

U.S. STRUCTURE FIRES IN NON-RESIDENTIAL PROPERTIES

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October 2009



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

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Abstract

In 2003-2006, U.S. municipal fire departments responded to an estimated average of 109,300 structure fires in non-residential properties annually. These fires resulted in 100 civilian fire deaths, 1,410 civilian injuries, \$2.4 billion in direct property damage, annually. One out of every 5 of these fires was contained to trash or rubbish. Twenty-two percent of non-residential structure fires involved storage facilities. One out of every four non-residential structure fires occurs in the afternoon, between 2 p.m. and 6 p.m.

These estimates are based on data from the U.S. Fire Administration's (USFA) National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association's (NFPA) annual fire department experience survey.

Keywords: fire statistics, non-residential

Acknowledgements

The National Fire Protection Association thanks all the fire departments and state fire authorities who participate in the National Fire Incident Reporting System (NFIRS) and the annual NFPA fire experience survey. These firefighters are the original sources of the detailed data that make this analysis possible. Their contributions allow us to estimate the size of the fire problem.

We are also grateful to the U.S. Fire Administration for its work in developing, coordinating, and maintaining NFIRS.

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 617-984-7443.

Copies of this analysis are available from:

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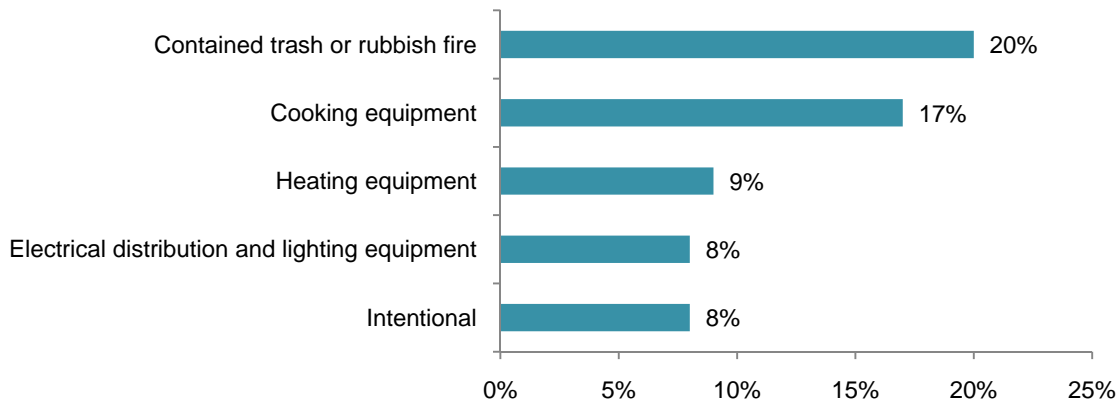


Non-Residential Structure Fires Fact Sheet

In 2003-2006, an estimated 109,300 structure fires in non-residential properties were reported to municipal fire departments annually. These fires resulted in:

- 100 civilian fire deaths,
 - 1,410 civilian injuries,
 - \$2.4 billion in direct property damage, annually.
- One out of every 5 non-residential structure fires is a contained trash or rubbish fire.

Leading Cause of Structure Fires in Non-Residential Properties, 2003-2006



Estimates are derived from the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS) Version 5.0 and NFPA's annual fire department experience survey.

Property use breakdown for structure fires in nonresidential properties during 2003-2006:

- 22% - Storage properties
 - 19% - Mercantile or business properties
 - 19% - Outside or special properties
 - 14% - Public assembly properties
 - 23% - Other non-residential properties
- One out of every 4 non-residential structure fires occurs in the afternoon, between 2 p.m. and 6 p.m.

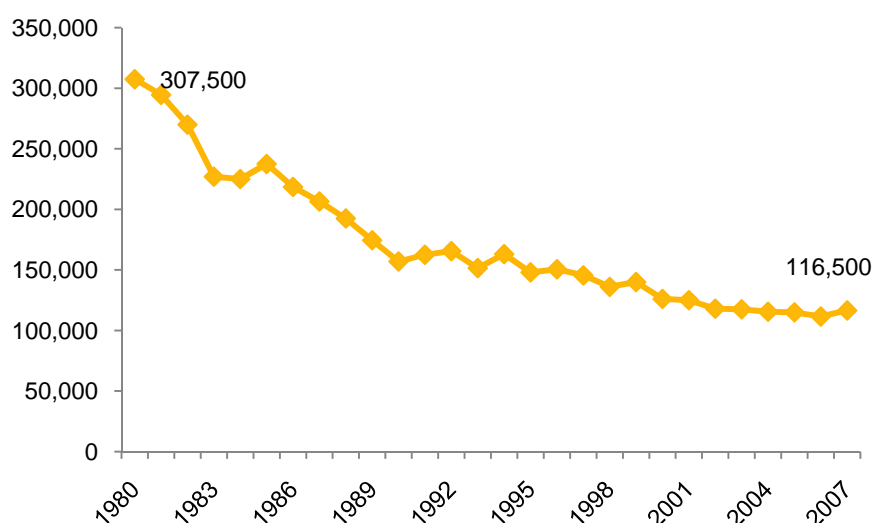
Structure Fires in Non-Residential Properties

This analysis examines reported structure fires in all properties that are not considered residential. Non-residential properties are captured in NFIRS property use codes 100-399 and 500-999.

In 2003-2006, an estimated 109,300 structure fires were reported in non-residential properties, per year.

Municipal fire departments responded to an estimated average of 109,300 structure fires in non-residential properties annually during 2003-2006. These fires resulted in an annual average of 100 civilian deaths, 1,410 civilian injuries, and \$2.4 billion in direct property damage. See Appendix A for information on NFIRS and the methodology used in this analysis.

Figure 1. U.S. Structure Fires in Non-Residential Properties by Year, 1980-2007



Source: NFPA Survey, see note on Table 2.

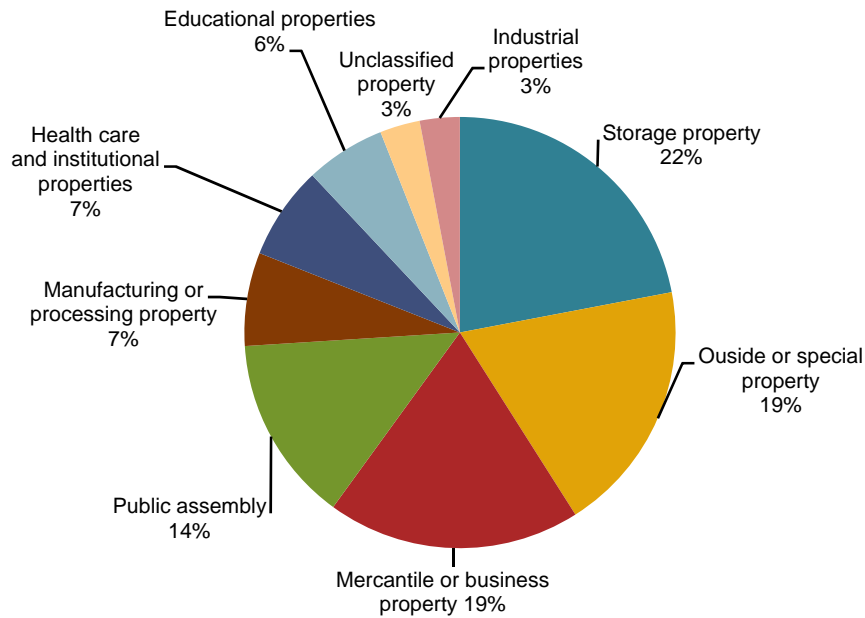
Since 1980, reported non-residential structure fires fell 63%.

As Table 2 and Figure 1 show, structure fires in non-residential properties fell 63% from 307,500 in 1980 to 116,500 in 2007. In comparison, structure fires of all types declined 50% from 1980 to 2007.

Storage properties are the leading property use for structure fires in non-residential properties.

During 2003-2006, 22% of structure fires in non-residential properties involved storage facilities. These fires resulted in 38% of the civilian deaths, 21% of civilian injuries, and 20% of direct property damage. Mercantile and business properties and outside and special properties tied as the second leading non-residential property types for structure fires. Each property use group has its own report, please refer to that report for more specific statistics. (See Table 1 and Figure 2).

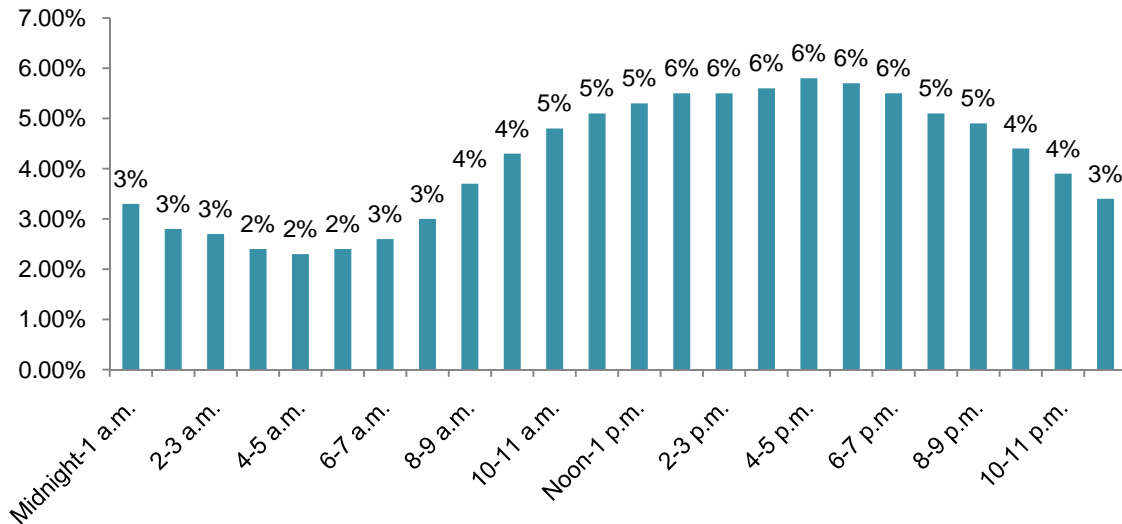
Figure 2. U.S. Structure Fires in Non-Residential Properties by Occupancy Type during 2003-2006



One out of every 4 non-residential structure fires occurs in the afternoon.

