.

**Statistically significant at the .01 level.

Figure 3 Civilian Fire Deaths in the Home in the United States (1977-2002)

Civilian Fire Deaths in the Home



Source: NFPA Survey of Fire Departments
for U.S. Fire Experience, (1977-2002)

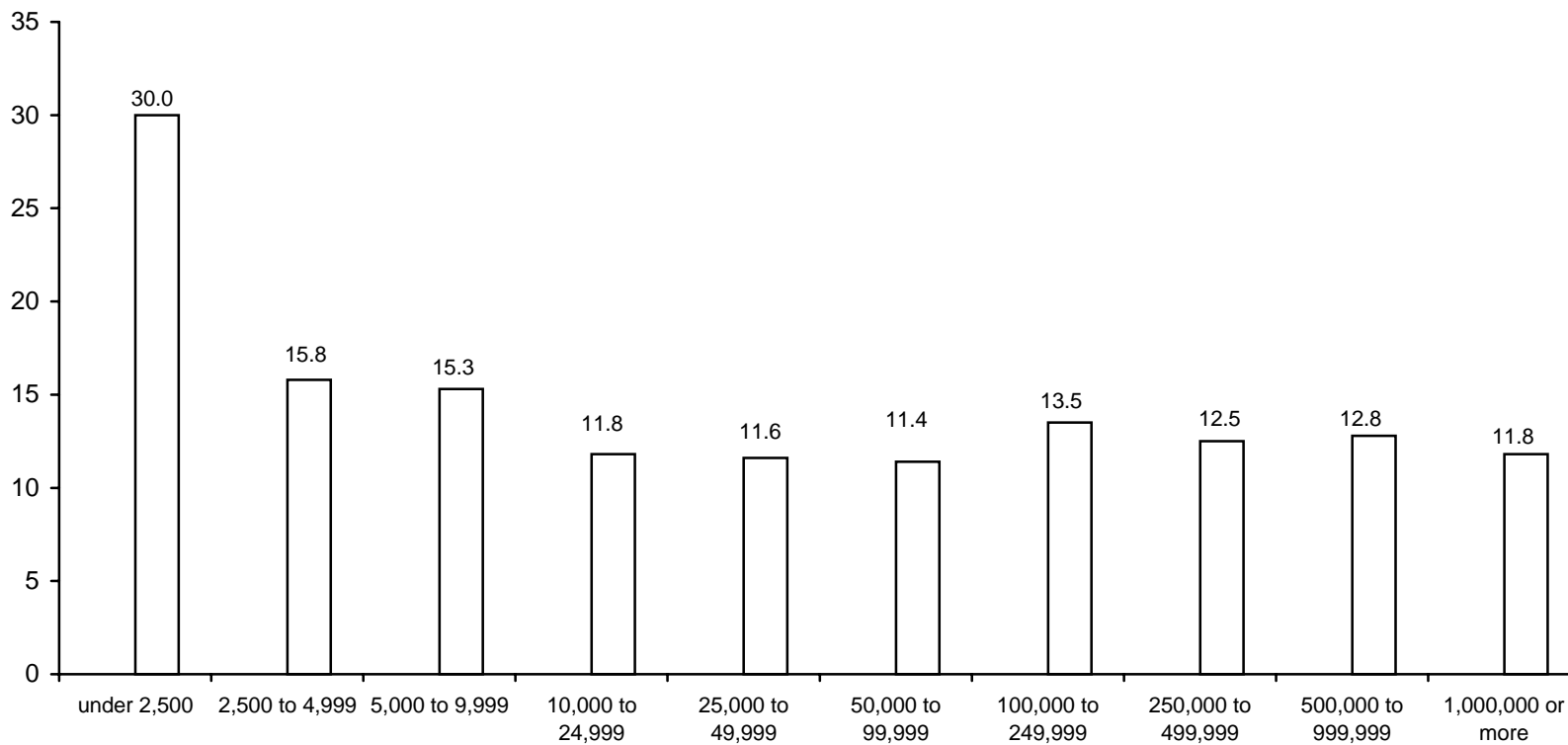
the recent examination of the feasibility of less fire-prone cigarettes. The wider use of upholstered furniture and mattresses that are more resistant to cigarette ignitions is an example of change that has already accomplished much and will continue to do more. Fifth, the special fire safety needs of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

Civilian fire death rates by size of community were examined for the 1998-2002 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.

An estimated 540 civilians died in highway vehicle fires, an increase of 14.9 from a year ago, and the highest figure since 1998.

**Figure 4 Civilian Fire Deaths per Million Population
By Size of Community (1998-2002)**

Civilian Fire Deaths per Million People



Source: NFPA's Annual Survey of Fire Departments
for U.S. Fire Experience (1998-02)

Size of Community

Civilian Fire Injuries

Results based on data reported to the NFPA indicate that in addition to 3,380 civilian fire deaths, there were 18,425 civilian fire injuries in 2002. This is a decrease of 9.2% from a year ago, excluding the events of 9/11/01, where an estimated 800 civilians were injured.

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 14,050 civilians were injured in residential properties, a decrease of 9.8%. Of these injuries, 9,950 occurred in one- and two-family dwellings, while 3,700 occurred in apartments.

For the 1977-2002 period, the number of civilian injuries has ranged from a high of 31,275 in 1983 to a low of 18,425 in 2002 for an overall decrease of 41%. 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 18% in 2001-2002 to 18,425 by the end of 2002.

Property Loss

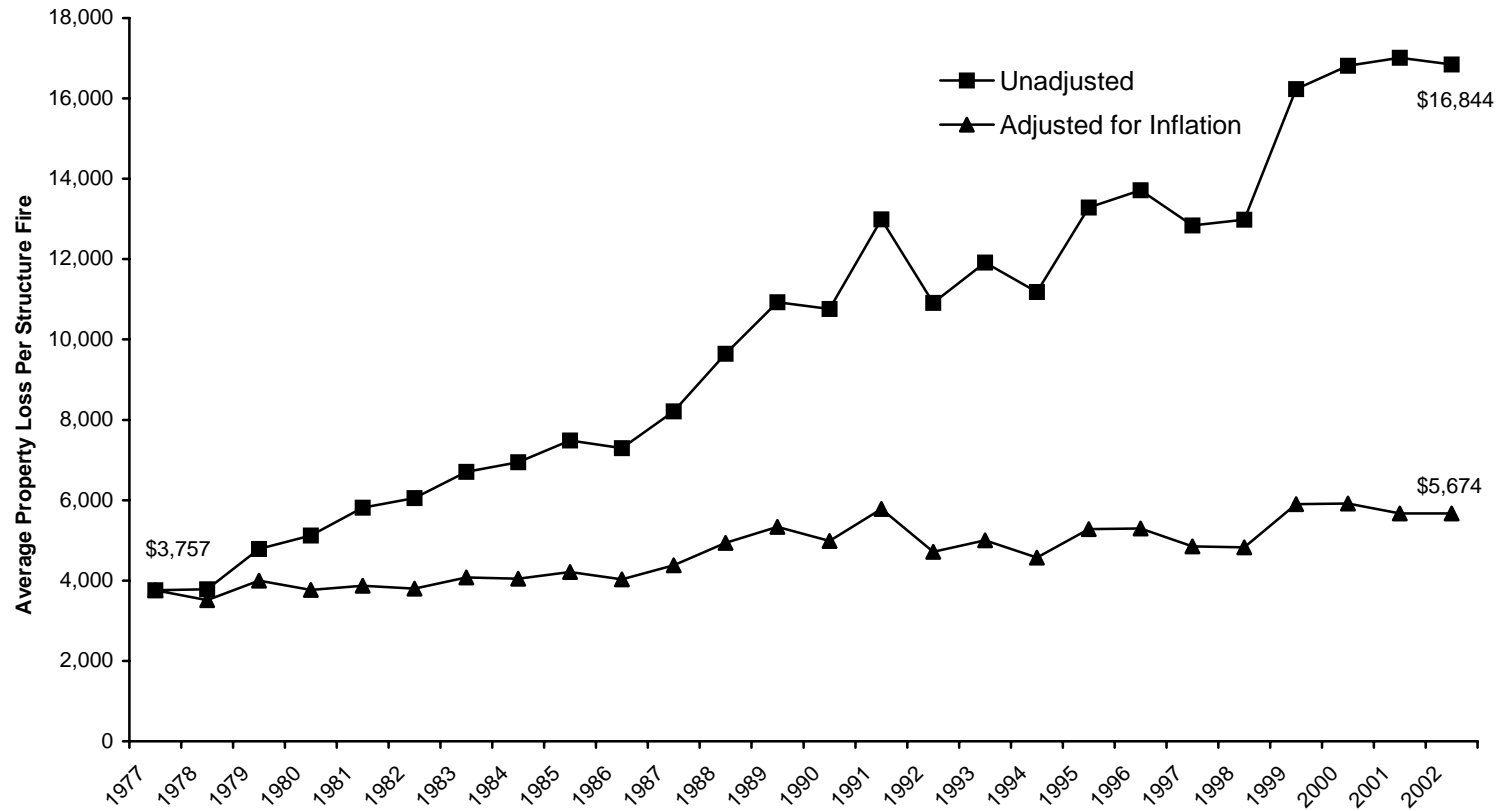
The NFPA estimates that the 1,687,500 fires responded to by the fire service caused \$10,337,000,000 in property damage in 2002. This is a slight decrease of 2.2% from a year ago, excluding the events of 9/11/01, where there was an estimated \$33.44 billion in property loss.