Tables 3, 4, and 5 show reported structure fires in these properties by month, day of week, and alarm time respectively. The peak days for non-residential structure fires occurred were Monday and Friday in 2003-2006, with 15% on each day. There isn't a specific peak month for non-residential structure fires. Figure 3 shows that 1 of every 4 non-residential structure fires occur in the afternoon, between 2 p.m. and 6 p.m.

Figure 3. Structure Fires in Non-Residential Properties, by Alarm Time 2003-2006 Annual Averages



Source: NFIRS and NFPA Survey

One out of every 5 non-residential structure fires is a contained trash or rubbish fire.

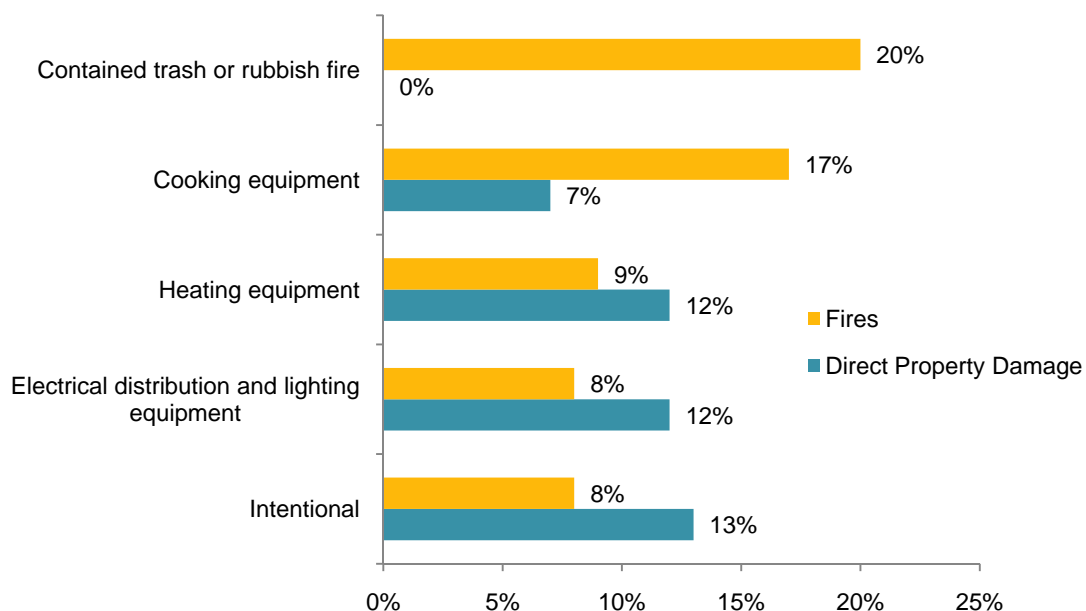
Table 6 shows the leading causes of fires in these properties with data summarized from several NFIRS fields. In some cases, the equipment involved in ignition is most relevant; heat source, the field “cause,” and factor contributing to ignition also provide relevant information. The causes shown in this table are not mutually exclusive when they have been pulled from different fields. More detailed information on equipment involved in ignition may be found in Table 7; more information on heat source is in Table 8; further explanation of the methodology used is in Appendix B.

Overall, contained trash or rubbish fires caused 20% of the fires reported in non-residential properties. Cooking equipment was the second leading cause of these fires. Thirteen percent of non-residential structure fires were confined cooking fires and 4% involved equipment that was identified as cooking. (See Table 6 and Figure 4).

Heating equipment was involved in 9% of non-residential structure fires, this includes the 6% of fires in which heating equipment was specifically identified and 4% that was confined to heating equipment.

Intentional fires and playing with heat source fires were the leading cause of civilian fire deaths in these properties. It should be noted that in 2003 an intentional fire in Connecticut, which involved playing with heat source, resulted in 16 casualties and dozens of injuries. This incident has an impact on the estimated number of deaths per year as well as the percentage of civilian fire deaths.

Figure 4. Structure Fires and Direct Property Damage in Non-Residential Properties by Leading Cause of Fire 2003-2006 Annual Averages



An unclassified storage area was leading area of origin non-residential structure fires that were not reported as confined.

Twenty-two percent of non-residential structure fires originated in an unclassified storage area. Ten percent of these fires started in an unclassified structural area and 7% began in an exterior wall surface. (See Table 9.)

Trash or rubbish was the leading item first ignited in non-residential structure fires.

Causal information such as item first ignited is not required when a fire is reported as contained to trash or rubbish. Presumably, trash or rubbish was the item first ignited in these fires, meaning that 23% of reported non-residential structure fires involved the ignition of trash or rubbish. The same rules apply for fires that are reported as confined cooking equipment fires. Presumably, cooking materials and food would have been the item first ignited in these fires, meaning that 14% of reported non-residential structure fires involved the ignition of food or cooking materials. Electrical wire or cable insulation was the item first ignited in 6% of non-residential structure fires.

Although only 5% of reported non-residential fires involved the ignition of flammable liquid, these fires were the leading cause of civilian deaths (27%) and injuries (26%).

Most non-residential structure fires are small.

Sixty-two percent of non-residential structure fires were contained or confined to the object of origin. In NFIRS Version 5.0, there are six categories of confined structure fires, including cooking fires confined to the cooking vessel, confined chimney or flue fires, confined incinerator fire, confined fuel burner or boiler fire or delayed ignition, confined commercial compactor fire, and trash or rubbish fires in a structure with no flame damage to the structure or its contents.

Just over a quarter (28%) of non-residential structure fires spread beyond the room of origin. (See Table 11.)

An average of 572,890 outside and other fires per year were reported at these properties.

During 2003-2006, an estimated annual average of 572,900 outside and other fires on these properties caused an average of 30 civilian deaths, 500 civilian injuries, and \$181 million in direct property damage per year. An average of 254,400 vehicle fires reported on these properties caused an average 450 civilian deaths, 1,290 civilian injuries, and \$1.2 billion in direct property damage per year.

Sprinkler presence is more common in non-residential properties than in homes.

The following information was taken from the NFPA report *U.S. Experience with Sprinklers and Other Automatic Fire Extinguishing Equipment*. Please see that report for more information.

The majority of reported fires in properties with automatic extinguishing equipment present from 2003 to 2006 are consistently shown in eating and drinking establishments, health care facilities, and manufacturing facilities.

Educational properties have shown roughly one-third of reported fires in properties with automatic extinguishing equipment present in the most recent two years of 2005 and 2006.

Public assembly properties showed over half of 2006 reported fires in properties with automatic extinguishing equipment present, but the percentages have been consistently below one-third for public assembly properties other than eating and drinking establishments.

Most fires in storage properties are not in warehouses but are in garages, barns, silos, and small outbuildings. It is these types of buildings that drive the very low percentage of reported fires with automatic extinguishing equipment in all storage properties combined.

Additional information sources

Many of NFPA's codes and standards apply to non-residential properties. *NFPA 101: Life Safety Code* and *NFPA 5000: Building Construction and Safety Code* address construction, protection, and occupancy features necessary to minimize the danger to life from the effects of fire, including smoke, heat, and toxic gases created during a fire. *NFPA 1: Fire Code*, includes but is not limited to inspections of buildings, investigation of fires, review of construction plans, and other issues. Please visit www.nfpa.org for more information.

Table 1.
Structure Fires in Non-Residential Properties, by Property Use
2003-2006 Annual Averages

| Property Use | Fires | | Civilian Deaths | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|--|--------------|-------------|------------------------|-------------|--------------------------|-------------|---|-------------|
| Public assembly | 3,100 | (3%) | 0 | (3%) | 20 | (1%) | \$33 | (1%) |
| Eating or drinking places | 15,800 | (14%) | 10 | (7%) | 150 | (11%) | \$398 | (16%) |
| Place of worship or funeral property | 8,100 | (7%) | 0 | (3%) | 90 | (7%) | \$207 | (9%) |
| Club | 2,000 | (2%) | 0 | (2%) | 10 | (1%) | \$92 | (4%) |
| Variable use or amusement or recreation | 1,900 | (2%) | 0 | (1%) | 20 | (1%) | \$33 | (1%) |
| Library, museum, courthouse or other public property | 1,200 | (1%) | 0 | (0%) | 10 | (0%) | \$13 | (1%) |
| Fixed use amusement or recreation | 700 | (1%) | 0 | (0%) | 0 | (0%) | \$22 | (1%) |
| Passenger terminal | 600 | (1%) | 0 | (0%) | 10 | (0%) | \$14 | (1%) |
| Educational properties | 600 | (1%) | 0 | (0%) | 0 | (0%) | \$1 | (0%) |
| Preschool through grade 12 | 6,700 | (6%) | 0 | (0%) | 90 | (6%) | \$90 | (4%) |
| Adult education or college classroom | 4,900 | (4%) | 0 | (0%) | 70 | (5%) | \$74 | (3%) |
| Day care | 800 | (1%) | 0 | (0%) | 10 | (1%) | \$9 | (0%) |
| Health care, detention, and correction properties | 600 | (1%) | 0 | (0%) | 10 | (0%) | \$3 | (0%) |
| Nursing home or residential board and care facility | 7,600 | (7%) | 20 | (19%) | 220 | (16%) | \$40 | (2%) |
| Hospital or hospice | 2,900 | (3%) | 20 | (17%) | 120 | (9%) | \$8 | (0%) |
| Mental retardation or substance abuse | 1,600 | (1%) | 0 | (1%) | 30 | (2%) | \$5 | (0%) |
| Clinic or doctor's office | 1,500 | (1%) | 0 | (1%) | 20 | (2%) | \$3 | (0%) |
| Prison, jail or police station | 700 | (1%) | 0 | (0%) | 10 | (0%) | \$19 | (1%) |
| Mercantile or business properties | 600 | (1%) | 0 | (0%) | 30 | (2%) | \$2 | (0%) |
| Grocery or convenience store | 21,000 | (19%) | 10 | (13%) | 280 | (20%) | \$748 | (31%) |
| Office, bank or mail facility | 4,800 | (4%) | 0 | (2%) | 40 | (3%) | \$158 | (7%) |
| Unclassified or unknown-type mercantile or business | 3,900 | (4%) | 0 | (1%) | 30 | (2%) | \$102 | (4%) |
| Service station or vehicle sales, service or repair | 3,000 | (3%) | 0 | (2%) | 30 | (2%) | \$132 | (5%) |
| Laundry, dry-cleaning, professional supplies or services | 2,400 | (2%) | 0 | (5%) | 80 | (6%) | \$112 | (5%) |
| Specialty shop | 1,900 | (2%) | 0 | (1%) | 20 | (2%) | \$47 | (2%) |
| Department store or unclassified general retail | 1,800 | (2%) | 0 | (2%) | 30 | (2%) | \$74 | (3%) |
| Personal Service, recreational or home repair | 1,500 | (1%) | 0 | (0%) | 20 | (1%) | \$55 | (2%) |
| Industrial, utility, defense, agriculture, or mining properties | 800 | (1%) | 0 | (0%) | 10 | (1%) | \$24 | (1%) |
| Agriculture | 3,200 | (3%) | 10 | (7%) | 50 | (3%) | \$128 | (5%) |
| Unclassified utility, defense, agriculture, mining | 1,200 | (1%) | 0 | (1%) | 10 | (1%) | \$51 | (2%) |
| Utility or distribution system | 600 | (1%) | 0 | (2%) | 10 | (1%) | \$26 | (1%) |