Fires in structures resulted in an estimated \$8,742,000,000 in property damage, a very slight decrease of 1.5% from a year ago, again excluding the events of 9/11/01. Average loss per structure fire was \$16,844, down a slight 1.0% from a year ago.

Over the 1977-2002 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 2002, an estimated \$6,055,000,000 occurred in residential properties, up a moderate 7.3% from a year ago. An estimated \$5,005,000,000 occurred in one- and two-family dwellings, up a moderate 7.6% from last year. An estimated \$926,000,000 also occurred in apartments. Other property damage figures worth noting for 2002 include: \$338,000,000 in special structures, a significant increase of 73.3%;

**Figure 5 Average Property Loss per Structure Fire*
in the United States (1977-2002)**



Source: NFPA's Annual Survey of Fire Departments
for U.S. Fire Experience (1977-2002)

*Does not include the
events of 9/11/01

\$92,000,000 in educational properties, a significant decrease of 45.9%; \$627,000,000 in storage properties, a substantial decrease of 32.6%; \$658,000,000 in industrial properties a decrease of 23.3%.

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 44,500 intentionally set structure fires in the U.S. in 2002, a slight decrease of 2.2% 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 350 civilian deaths, an increase of 6.1% from a year ago, excluding the events of 9/11/01 where 2,451 civilian deaths occurred. These set structure fires also resulted in \$919,000,000 in property loss, a decrease of 9.2% from last year, again excluding the events of 9/11/01, where \$33.44 billion in property loss occurred. In all, intentionally set fires accounted for 8.6% of all structure fires, but for 10.5% of the property loss.

Also in 2002, there were an estimated 41,000 intentionally set vehicle fires, an increase of 3.8% from a year ago. These set vehicle fires resulted in an estimated \$222,000,000 in property damage, a slight increase of 1.4% from last year. In all, intentionally set vehicle fires accounted for 12.4% of all vehicle fires, but for 16.0% of the property loss.

Table 5
Estimate of 2002 Losses in
Intentionally* Set Structure Fires

Intentionally* Set Structure Fires	Estimate	Percent change from 2001
Number of Structure Fires	44,500	-2.2
Civilian Deaths	350	+6.1
Property Loss ¹	\$919,000,000	-9.2

The estimates are based on data reported to the NFPA by fire departments that responded to the 2002 National Fire Experience Survey.

The results in the percent change from 2001 above do not include the events of 9/11/01, where 2,451 civilian deaths occurred, and there was \$33.44 billion in property loss.

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 region⁴ can be seen in Table 6. The South had the highest fire incident rate with 6.7 fires per thousand population followed by the Northeast (5.8), and the Northcentral (5.7).

The South with 15.6 again had the highest death rate per million population followed by the Northeast (10.6), and the Northcentral (10.3).

The Northcentral (74.9), had the highest injury rate per million population, while the West had the lowest rate (52.3). The south (\$40.6) and the Northcentral (\$40.3) had the highest property loss rates per capita.

Fire incident rates by region and community size are shown in Table 7. The Northcentral had the highest incident rate for communities of 250,000 to 499,999, the Northeast had the highest rates for communities of 100,000 to 249,999, the West had the highest rate for communities of 50,000 to 99,999, and the South had the highest rates for communities of 10,000 to 24,999, and the smaller communities (population of less than 10,000).

Civilian fire death rates per million population are shown in Table 8. The Northeast had the highest rate for communities of 500,000 or more, the Northcentral had the highest rate for communities of 250,000 to 499,999, the South had the highest rate for communities of 2,500 to 99,999 population, and the West had the highest rate for the smallest communities (populations of less than 2,500).

Civilian fire injuries per million population by region and community size are shown in Table 9. The Northcentral had the highest rate for communities of 250,000 to 499,999, the Northeast had the highest rate for communities of 50,000 to 249,999, and communities less than 2,500 population, and the South had the highest rate for communities of 25,000 to 49,999, and communities of 5,000 to 9,999.

Property loss rates per capita are shown in Table 10. The Northcentral had the highest rate for communities of 100,000 to 499,999, the South had the highest rate for communities of 25,000 to 99,999, communities of 5,000 to 9,999, and communities of less than, 2,500, the Northeast had the highest rate for communities of 10,000 to 24,999, and the West had the highest rate for communities of 2,500 to 4,999.

Table 6
Fire Loss Rates Nationwide and by Region, 2002

<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	6.0	12.0	65.5	\$36.7
Northeast	5.8	10.8	68.9	28.8
Northcentral	5.7	10.3	74.9	40.3
South	6.7	15.6	65.6	40.6
West	5.2	9.1	52.3	33.9

Source: NFPA's Survey of Fire Departments for 2002 U.S. Fire Experience.

Table 7
2002 Fires per Thousand Population

Population of Community	All Regions	Northeast	Northcentral	South	West
500,000 or more	4.5	*	*	4.9	3.5
250,000 to 499,999	4.2	*	5.5	4.2	3.4
100,000 to 249,999	4.8	6.3	5.0	5.7	3.2
50,000 to 99,999	4.5	5.4	3.6	5.1	4.6
25,000 to 49,999	4.6	4.7	3.9	5.3	5.5
10,000 to 24,999	5.4	4.9	4.8	6.7	6.4
5,000 to 9,999	6.7	6.0	5.4	8.7	7.4
2,500 to 4,999	7.9	6.5	7.0	10.1	9.4
under 2,500	12.3	9.6	11.4	15.3	14.6

Source: NFPA's Survey of Fire Departments for 2002 U.S. Fire Experience.

*Insufficient data

Table 8
2002 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	10.8	15.3	*	10.9	7.8
250,000 to 499,999	9.7	*	14.8	10.3	5.4
100,000 to 249,999	13.9	20.6	17.2	18.1	4.1
50,000 to 99,999	9.8	8.4	7.9	14.1	7.2
25,000 to 49,999	11.6	5.4	77.9	19.7	11.6
10,000 to 24,999	8.3	5.7	5.9	16.7	3.5
5,000 to 9,999	16.6	14.8	13.6	24.4	11.6
2,500 to 4,999	17.5	13.2	14.1	22.7	15.2
under 2,500	21.0	21.6	7.2	19.1	25.5

Source: NFPA's Survey of Fire Departments for 2002 U.S. Fire Experience.