Table 1.
Structure Fires in Non-Residential Properties, by Property Use
2003-2006 Annual Averages
(Continued)

| Property Use | Fires | | Civilian Deaths | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|--------------|-------------|-----------------|-------------|-------------------|-------------|--------------------------------------|-------------|
| Manufacturing or processing properties | 600 | (1%) | 0 | (0%) | 10 | (1%) | \$12 | (1%) |
| Storage properties | 7,300 | (7%) | 10 | (6%) | 250 | (18%) | \$381 | (16%) |
| Unclassified storage | 24,200 | (22%) | 40 | (38%) | 290 | (21%) | \$487 | (20%) |
| Vehicle storage, garage or fire station | 13,900 | (13%) | 10 | (13%) | 100 | (7%) | \$176 | (7%) |
| Warehouse, residential or self-storage | 6,900 | (6%) | 10 | (14%) | 150 | (11%) | \$126 | (5%) |
| Grain or livestock storage | 2,000 | (2%) | 10 | (8%) | 30 | (2%) | \$138 | (6%) |
| Outside or special properties | 1,300 | (1%) | 0 | (2%) | 10 | (1%) | \$41 | (2%) |
| Highway, street, or parking area | 20,400 | (19%) | 10 | (8%) | 70 | (5%) | \$106 | (4%) |
| Open land, beach, or campsite | 8,600 | (8%) | 0 | (3%) | 20 | (1%) | \$11 | (0%) |
| Bridge, tunnel, or outbuilding | 5,300 | (5%) | 0 | (2%) | 20 | (1%) | \$9 | (0%) |
| Unclassified or unknown-type special property | 2,600 | (2%) | 0 | (2%) | 20 | (1%) | \$20 | (1%) |
| Construction site, oil or gas field, | 2,300 | (2%) | 0 | (0%) | 10 | (0%) | \$8 | (0%) |
| Unclassified property use | 900 | (1%) | 0 | (0%) | 0 | (0%) | \$54 | (2%) |
| All non-residential properties | 109,300 | (100%) | 100 | (100%) | 1,410 | (100%) | \$2,412 | (100%) |

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries are rounded to the nearest ten, and direct property damage is rounded to the nearest million dollars. Property damage has not been adjusted for inflation. Totals may not equal sums due to rounding errors.

Source: NFIRS and NFPA survey.

Table 2.
Structure Fires in Non-Residential Properties, by Year: 1980-2007

| Year | Fires | Civilian Deaths | Civilian Injuries | Direct Property Damage (in Billions) | |
|-------------------|---------|--------------------|----------------------|---|---------------------|
| | | | | As Reported | In 2007 Dollars |
| 1980 | 307,500 | 229 | 3,625 | \$2.4 ¹ | \$6.1 |
| 1981 | 294,500 | 220 | 5,325 | \$2.7 | \$6.2 |
| 1982 | 270,000 | 260 | 4,475 | \$2.5 | \$5.3 |
| 1983 | 227,000 | 270 | 4,700 | \$2.5 | \$5.2 |
| 1984 | 225,000 | 285 | 3,750 | \$2.5 | \$4.9 |
| 1985 | 237,500 | 240 | 3,525 | \$2.7 | \$5.1 |
| 1986 | 218,500 | 215 | 3,725 | \$2.3 | \$4.3 |
| 1987 | 206,500 | 220 | 3,375 | \$2.5 | \$4.6 |
| 1988 | 192,500 | 215 | 3,675 | \$3.2 | \$5.6 |
| 1989 | 174,500 | 220 | 3,275 | \$3.5 | \$5.9 |
| 1990 | 157,000 | 285 ² | 3,425 | \$2.5 | \$3.9 |
| 1991 | 162,500 | 190 | 3,125 | \$2.8 ³ | \$4.2 ³ |
| 1992 | 165,500 | 175 | 2,725 | \$3.1 | \$4.6 |
| 1993 | 151,500 | 155 | 3,950 ⁴ | \$2.6 ⁵ | \$3.7 ⁵ |
| 1994 | 163,000 | 125 | 3,100 | \$2.6 | \$3.6 |
| 1995 | 148,000 | 290 ⁶ | 2,600 | \$3.3 ⁷ | \$4.4 ⁷ |
| 1996 | 150,500 | 140 | 2,575 | \$3.0 | \$3.9 |
| 1997 | 145,500 | 120 | 2,600 | \$2.5 | \$3.2 |
| 1998 | 136,000 | 170 | 2,250 | \$2.3 | \$3.0 |
| 1999 | 140,000 | 120 | 2,100 | \$3.4 | \$4.2 |
| 2000 | 126,000 | 90 | 2,200 | \$2.8 | \$3.4 |
| 2001 ⁸ | 125,000 | 80 | 1,650 | \$3.2 | \$3.8 |
| 2002 | 118,000 | 80 | 1,550 | \$2.7 | \$3.1 |
| 2003 | 117,500 | 220 ⁹ | 1,525 | \$2.6 ¹⁰ | \$2.9 ¹⁰ |
| 2004 | 115,500 | 80 | 1,350 | \$2.4 | \$2.6 |
| 2005 | 115,000 | 50 | 1,500 | \$2.3 | \$2.5 |
| 2006 | 111,500 | 85 | 1,425 | \$2.6 | \$2.7 |
| 2007 | 116,500 | 105 | 1,350 | \$3.1 ¹¹ | \$3.1 ¹¹ |

¹ Individual incidents with large loss can affect the total for a given year. Note the following: The 1988 figure includes a Norco, Louisiana petroleum refinery with a loss of \$330 million. The 1989 figure includes a Pasadena, Texas polyolefin plant with a loss of \$750 million.

² Includes 87 deaths at the [Happy Land social club fire](#) in New York City (N.Y.C.).

³ Does not include \$1.5 billion in damage caused by Oakland Fire Storm.

⁴ Includes 1,024 injuries that occurred at the World Trade Center explosion and fire in N.Y.C.

⁵ Does not include Southern California Wildfire with a loss of \$809 million.

⁶ Includes 168 deaths that occurred at the federal office building fire in Oklahoma City, OK.

⁷ Includes an Oklahoma City, OK office building with a loss of \$135 million, a Georgia manufacturing plant fire with a loss of \$200 million and a Massachusetts industrial complex fire with a loss of \$500 million.

⁸ Does not include the events of 9/11/01, where there were 2,451 civilian deaths, 800 civilian injuries and \$33.44 billion in property loss.

Table 2.
Structure Fires in Non-Residential Properties, by Year: 1980-2007
(Continued)

⁹ This includes 100 fire deaths in the Station Nightclub Fire in Rhode Island and 31 deaths in two nursing home fires in Connecticut and Tennessee.

¹⁰ This does not include the Southern California Wildfires with an estimated property damage of \$2 billion.

¹¹ This does not include the California Fire Storm 2007 with an estimated property damage of \$1.8 billion.

Direct property damage figures do not include indirect losses, like business interruption. Inflation adjustment to 2007 dollars is done using the consumer price index.

Source: [Fire Loss in the United States 2007](#), Michael J. Karter, Jr., August 2008 and previous reports in the series.

Table 3.
Structure Fires in Non-Residential Properties, by Month
2003-2006 Annual Averages

| Month | Fires | | Civilian Deaths | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|----------------|----------------|---------------|-----------------|---------------|-------------------|---------------|---|---------------|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| January | 9,700 | (9%) | 10 | (8%) | 160 | (11%) | \$201 | (8%) |
| February | 8,600 | (8%) | 30 | (26%) | 140 | (10%) | \$219 | (9%) |
| March | 9,800 | (9%) | 10 | (8%) | 130 | (9%) | \$227 | (9%) |
| April | 10,100 | (9%) | 10 | (6%) | 120 | (8%) | \$203 | (8%) |
| May | 9,100 | (8%) | 0 | (4%) | 110 | (8%) | \$161 | (7%) |
| June | 8,800 | (8%) | 10 | (7%) | 130 | (9%) | \$187 | (8%) |
| July | 9,600 | (9%) | 10 | (9%) | 90 | (7%) | \$213 | (9%) |
| August | 8,500 | (8%) | 0 | (4%) | 100 | (7%) | \$267 | (11%) |
| September | 8,000 | (7%) | 0 | (4%) | 110 | (8%) | \$152 | (6%) |
| October | 9,000 | (8%) | 10 | (10%) | 100 | (7%) | \$171 | (7%) |
| November | 8,700 | (8%) | 0 | (5%) | 100 | (7%) | \$181 | (7%) |
| December | 9,300 | (9%) | 10 | (10%) | 110 | (8%) | \$232 | (10%) |
| Total | 109,300 | (100%) | 100 | (100%) | 1,410 | (100%) | \$2,412 | (100%) |
| Average | 9,100 | (8%) | 10 | (8%) | 120 | (8%) | \$201 | (8%) |

Table 4.
Structure Fires in Non-Residential Properties, by Day of Week
2003-2006 Annual Averages

| Day | Fires | | Civilian Deaths | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|----------------|----------------|---------------|-----------------|---------------|-------------------|---------------|---|---------------|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| Sunday | 14,900 | (14%) | 10 | (13%) | 140 | (10%) | \$302 | (13%) |
| Monday | 16,000 | (15%) | 10 | (14%) | 200 | (14%) | \$336 | (14%) |
| Tuesday | 15,800 | (14%) | 10 | (10%) | 230 | (16%) | \$383 | (16%) |
| Wednesday | 15,600 | (14%) | 30 | (26%) | 230 | (16%) | \$300 | (12%) |
| Thursday | 15,600 | (14%) | 10 | (13%) | 210 | (15%) | \$368 | (15%) |
| Friday | 15,900 | (15%) | 10 | (12%) | 220 | (15%) | \$331 | (14%) |
| Saturday | 15,600 | (14%) | 10 | (11%) | 190 | (14%) | \$393 | (16%) |
| Total | 109,300 | (100%) | 100 | (100%) | 1,410 | (100%) | \$2,412 | (100%) |
| Average | 15,600 | (14%) | 10 | (14%) | 200 | (14%) | \$345 | (14%) |

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries are rounded to the nearest ten, and direct property damage is rounded to the nearest million dollars. Property damage has not been adjusted for inflation. Totals may not equal sums due to rounding errors. Source: NFIRS and NFPA survey.

**Table 5.
Structure Fires in Non-Residential Properties, by Alarm Time
2003-2006 Annual Average**

| Time | Fires | | Civilian Deaths | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---------------------|----------------|---------------|------------------------|---------------|--------------------------|---------------|---|---------------|
| Midnight-12:59 a.m. | 3,600 | (3%) | 0 | (4%) | 30 | (2%) | \$106 | (4%) |
| 1:00-1:59 a.m. | 3,100 | (3%) | 10 | (6%) | 40 | (3%) | \$127 | (5%) |
| 2:00-2:59 a.m. | 2,900 | (3%) | 10 | (14%) | 40 | (3%) | \$137 | (6%) |
| 3:00-3:59 a.m. | 2,600 | (2%) | 0 | (5%) | 20 | (1%) | \$158 | (7%) |
| 4:00-4:59 a.m. | 2,500 | (2%) | 10 | (5%) | 30 | (2%) | \$124 | (5%) |
| 5:00-5:59 a.m. | 2,600 | (2%) | 0 | (3%) | 30 | (2%) | \$108 | (4%) |
| 6:00-6:59 a.m. | 2,900 | (3%) | 0 | (3%) | 30 | (2%) | \$104 | (4%) |
| 7:00-7:59 a.m. | 3,300 | (3%) | 0 | (4%) | 40 | (3%) | \$66 | (3%) |
| 8:00-8:59 a.m. | 4,000 | (4%) | 0 | (3%) | 80 | (6%) | \$56 | (2%) |
| 9:00-9:59 a.m. | 4,700 | (4%) | 0 | (5%) | 110 | (8%) | \$75 | (3%) |
| 10:00-10:59 a.m. | 5,200 | (5%) | 0 | (2%) | 100 | (7%) | \$66 | (3%) |
| 11:00-11:59 a.m. | 5,500 | (5%) | 0 | (3%) | 80 | (6%) | \$86 | (4%) |
| 12:00-12:59 p.m. | 5,800 | (5%) | 0 | (4%) | 70 | (5%) | \$79 | (3%) |
| 1:00-1:59 p.m. | 6,000 | (5%) | 0 | (4%) | 80 | (6%) | \$73 | (3%) |
| 2:00-2:59 p.m. | 6,100 | (6%) | 0 | (2%) | 80 | (6%) | \$91 | (4%) |
| 3:00-3:59 p.m. | 6,200 | (6%) | 10 | (5%) | 90 | (7%) | \$153 | (6%) |
| 4:00-4:59 p.m. | 6,400 | (6%) | 0 | (4%) | 80 | (6%) | \$98 | (4%) |
| 5:00-5:59 p.m. | 6,200 | (6%) | 10 | (5%) | 90 | (6%) | \$90 | (4%) |
| 6:00-6:59 p.m. | 6,000 | (5%) | 0 | (2%) | 70 | (5%) | \$108 | (4%) |
| 7:00-7:59 p.m. | 5,600 | (5%) | 0 | (2%) | 50 | (3%) | \$87 | (4%) |
| 8:00-8:59 p.m. | 5,300 | (5%) | 0 | (5%) | 50 | (4%) | \$101 | (4%) |
| 9:00-9:59 p.m. | 4,800 | (4%) | 0 | (3%) | 40 | (3%) | \$114 | (5%) |
| 10:00-10:59 p.m. | 4,300 | (4%) | 0 | (2%) | 40 | (3%) | \$95 | (4%) |
| 11:00-11:59 p.m. | 3,700 | (3%) | 0 | (5%) | 30 | (2%) | \$107 | (4%) |
| Total | 109,300 | (100%) | 100 | (100%) | 1,410 | (100%) | \$2,412 | (100%) |
| Average | 4,600 | (4%) | 0 | (4%) | 60 | (4%) | \$101 | (4%) |

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries are rounded to the nearest ten, and direct property damage is rounded to the nearest million dollars. Property damage has not been adjusted for inflation. Totals may not equal sums due to rounding errors. Source: NFIRS and NFPA survey.

Table 6.
Leading Causes of Structure Fires in Non-Residential Properties
2003-2006 Annual Averages

| Cause | Fires | | Civilian Deaths* | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|--------|-------|------------------|-------|-------------------|-------|--------------------------------------|-------|
| Contained trash or rubbish fire | 21,600 | (20%) | 0 | (0%) | 30 | (2%) | \$2 | (0%) |
| Cooking equipment | 18,600 | (17%) | 0 | (3%) | 210 | (15%) | \$171 | (7%) |
| <i>Confined cooking equipment</i> | 14,700 | (13%) | 0 | (0%) | 90 | (6%) | \$5 | (0%) |
| <i>Identified cooking equipment</i> | 4,000 | (4%) | 0 | (3%) | 120 | (8%) | \$166 | (7%) |
| Heating equipment | 10,100 | (9%) | 10 | (12%) | 180 | (13%) | \$282 | (12%) |
| <i>Identified heating equipment</i> | 6,100 | (6%) | 10 | (11%) | 160 | (11%) | \$277 | (11%) |
| <i>Confined heating equipment</i> | 4,000 | (4%) | 0 | (1%) | 20 | (2%) | \$5 | (0%) |
| Electrical distribution and lighting equipment | 9,100 | (8%) | 0 | (5%) | 110 | (8%) | \$297 | (12%) |
| Intentional | 9,000 | (8%) | 40 | (38%) | 140 | (10%) | \$309 | (13%) |
| Exposure fire | 6,700 | (6%) | 0 | (1%) | 10 | (1%) | \$172 | (7%) |
| Shop tools and industrial equipment excluding torches, burners or soldering irons | 4,400 | (4%) | 10 | (8%) | 200 | (14%) | \$267 | (11%) |
| Clothes dryer or washer | 3,500 | (3%) | 0 | (1%) | 100 | (7%) | \$31 | (1%) |
| Smoking materials | 3,200 | (3%) | 10 | (8%) | 60 | (4%) | \$46 | (2%) |
| Torch, burner or soldering iron | 2,600 | (2%) | 10 | (10%) | 90 | (7%) | \$84 | (3%) |
| Playing with heat source | 1,800 | (2%) | 30 | (30%) | 40 | (3%) | \$61 | (3%) |

* In 2003 an intentional fire in Connecticut, which involved playing with heat source, resulted in 16 casualties and dozens of injuries. This incident has an impact on the estimated number of deaths per year as well as the percentage of civilian fire deaths.

Note: These are the leading causes, obtained from the following list: intentional (from the NFIRS field "cause"); playing with fire (from factor contributing to ignition); confined heating (including confined chimney and confined fuel burner or boiler fires), confined cooking, and contained trash or rubbish from incident type; identified heating, identified cooking, clothes dryer or washer, torch (including burner and soldering iron), electrical distribution and lighting equipment, medical equipment, and electronic, office or entertainment equipment (from equipment involved in ignition); smoking materials, candles, lightning, and spontaneous combustion or chemical reaction (from heat source), and mobile property involved (from mobile property involved in ignition). The statistics on smoking materials and candles include a proportional share of fires in which the heat source was heat from an unclassified open flame or smoking material. The same fire can be listed under multiple causes, based on multiple data elements. Details on handling of unknown, partial unknowns, and other underspecified codes may be found in the Appendix.

These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths are rounded to the nearest ten, injuries are rounded to the nearest one, and direct property damage is rounded to the nearest million dollars. Property damage has not been adjusted for inflation.

Source: NFIRS and NFPA survey.