*Insufficient data

Table 9
2002 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	60.0	*	*	63.1	38.3
250,000 to 499,999	93.3	*	110.6	86.4	90.8
100,000 to 249,999	100.4	160.5	99.8	115.9	44.6
50,000 to 99,999	76.8	85.6	91.4	68.1	67.0
25,000 to 49,999	81.5	84.6	79.6	88.8	65.4
10,000 to 24,999	65.4	62.7	70.7	65.7	48.9
5,000 to 9,999	41.8	31.8	44.7	45.2	39.8
2,500 to 4,999	24.9	28.3	28.3	25.0	*
under 2,500	51.3	54.1	52.5	46.9	50.9

Source: NFPA's Survey of Fire Departments for 2002 U.S. Fire Experience.

*Insufficient data

Table 10
2002 Property Loss per Person
by Region and Size of Community

Population of Community	All Regions	Northeast	Northcentral	South	West
500,000 or more	\$31.4	*	*	\$35.0	\$26.5
250,000 to 499,999	28.9	*	35.7	30.5	23.8
100,000 to 249,999	36.3	36.2	42.3	37.1	24.9
50,000 to 99,999	30.4	33.1	26.2	37.7	35.5
25,000 to 49,999	46.4	26.9	42.2	37.5	35.3
10,000 to 24,999	43.9	44.2	37.1	42.1	45.2
5,000 to 9,999	50.5	34.2	47.7	48.4	41.2
2,500 to 4,999	84.5	46.0	66.0	72.9	81.0
under 2,500	91.7	48.6	74.2	105.7	89.3

Source: NFPA's Survey of Fire Departments for 2002 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 2002 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	8,231	2,172	28.25	111.20	\$52,735,200
500,000 to 999,999	3,170	1,025	7.44	39.60	24,423,700
250,000 to 499,999	1,500	454	3.45	33.34	10,536,500
100,000 to 249,999	716	250	2.09	15.02	5,728,800
50,000 to 99,999	311	102	0.68	5.21	2,113,500
25,000 to 49,999	157	49	0.40	2.75	1,622,300
10,000 to 24,999	80	25	0.12	0.97	665,600
5,000 to 9,999	47	14	0.12	0.29	344,900
2,500 to 4,999	27	8	0.06	0.09	287,800
under 2,500	13	3	0.02	0.06	93,200

Source: NFPA's Survey of Fire Departments for 2002 U.S. Fire Experience.

Table 12
Average 2002 Residential Fire Experience by Size of Community

Population of Community	Number of Fires	Civilian Deaths	Civilian Injuries	Property Loss
1,000,000 or more	3,915	22.88	59.00	\$25,557,800
500,000 to 999,999	806	6.08	32.95	14,941,800
250,000 to 499,999	362	2.58	25.22	6,209,400
100,000 to 249,999	201	1.70	12.79	2,928,300
50,000 to 99,999	82	0.57	4.06	1,126,600
25,000 to 49,999	38	0.31	2.14	858,000
10,000 to 24,999	20	0.10	0.71	319,700
5,000 to 9,999	12	0.09	0.23	189,700
2,500 to 4,999	6	0.04	0.06	126,900
under 2,500	2	0.01	0.02	49,800

Source: NFPA's Survey of Fire Departments for 2002 U.S. Fire Experience.

Fire Department Responses

In all, fire departments responded to the following estimated number of fires and other incidents in 2002.

	Number	Percent Change From 2001
Fire Incidents	1,687,500	-2.7
Medical Aid Responses (Ambulance, EMS, Rescue)	12,903,000	+4.6
False Alarms	2,116,000	-1.9
Mutual Aid or Assistance Calls	888,500	+6.0
Hazardous Material Responses (Spills, Leaks, etc.)	361,000	-5.4
Other Hazardous Responses (arcing wires, bomb removal etc.)	603,500	-0.2
All Other Responses (smoke scares, lock-outs, etc.)	2,744,000	-5.9
Total Incidents	21,303,500	-4.3

A further breakdown on false responses was collected on the 2002 surveys and the results can be seen in Table 13.