Table 7.
Structure Fires in Non-Residential Properties, by Equipment Involved in Ignition
2003-2006 Annual Averages

| Equipment Involved in Ignition | Fires | | Civilian | | Civilian | | Direct Property | |
|--|----------------|---------------|------------|---------------|--------------|-------------------------|-----------------|---------------|
| | | | Deaths | Injuries | Injuries | Damage (in Millions) | | |
| No equipment involved | 29,000 | (27%) | 20 | (18%) | 260 | (18%) | \$716 | (30%) |
| Contained trash or rubbish fire | 21,600 | (20%) | 0 | (0%) | 30 | (2%) | \$2 | (0%) |
| Confined cooking fire | 14,700 | (13%) | 0 | (0%) | 90 | (6%) | \$5 | (0%) |
| Wiring switch or outlet | 3,500 | (3%) | 0 | (0%) | 20 | (2%) | \$128 | (5%) |
| Clothes dryer | 3,200 | (3%) | 0 | (1%) | 90 | (6%) | \$30 | (1%) |
| Lamp, bulb, or lighting | 2,800 | (3%) | 0 | (1%) | 30 | (2%) | \$59 | (2%) |
| Fixed or portable space heater | 3,300 | (3%) | 10 | (11%) | 100 | (7%) | \$167 | (7%) |
| Confined fuel burner or boiler fire | 2,700 | (2%) | 0 | (1%) | 10 | (1%) | \$3 | (0%) |
| Torch | 2,400 | (2%) | 10 | (10%) | 80 | (6%) | \$78 | (3%) |
| Fan | 1,900 | (2%) | 0 | (0%) | 40 | (3%) | \$49 | (2%) |
| Unclassified equipment involved in ignition | 1,800 | (2%) | 0 | (1%) | 30 | (2%) | \$292 | (12%) |
| Confined chimney or flue fire | 1,300 | (1%) | 0 | (0%) | 10 | (1%) | \$2 | (0%) |
| Range with or without oven, cooking surface | 1,200 | (1%) | 0 | (3%) | 30 | (2%) | \$42 | (2%) |
| Water heater | 900 | (1%) | 0 | (0%) | 30 | (2%) | \$26 | (1%) |
| Deep fryer | 900 | (1%) | 0 | (0%) | 20 | (2%) | \$41 | (2%) |
| Air conditioner | 900 | (1%) | 0 | (0%) | 20 | (2%) | \$16 | (1%) |
| Power switch gear or overcurrent protection device | 800 | (1%) | 0 | (0%) | 30 | (2%) | \$37 | (2%) |
| Confined commercial compactor fire | 700 | (1%) | 0 | (0%) | 0 | (0%) | \$1 | (0%) |
| Central heat, furnace or boiler | 700 | (1%) | 0 | (0%) | 10 | (1%) | \$50 | (2%) |
| Cord or plug | 600 | (1%) | 0 | (2%) | 10 | (1%) | \$27 | (1%) |
| Portable cooking or warming equipment | 600 | (1%) | 0 | (0%) | 20 | (1%) | \$20 | (1%) |
| Lawn mower | 600 | (1%) | 0 | (1%) | 10 | (1%) | \$20 | (1%) |
| Refrigerator, refrigerator or freezer | 600 | (1%) | 0 | (0%) | 10 | (1%) | \$56 | (2%) |
| Other known equipment | 12,300 | (11%) | 50 | (53%) | 410 | (29%) | \$545 | (23%) |
| Other confined fire | 400 | (0%) | 0 | (0%) | 0 | (0%) | \$1 | (0%) |
| Total | 109,300 | (100%) | 100 | (100%) | 1,410 | (100%) | \$2,412 | (100%) |

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries are rounded to the nearest ten, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Totals may not equal sums due to rounding errors. Source: NFIRS and NFPA survey.

Table 8.
Structure Fires in Non-Residential Properties, by Heat Source
2003-2006 Annual Averages

| Heat Source | Fires | | Civilian | | Civilian | | Direct Property | |
|--|----------------|---------------|------------|---------------|--------------|-------------------------|-----------------|---------------|
| | | | Deaths | Injuries | Injuries | Damage (in Millions) | | |
| Contained trash or rubbish fire | 21,600 | (20%) | 0 | (0%) | 30 | (2%) | \$2 | (0%) |
| Confined cooking fire | 14,700 | (13%) | 0 | (0%) | 90 | (6%) | \$5 | (0%) |
| Arcing | 9,300 | (8%) | 10 | (5%) | 160 | (12%) | \$345 | (14%) |
| Unclassified heat from powered equipment | 8,800 | (8%) | 0 | (3%) | 160 | (11%) | \$335 | (14%) |
| Radiated, conducted heat from operating equipment | 7,400 | (7%) | 10 | (8%) | 150 | (11%) | \$288 | (12%) |
| Spark, ember or flame from operating equipment | 5,700 | (5%) | 10 | (14%) | 210 | (15%) | \$303 | (13%) |
| Unclassified heat source | 5,600 | (5%) | 10 | (5%) | 70 | (5%) | \$171 | (7%) |
| Unclassified hot or smoldering object | 4,500 | (4%) | 0 | (3%) | 30 | (2%) | \$112 | (5%) |
| Hot ember or ash | 4,500 | (4%) | 0 | (3%) | 40 | (3%) | \$83 | (3%) |
| Smoking materials | 3,200 | (3%) | 10 | (8%) | 60 | (4%) | \$46 | (2%) |
| Confined fuel burner or boiler fire | 2,700 | (2%) | 0 | (1%) | 10 | (1%) | \$3 | (0%) |
| Match | 2,600 | (2%) | 0 | (1%) | 30 | (2%) | \$99 | (4%) |
| Lighter | 2,500 | (2%) | 30 | (33%) | 100 | (7%) | \$83 | (3%) |
| Lightning | 1,600 | (1%) | 0 | (0%) | 0 | (0%) | \$66 | (3%) |
| Flame or torch used for lighting | 1,500 | (1%) | 10 | (7%) | 40 | (3%) | \$39 | (2%) |
| Heat from direct flame or convection currents | 1,500 | (1%) | 0 | (0%) | 0 | (0%) | \$55 | (2%) |
| Confined chimney or flue fire | 1,300 | (1%) | 0 | (0%) | 10 | (1%) | \$2 | (0%) |
| Radiated heat from another fire | 1,300 | (1%) | 0 | (0%) | 0 | (0%) | \$23 | (1%) |
| Molten or hot material | 1,200 | (1%) | 0 | (1%) | 30 | (2%) | \$58 | (2%) |
| Heat or spark from friction | 1,200 | (1%) | 0 | (0%) | 50 | (4%) | \$89 | (4%) |
| Candle | 1,000 | (1%) | 0 | (0%) | 40 | (3%) | \$27 | (1%) |
| Chemical reaction | 1,000 | (1%) | 0 | (2%) | 20 | (1%) | \$40 | (2%) |
| Unclassified heat spread from another fire | 800 | (1%) | 0 | (0%) | 0 | (0%) | \$16 | (1%) |
| Confined commercial compactor fire | 700 | (1%) | 0 | (0%) | 0 | (0%) | \$1 | (0%) |
| Multiple heat sources including multiple ignitions | 600 | (1%) | 0 | (4%) | 10 | (1%) | \$41 | (2%) |
| Other known heat source | 2,300 | (2%) | 0 | (2%) | 40 | (3%) | \$81 | (3%) |
| Other confined fire | 400 | (0%) | 0 | (0%) | 0 | (0%) | \$1 | (0%) |
| Total | 109,300 | (100%) | 100 | (100%) | 1,410 | (100%) | \$2,412 | (100%) |

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries are rounded to the nearest ten, and direct property damage is rounded to the nearest million dollars. Property damage has not been adjusted for inflation. Non-confined and non-contained structure fires in which the heat source was unknown or not reported have been allocated proportionally among fires with known heat source. Totals may not equal sums due to rounding errors.

Source: NFIRS and NFPA survey.

Table 9.
Structure Fires in Non-Residential Properties, by Area of Origin
2003-2006 Annual Averages

| Area of Origin | Fires | | Civilian | | Civilian | | Direct Property | |
|--|--------|-------|----------|----------|----------|-------------------------|-----------------|------|
| | | | Deaths | Injuries | Injuries | Damage (in Millions) | | |
| Contained trash or rubbish fire | 21,600 | (20%) | 0 | (0%) | 30 | (2%) | \$2 | (0%) |
| Confined cooking fire | 14,700 | (13%) | 0 | (0%) | 90 | (6%) | \$5 | (0%) |
| Unclassified storage area | 5,100 | (5%) | 10 | (7%) | 60 | (4%) | \$197 | (8%) |
| Garage or vehicle storage area | 4,900 | (4%) | 10 | (14%) | 120 | (9%) | \$115 | (5%) |
| Exterior wall surface | 3,600 | (3%) | 0 | (1%) | 20 | (1%) | \$49 | (2%) |
| Kitchen or cooking area | 3,300 | (3%) | 10 | (6%) | 90 | (6%) | \$118 | (5%) |
| Unclassified outside area | 3,000 | (3%) | 0 | (1%) | 20 | (1%) | \$46 | (2%) |
| Storage of supplies or tools or dead storage | 2,800 | (3%) | 0 | (4%) | 30 | (2%) | \$88 | (4%) |
| Unclassified area | 2,700 | (2%) | 0 | (3%) | 20 | (1%) | \$53 | (2%) |
| Confined fuel burner or boiler fire | 2,700 | (2%) | 0 | (1%) | 10 | (1%) | \$3 | (0%) |
| Exterior roof surface | 2,500 | (2%) | 0 | (0%) | 10 | (1%) | \$43 | (2%) |
| Lavatory, bathroom, locker room or check room | 2,300 | (2%) | 0 | (0%) | 40 | (3%) | \$20 | (1%) |
| Unclassified equipment or service area | 2,200 | (2%) | 0 | (3%) | 50 | (4%) | \$109 | (5%) |
| Unclassified structural area | 2,200 | (2%) | 0 | (2%) | 20 | (1%) | \$147 | (6%) |
| Wall assembly or concealed space | 2,000 | (2%) | 0 | (0%) | 20 | (1%) | \$48 | (2%) |
| Storage room, area, tank, or bin | 2,000 | (2%) | 0 | (2%) | 30 | (2%) | \$72 | (3%) |
| Processing or manufacturing area, or workroom | 1,900 | (2%) | 0 | (3%) | 110 | (8%) | \$171 | (7%) |
| Laundry room or area | 1,600 | (1%) | 0 | (0%) | 50 | (4%) | \$16 | (1%) |
| Office | 1,500 | (1%) | 0 | (0%) | 10 | (1%) | \$113 | (5%) |
| Confined chimney or flue fire | 1,300 | (1%) | 0 | (0%) | 10 | (1%) | \$2 | (0%) |
| Unclassified function area | 1,300 | (1%) | 0 | (1%) | 20 | (2%) | \$49 | (2%) |
| Attic or ceiling or roof assembly or concealed space | 1,200 | (1%) | 0 | (0%) | 10 | (1%) | \$96 | (4%) |
| Maintenance or paint shop or area | 1,200 | (1%) | 10 | (5%) | 60 | (4%) | \$83 | (3%) |
| Ceiling or floor assembly or concealed space | 1,200 | (1%) | 0 | (0%) | 10 | (1%) | \$40 | (2%) |
| Machinery room or area or elevator machinery room | 1,100 | (1%) | 0 | (1%) | 30 | (2%) | \$72 | (3%) |
| Lawn, field or open area | 1,100 | (1%) | 0 | (1%) | 10 | (0%) | \$10 | (0%) |
| Heating equipment room | 1,000 | (1%) | 0 | (0%) | 20 | (1%) | \$32 | (1%) |
| Duct for HVAC, cable, exhaust, heating, or AC | 900 | (1%) | 0 | (0%) | 20 | (1%) | \$12 | (0%) |
| Vacant structural area | 900 | (1%) | 0 | (2%) | 0 | (0%) | \$10 | (0%) |
| Sales or showroom area | 800 | (1%) | 0 | (1%) | 10 | (1%) | \$41 | (2%) |
| Bedroom | 800 | (1%) | 30 | (25%) | 100 | (7%) | \$9 | (0%) |
| Confined commercial compactor fire | 700 | (1%) | 0 | (0%) | 0 | (0%) | \$1 | (0%) |
| Switchgear area or transformer vault | 700 | (1%) | 0 | (0%) | 20 | (1%) | \$19 | (1%) |
| Lobby or entrance way | 700 | (1%) | 0 | (1%) | 10 | (0%) | \$17 | (1%) |
| Crawl space or substructure space | 600 | (1%) | 0 | (0%) | 10 | (1%) | \$35 | (1%) |
| Engine area, running gear or wheel area vehicle | 600 | (1%) | 0 | (1%) | 10 | (1%) | \$14 | (1%) |
| Small assembly area, less than 100 person capacity | 600 | (1%) | 0 | (0%) | 10 | (1%) | \$22 | (1%) |

Table 9.
Structure Fires in Non-Residential Properties, by Area of Origin
2003-2006 Annual Averages
(Continued)

| Area of Origin | Fires | | Civilian Deaths | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|-------------------------------|----------------|---------------|-----------------|---------------|-------------------|---------------|--------------------------------------|---------------|
| Unclassified service facility | 600 | (1%) | 0 | (0%) | 20 | (1%) | \$22 | (1%) |
| Other known area | 9,400 | (9%) | 20 | (16%) | 190 | (13%) | \$409 | (17%) |
| Other confined fire | 400 | (0%) | 0 | (0%) | 0 | (0%) | \$1 | (0%) |
| Total | 109,300 | (100%) | 100 | (100%) | 1,410 | (100%) | \$2,412 | (100%) |

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries are rounded to the nearest ten, and direct property damage is rounded to the nearest million dollars. Property damage has not been adjusted for inflation. Non-confined and non-contained structure fires in which the heat source was unknown or not reported have been allocated proportionally among fires with known heat source. Totals may not equal sums due to rounding errors.

Source: NFIRS and NFPA survey.

Table 10.
Structure Fires in Non-Residential Properties, by Item First Ignited
2003-2006 Annual Averages

| Item First Ignited | Fires | | Civilian | | Civilian | | Direct Property | |
|--|----------------|---------------|------------|---------------|--------------|---------------|-----------------|--------------|
| | | | Deaths | Injuries | Damage | (in Millions) | | |
| Contained trash or rubbish fire | 21,600 | (20%) | 0 | (0%) | 30 | (2%) | \$2 | (0%) |
| Confined cooking fire | 14,700 | (13%) | 0 | (0%) | 90 | (6%) | \$5 | (0%) |
| Electrical wire or cable insulation | 6,200 | (6%) | 0 | (2%) | 90 | (7%) | \$176 | (7%) |
| Structural member or framing | 5,900 | (5%) | 0 | (1%) | 40 | (3%) | \$314 | (13%) |
| Exterior wall covering or finish | 5,600 | (5%) | 0 | (0%) | 20 | (2%) | \$84 | (3%) |
| Unclassified item first ignited | 5,500 | (5%) | 0 | (2%) | 80 | (5%) | \$172 | (7%) |
| Flammable or combustible liquid or gas, filter or piping | 5,000 | (5%) | 30 | (27%) | 370 | (26%) | \$272 | (3%) |
| Rubbish, trash, or waste | 2,900 | (3%) | 0 | (2%) | 20 | (1%) | \$62 | (0%) |
| Confined fuel burner or boiler fire | 2,700 | (2%) | 0 | (1%) | 10 | (1%) | \$3 | (3%) |
| Exterior roof covering or finish | 2,700 | (2%) | 0 | (0%) | 10 | (1%) | \$66 | (4%) |
| Unclassified structural component or finish | 2,400 | (2%) | 0 | (2%) | 10 | (1%) | \$106 | (1%) |
| Light vegetation including grass | 2,200 | (2%) | 0 | (0%) | 10 | (1%) | \$25 | (2%) |
| Dust, fiber, lint, including sawdust or excelsior | 2,100 | (2%) | 0 | (0%) | 60 | (4%) | \$56 | (4%) |
| Interior wall covering, excluding drapes | 1,700 | (2%) | 0 | (0%) | 10 | (1%) | \$100 | (5%) |
| Multiple items first ignited | 1,700 | (2%) | 0 | (4%) | 30 | (2%) | \$110 | (2%) |
| Cooking materials, including food | 1,600 | (1%) | 0 | (1%) | 50 | (3%) | \$54 | (3%) |
| Box, carton, bag, basket, barrel | 1,500 | (1%) | 0 | (0%) | 30 | (2%) | \$83 | (3%) |
| Insulation within structural area | 1,500 | (1%) | 0 | (0%) | 20 | (2%) | \$63 | (1%) |
| Unclassified organic materials | 1,400 | (1%) | 0 | (0%) | 10 | (1%) | \$34 | (1%) |
| Magazine, newspaper, writing paper | 1,400 | (1%) | 0 | (0%) | 20 | (1%) | \$25 | (2%) |
| Agricultural crop, including fruits and vegetables | 1,400 | (1%) | 0 | (2%) | 10 | (1%) | \$44 | (0%) |
| Confined chimney or flue fire | 1,300 | (1%) | 0 | (0%) | 10 | (1%) | \$2 | (3%) |
| Interior ceiling cover or finish | 1,000 | (1%) | 0 | (1%) | 10 | (1%) | \$54 | (3%) |
| Clothing | 1,000 | (1%) | 10 | (6%) | 60 | (4%) | \$22 | (2%) |
| Linen, other than bedding | 900 | (1%) | 0 | (0%) | 20 | (2%) | \$20 | (1%) |
| Mattress and bedding material | 800 | (1%) | 30 | (26%) | 60 | (4%) | \$16 | (1%) |
| Unclassified storage supplies | 800 | (1%) | 0 | (1%) | 10 | (1%) | \$39 | (2%) |
| Appliance housing or casing | 800 | (1%) | 0 | (0%) | 10 | (1%) | \$13 | (1%) |
| Upholstered furniture or vehicle seat | 700 | (1%) | 10 | (5%) | 20 | (1%) | \$27 | (1%) |
| Confined commercial compactor fire | 700 | (1%) | 0 | (0%) | 0 | (0%) | \$1 | (1%) |
| Exterior trim, including doors | 700 | (1%) | 0 | (1%) | 0 | (0%) | \$18 | (0%) |
| Unclassified soft goods, or wearing apparel | 600 | (1%) | 0 | (2%) | 10 | (1%) | \$8 | (1%) |
| Rolled or wound material | 600 | (1%) | 0 | (0%) | 10 | (1%) | \$26 | (0%) |
| Floor covering rug, carpet, or mat | 600 | (1%) | 0 | (1%) | 10 | (1%) | \$18 | (1%) |
| Unclassified furniture, utensils | 600 | (1%) | 0 | (2%) | 10 | (1%) | \$26 | (1%) |
| Other known item | 6,000 | (5%) | 10 | (10%) | 110 | (8%) | \$267 | (11%) |
| Other confined fire | 400 | (0%) | 0 | (0%) | 0 | (0%) | \$1 | (0%) |
| Total | 109,300 | (100%) | 100 | (100%) | 1,410 | (100%) | \$2,412 | (94%) |

Table 10.
Structure Fires in Non-Residential Properties, by Item First Ignited
2003-2006 Annual Averages
(Continued)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries are rounded to the nearest ten and direct property damage is rounded to the nearest million dollars. Property damage has not been adjusted for inflation. Non-confined and non-contained structure fires in which the heat source was unknown or not reported have been allocated proportionally among fires with known heat source. Totals may not equal sums due to rounding errors.

Source: NFIRS and NFPA survey.