Table 13
Estimates of False Alarms by Type, 2002

	Estimate	Percent Change From 2001	Percent of All False Alarms
Malicious, Mischievous False Call	311,000	+13.5	14.7
System Malfunction	793,000	-3.5	37.5
Unintentional Call	713,000	-6.4	33.7
Other False Alarms (Bomb Scares, etc.)	299,000	-3.3	14.1
Total	2,116,000	-1.9	

Source: NFPA's Survey of Fire Departments for 2002 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 2002 Fire Experience. This section explains the major steps in conducting the 2002 survey.

Sample Selection

The NFPA currently has 30,020 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 2002 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 315 departments in the four highest strata protect 104,170,000.

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 14,756 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 2002 NFPA Fire Experience Questionnaire during the 2nd week of January 2003. A second mailing was sent in mid-March to fire departments that had not responded to the first mailing. A total of 3,460 departments responded to the questionnaire 2,733 to the first mailing and 727 to the second.

Table 14 shows the number of departments that responded by region and size of community. The overall response rate was 23%, although response rates were considerably higher for departments protecting larger communities than they were for departments protecting smaller communities. The 3,460 departments that did respond protect 106,421,517 people or 37% 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 2002 NFPA Survey, by
Region and Community Size

Population of Community	All Regions	Northeast	Northcentral	South	West
1,000,000 or more	10	2	1	4	3
500,000 to 999,999	27	1	2	15	9
250,000 to 499,999	25	1	5	10	9
100,000 to 249,999	103	9	21	40	33
50,000 to 99,999	201	26	61	65	49
25,000 to 49,999	248	39	107	76	26
10,000 to 24,999	532	102	236	135	59
5,000 to 9,999	676	128	267	195	86
2,500 to 4,999	636	132	292	153	59
Under 2,500	1,002	150	501	205	146
TOTAL	3,460	590	1,493	898	479

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 calculated.⁶ 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 2002, for instance, property damage in storage properties was estimated to be \$627,000,000. This represented a decrease of 32.6% from the year before, but was found not to be statistically significant.

In addition to sampling errors, there are nonsampling errors. These include biases 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, 132 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 respondent rate was 77% higher for civilian deaths and 14% for property loss, while the nonrespondent rate was 36% higher for fires (none of these results were found to be statistically significant).

For communities of 50,000 to 99,999, the nonrespondent rate was 9% higher for fires, while the respondent rate was 5% higher for property loss, and the rates were similar for civilian deaths. (None of these results were found to be statistically significant).

For communities of 25,000 to 49,999, the respondent rate was 21% higher for civilian deaths and 136% higher for property loss, while the nonrespondent rate was 52% higher for fires. (Only the result for property loss was found to be statistically significant).

For communities of 10,000 to 24,999, the respondent rate was 24% higher for civilian deaths and 138% higher for property loss, while the rates were similar for fires. (Only the result for property loss was found to be statistically significant).

For communities of 10,000 to 24,999, the nonrespondent rate was 25% higher for fires and 170% higher for civilian deaths, while the respondent rate was 33% higher for property loss. (None of these results were found to be statistically significant).

Table 15
A Comparison of Respondents and Nonrespondents*
to the 2002 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	4.7	18	6.4	94	14.0	18	7.9	61	36.5	9	31.9
50,000 to 99,999	171	4.5	28	4.9	192	9.8	28	9.7	107	33.4	17	31.7
25,000 to 49,999	215	4.6	27	7.0	235	11.3	25	9.3	104	46.5	14	19.7
10,000 to 24,999	475	5.4	36	5.6	525	8.7	33	7.0	218	44.0	11	18.5
5,000 to 9,999	635	6.7	23	8.4	660	16.3	22	44.1	285	50.5	9	38.0

*Some departments did not return the questionnaire. A sample of these nonrespondents was contacted by telephone and questioned about their 2002 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 fire fighter, 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.

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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., *Patterns of Civilian Fire Casualties in Home Fires by Age and Sex, 1994-98*, August 2001, 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. Steven K. Thompson, *Sampling*
John Wiley, New York, NY, 1992, p.p. 107-111.
6. William G. Cochran, *Sampling Techniques*
John Wiley, New York, NY, 1977, p.p. 150-161