Table 11.
Structure Fires in Non-Residential Properties, by Extent of Flame Damage
2003-2006 Annual Averages

| Extent of Flame Damage | Fires | | Civilian Deaths | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|--------------------------------|----------------|---------------|------------------------|---------------|--------------------------|---------------|---|---------------|
| Confined or contained fire | 41,300 | (38%) | 0 | (1%) | 150 | (11%) | \$14 | (1%) |
| Confined to object of origin | 26,000 | (24%) | 20 | (16%) | 390 | (28%) | \$233 | (10%) |
| Confined to room of origin | 11,500 | (11%) | 10 | (11%) | 370 | (26%) | \$208 | (9%) |
| Confined to floor of origin | 2,600 | (2%) | 10 | (6%) | 60 | (4%) | \$116 | (5%) |
| Confined to building of origin | 21,400 | (20%) | 50 | (50%) | 330 | (23%) | \$1,437 | (60%) |
| Beyond building of origin | 6,500 | (6%) | 20 | (15%) | 110 | (8%) | \$404 | (17%) |
| Total | 109,300 | (100%) | 100 | (100%) | 1,410 | (100%) | \$2,412 | (100%) |

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries are rounded to the nearest ten, and direct property damage is rounded to the nearest million dollars. Property damage has not been adjusted for inflation. Non-confined and non-contained structure fires in which the heat source was unknown or not reported have been allocated proportionally among fires with known heat source. Totals may not equal sums due to rounding errors.

Source: NFIRS and NFPA survey.

Appendix A.

How National Estimates Statistics Are Calculated

The statistics in this analysis are estimates derived from the U.S. Fire Administration's (USFA's) National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association's (NFPA's) annual survey of U.S. fire departments. NFIRS is a voluntary system by which participating fire departments report detailed factors about the fires to which they respond. Roughly two-thirds of U.S. fire departments participate, although not all of these departments provide data every year.

NFIRS provides the most detailed incident information of any national database not limited to large fires. NFIRS is the only database capable of addressing national patterns for fires of all sizes by specific property use and specific fire cause. NFIRS also captures information on the extent of flame spread, and automatic detection and suppression equipment. For more information about NFIRS visit <http://www.nfirs.fema.gov/>. Copies of the paper forms may be downloaded from <http://www.nfirs.fema.gov/download/nfirpaperforms2007.pdf>.

Each year, NFPA conducts an annual survey of fire departments which enables us to capture a summary of fire department experience on a larger scale. Surveys are sent to all municipal departments protecting populations of 50,000 or more and a random sample, stratified by community size, of the smaller departments. Typically, a total of roughly 3,000 surveys are returned, representing about one of every ten U.S. municipal fire departments and about one third of the U.S. population.

The survey is stratified by size of population protected to reduce the uncertainty of the final estimate. Small rural communities have fewer people protected per department and are less likely to respond to the survey. A larger number must be surveyed to obtain an adequate sample of those departments. (NFPA also makes follow-up calls to a sample of the smaller fire departments that do not respond, to confirm that those that did respond are truly representative of fire departments their size.) On the other hand, large city departments are so few in number and protect such a large proportion of the total U.S. population that it makes sense to survey all of them. Most respond, resulting in excellent precision for their part of the final estimate.

The survey includes the following information: (1) the total number of fire incidents, civilian deaths, and civilian injuries, and the total estimated property damage (in dollars), for each of the major property use classes defined in NFIRS; (2) the number of on-duty firefighter injuries, by type of duty and nature of illness; and (3) information on the type of community protected (e.g., county versus township versus city) and the size of the population protected, which is used in the statistical formula for projecting national totals from sample results. The results of the survey are published in the annual report *Fire Loss in the United States*. To download a free copy of the report, visit <http://www.nfpa.org/assets/files/PDF/OS.fireloss.pdf>.

Projecting NFIRS to National Estimates

As noted, NFIRS is a voluntary system. Different states and jurisdictions have different reporting requirements and practices. Participation rates in NFIRS are not necessarily uniform across regions and community sizes, both factors correlated with frequency and

severity of fires. This means NFIRS may be susceptible to systematic biases. No one at present can quantify the size of these deviations from the ideal, representative sample, so no one can say with confidence that they are or are not serious problems. But there is enough reason for concern so that a second database - the NFPA survey - is needed to project NFIRS to national estimates and to project different parts of NFIRS separately. This multiple calibration approach makes use of the annual NFPA survey where its statistical design advantages are strongest.

Scaling ratios are obtained by comparing NFPA's projected totals of residential structure fires, non-residential structure fires, vehicle fires, and outside and other fires, and associated civilian deaths, civilian injuries, and direct property damage with comparable totals in NFIRS. Estimates of specific fire problems and circumstances are obtained by multiplying the NFIRS data by the scaling ratios.

Analysts at the NFPA, the USFA and the Consumer Product Safety Commission have developed the specific analytical rules used for this procedure. "The National Estimates Approach to U.S. Fire Statistics," by John R. Hall, Jr. and Beatrice Harwood, provides a more detailed explanation of national estimates. A copy of the article is available online at <http://www.nfpa.org/osds> or through NFPA's One-Stop Data Shop.

Version 5.0 of NFIRS, first introduced in 1999, used a different coding structure for many data elements, added some property use codes, and dropped others.

Figure 1.

Fires Originally Collected in NFIRS 5.0 by Year

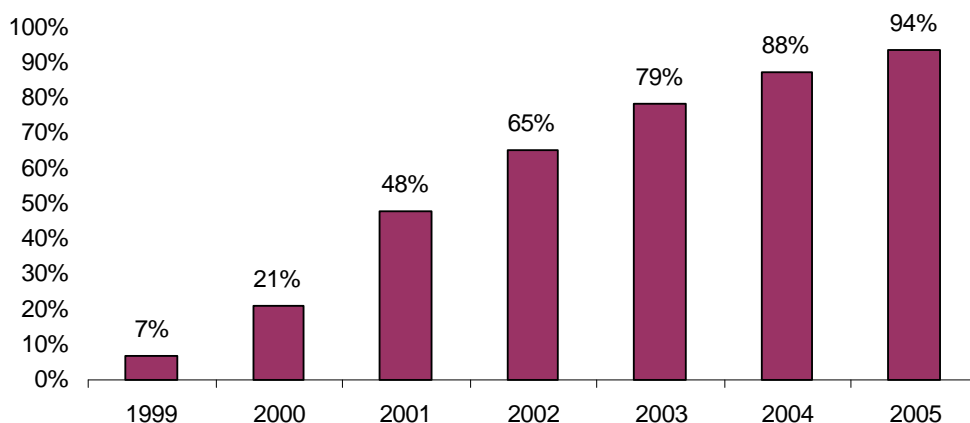


Figure 1 shows the percentage of fires originally collected in the NFIRS 5.0 system. Each year's release version of NFIRS data also includes data collected in older versions of NFIRS that were converted to NFIRS 5.0 codes.

For 2002 data on, analyses are based on scaling ratios using only data originally collected in NFIRS 5.0:

$$\frac{\text{NFPA survey projections}}{\text{NFIRS totals (Version 5.0)}}$$

For 1999 to 2001, the same rules may be applied, but estimates for these years in this form will be less reliable due to the smaller amount of data originally collected in NFIRS 5.0; they should be viewed with extreme caution.

A second option is to omit year estimates for 1999-2001 from year tables.

NFIRS 5.0 has six categories of confined structure fires, including:

- cooking fires confined to the cooking vessel,
- confined chimney or flue fires,
- confined incinerator fire,
- confined fuel burner or boiler fire or delayed ignition,
- confined commercial compactor fire, and
- trash or rubbish fires in a structure with no flame damage to the structure or its contents.

Although causal and other detailed information is typically not required for these incidents, it is provided in some cases. In order for that limited detail to be used to characterize the confined fires, they must be analyzed separately from non-confined fires. Otherwise, the patterns in a factor for the more numerous non-confined fires with factor known will dominate the allocation of the unknown factor fires for both non-confined and confined fires. If the pattern is different for confined fires, which is often the case, that fact will be lost unless analysis is done separately.

For most fields other than Property Use, NFPA allocates unknown data proportionally among known data. This approach assumes that if the missing data were known, it would be distributed in the same manner as the known data. NFPA makes additional adjustments to several fields.

For Factor Contributing to Ignition, the code “none” is treated as an unknown and allocated proportionally. For Human Factor Contributing to Ignition, NFPA enters a code for “not reported” when no factors are recorded. “Not reported” is treated as an unknown, but the code “none” is treated as a known code and not allocated. Multiple entries are allowed in both of these fields. Percentages are calculated on the total number of fires, not entries, resulting in sums greater than 100%. Groupings for this field show all category headings and specific factors if they account for a rounded value of at least 1%.

Type of Material First Ignited (TMI). This field is required only if the Item First Ignited falls within the code range of 00-69. NFPA has created a new code “not required” for this field that is applied when Item First Ignited is in code 70-99 (organic materials, including cooking materials and vegetation, and general materials, such as electrical wire, cable insulation, transformers, tires, books, newspaper, dust, rubbish, etc..) and TMI is blank. The ratio for allocation of unknown data is:

$$\frac{(\text{All fires} - \text{TMI Not required})}{(\text{All fires} - \text{TMI Not Required} - \text{Undetermined} - \text{Blank})}$$

Heat Source. In NFIRS 5.0, one grouping of codes encompasses various types of open flames and smoking materials. In the past, these had been two separate groupings. A new code was added to NFIRS 5.0, which is code 60: “Heat from open flame or smoking material, other.” NFPA treats this code as a partial unknown and allocates it proportionally across the codes in the 61-69 range.

- 61. Cigarette,
- 62. Pipe or cigar,
- 63. Heat from undetermined smoking material,
- 64. Match,
- 65. Lighter: cigarette lighter, cigar lighter,
- 66. Candle,
- 67 Warning or road flare, fusee,
- 68. Backfire from internal combustion engine. Excludes flames and sparks from an exhaust system, (11)
- 69. Flame/torch used for lighting. Includes gas light and gas-/liquid-fueled lantern.

In addition to the conventional allocation of missing and undetermined fires, NFPA multiplies fires with codes in the 61-69 range by

$$\frac{\text{All fires in range 60-69}}{\text{All fires in range 61-69}}$$

The downside of this approach is that heat sources that are truly a different type of open flame or smoking material are erroneously assigned to other categories. The grouping “smoking materials” includes codes 61-63 (cigarettes, pipes or cigars, and heat from undetermined smoking material, with a proportional share of the code 60s and true unknown data.

Equipment Involved in Ignition (EII). NFIRS 5.0 originally defined EII as the piece of equipment that provided the principal heat source to cause ignition if the equipment malfunctioned or was used improperly. In 2006, the definition was modified to “the piece of equipment that provided the principal heat source to cause ignition.” However, the 2006 data is not yet available and a large portion of the fires coded as no equipment involved (NNN) have heat sources in the operating equipment category. To compensate, NFPA treats fires in which EII = NNN and heat source is not in the range of 40-99 as an additional unknown.

To allocate unknown data for EII, the known data is multiplied by

$$\frac{\text{All fires}}{(\text{All fires} - \text{blank} - \text{undetermined} - [\text{fires in which EII} = \text{NNN and heat source} < 40-99])}$$

Additional allocations may be used in specific analyses. For example, NFPA’s report about home heating fires treats Equipment Involved in Ignition Code 120, fireplace, chimney, other” as a partial unknown (like Heat Source 60) and allocates it over its related decade of 121-127, which includes codes for fireplaces (121-122) and chimneys (126-127) but also includes codes for fireplace insert or stove, heating stove, and chimney or vent connector. More general analyses of specific occupancies may not perform as many allocations of partial allocations. Notes at the end of each table describe what was allocated.

Rounding and percentages. The data shown are estimates and generally rounded. An entry of zero may be a true zero or it may mean that the value rounds to zero. Percentages are calculated from unrounded values. It is quite possible to have a percentage entry of up to 100%, even if the rounded number entry is zero. Values that appear identical may be associated with different percentages, and identical percentages may be associated with slightly different values.

Appendix B.

Methodology and Definitions Used in “Leading Cause” Tables

The cause table reflects relevant causal factors that accounted for at least 2% of the fires in a given occupancy. Only those causes that seemed to describe a scenario are included. Because the causal factors are taken from different fields, some double counting is possible. Percentages are calculated against the total number of structure fires, including both confined and non-confined fires. Bear in mind that every fire has at least three “causes” in the sense that it could have been prevented by changing behavior, heat source, or ignitability of first fuel, the last an aspect not reflected in any of the major cause categories. For example, several of the cause categories in this system refer to types of equipment (cooking, heating, electrical distribution and lighting, clothes dryers and washers, torches). However, the problem may be not with the equipment but with the way it is used. The details in national estimates are derived from the U.S. Fire Administration’s National Fire Incident Reporting System (NFIRS). This methodology is based on the coding system used in Version 5.0 of NFIRS. The *NFIRS 5.0 Reference Guide*, containing all of the codes, can be downloaded from <http://www.nfirs.fema.gov/documentation/reference/>.

Cooking equipment and heating equipment are calculated by summing fires identified by equipment involved in ignition and relevant confined fires. Confined fires will be shown if they account for at least 1% of the incidents. **Confined cooking fires** (cooking fires involving the contents of a cooking vessel without fire extension beyond the vessel) are identified by NFIRS incident type 113;

Confined heating equipment fires include **confined chimney or flue fires** (incident type 114) and **confined fuel burner or boiler** fires (incident type 116). The latter includes delayed ignitions and incidents where flames caused no damage outside the fire box. The two types of confined heating fires may be combined or listed separately, depending on the numbers involved.

Contained trash or rubbish fires with no flame damage to structure or its contents are identified by incident type 118. No cause can be ascertained for these incidents, but they account for a substantial share of the incidents in some occupancies. When appropriate, these fires are generally shown at the bottom of a cause table.

Confined or contained fires (incident type 113-118) are excluded from the remaining estimates. Unknown data is allocated proportionally among non-confined fires.

Intentional fires are identified by fires with a “1” (intentional) in the field “cause.” The estimate includes a proportional share of fires in which the cause was undetermined after investigation, under investigation, or not reported. All fires with intentional causes are included in this category regardless of the age of the person involved. Earlier versions of NFIRS included codes for incendiary and suspicious; both convert to intentional. Intentional fires were deliberately set; they may or may not be incendiary in a legal sense. No age restriction is applied.

Fires caused by **playing with heat source** (typically matches or lighters) are identified by code 19 in the field “factor contributing to ignition.” Because of conversion issues, only data originally collected in Version 5.0 of NFIRS is used in the initial calculation. It appears that “none” is often being used in place of “unknown.” Fires in which the factor contribution to ignition was undetermined (UU), entered as none (NN) or left blank are considered unknown and

allocated proportionally. Because factor contributing to ignition is not required for intentional fires, the share unknown, by these definitions, is somewhat larger than it should be. After the Version 5.0 only data has been run for non-confined fires and the unknown data allocated, percentages are calculated for each code of Version 5.0 non-confined fires. Total non-confined structure fires (all versions) are multiplied by these percentages to obtain national estimates. The final percentage of fires is calculated by dividing these estimates by the total number of confined and non-confined fires from all versions.

The heat source field is used to identify fires started by: **smoking materials** (cigarette, code 61; pipe or cigar, code 62; and heat from undetermined smoking material, code 63); **candles** (code 66), **lightning** (code 73); and **spontaneous combustion or chemical reaction** (code 72). Fires started by heat from unclassified open flame or smoking materials (code 60) are allocated proportionally among the “other open flame or smoking material” codes (codes 61-69) in an allocation of partial unknown data. This includes smoking materials and candles. This approach results in any true unclassified smoking or open flame heat sources such as incense being inappropriately allocated. However, in many fires, this code was used as an unknown.

The equipment involved in ignition field is used to find several cause categories. This category includes equipment that functioned properly and equipment that malfunctioned.

Identified cooking equipment refers to equipment used to cook, heat or warm food (codes 600, 620-649 and 654). Fire in which ranges, ovens or microwave ovens, food warming appliances, fixed or portable cooking appliances, deep fat fryers, open fired charcoal or gas grills, grease hoods or ducts, or other cooking appliances) were involved in the ignition are said to be caused by cooking equipment. Food preparation devices that do not involve heating, such as can openers or food processors, are not included here. Unclassified kitchen and cooking equipment (code 600) is included here because a larger share of the whole category involved cooking rather than kitchen equipment.

Identified heating equipment (codes 100 and 120-199) includes central heat, portable and fixed heaters (including wood stoves), fireplaces, chimneys, hot water heaters, and heat transfer equipment such as hot air ducts or hot water pipes. Heat pumps are not included. Unclassified heating, ventilation and air condition equipment (code 100) is included here because a larger share of the whole category involved heating rather than air conditioning or ventilation equipment.

Electrical distribution and lighting equipment (codes 200-299) include: fixed wiring; transformers; associated overcurrent or disconnect equipment such as fuses or circuit breakers; meters; meter boxes; power switch gear; switches, receptacles and outlets; light fixtures, lamps, bulbs or lighting; signs; cords and plugs; generators, transformers, inverters, batteries and battery charges.

Torch, burner or soldering iron (codes 331-334) includes welding torches, cutting torches, Bunsen burners, plumber furnaces, blowtorches, and soldering equipment.

Clothes dryer or washer (codes 811, 813 and 814) includes clothes dryers alone, washer and dryer combinations within one frame, and washing machines for clothes.

Electronic, office or entertainment equipment (codes 700-799) includes: computers and related equipment; calculators and adding machines; telephones or answering machines; copiers; fax machines; paper shredders; typewriters; postage meters; other office equipment; musical instruments; stereo systems and/or components; televisions and cable TV converter boxes; cameras, excluding professional television studio cameras, video equipment and other electronic equipment. Older versions of NFIRS had a code for electronic equipment that included radar, X-rays, computers, telephones, and transmitter equipment. Because this code was so broad, it unfortunately converts to equipment involved undetermined.

Shop tools and industrial equipment excluding torches, burners or soldering irons (codes 300-330, 335-399) includes power tools; painting equipment; compressors; atomizing equipment; pumps; wet/dry vacuums; hoists, lifts or cranes; powered jacking equipment; water or gas drilling equipment; unclassified hydraulic equipment; heat-treating equipment; incinerators, industrial furnaces, ovens or kilns; pumps; compressors; internal combustion engines; conveyors; printing presses; casting, molding; or forging equipment; heat treating equipment; tar kettles; working or shaping machines; coating machines; chemical process equipment; waste recovery equipment; power transfer equipment; power takeoff; powered valves; bearings or brakes; picking, carding or weaving machines; testing equipment; gas regulators; separate motors; non-vehicular internal combustion engines; and unclassified shop tools and industrial equipment.

Medical equipment (codes 410-419) includes: dental, medical or other powered bed, chair or wheelchair; dental equipment; dialysis equipment; medical monitoring and imaging equipment; oxygen administration equipment; radiological equipment; medical sterilizers, therapeutic equipment and unclassified medical equipment.

Mobile property (vehicle) describes fires in which some type of mobile property was involved in ignition, regardless of whether the mobile property itself burned. Mobile property includes: highway-type vehicles such as cars, trucks, recreational vehicles, and motorcycles; trains, trolleys and subways; boats and ships; aircraft; industrial, agricultural and construction vehicles; and riding lawn mowers, snow removal vehicles and tractors. Because of conversion issues, only data originally collected in Version 5.0 of NFIRS is used in the initial calculation. The data was obtained by first running Version 5.0 non confined fires only to identify vehicles that were involved in ignition whether or not they burned themselves (mobile property involved codes 2 and 3). After the unknown data was allocated, percentages are calculated for each code of Version 5.0 non-confined fires. Total non-confined structure fires (all versions) are multiplied by these percentages to obtain national estimates. The final percentage of fires is calculated by dividing these estimates by the total number of confined and non-confined fires from all versions.

Exposures are fires that are caused by the spread of or from another fire. These include fires in which the exposure number is greater than 0; the factor contributing to ignition is property too close (code 71); or heat source is heat spreading from another fire via direct flame or convection current (code 80-89). Because exposures are identified by the older hierarchical sort, all non-confined fires with exposure number greater than zero are counted as exposures, but those identified by heat source and factor contributing to ignition include only fires that were not grouped in other categories such as cooking or heating equipment.