# U.S. HOTEL AND MOTEL STRUCTURE FIRES

**Ben Evarts**

**July 2012**

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

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**Abstract**

U.S. fire departments responded to an estimated average of 3,700 structure fires per year at hotel or motel properties between 2006 and 2010. These fires caused average annual losses of 12 civilian deaths, 143 civilian injuries, and $127 million in direct property damage each year. Nearly half (45%) of these fires involved cooking equipment, 10% were caused by smoking materials, 9% were caused by heating equipment, and clothes dryers or washers were also involved in 9% of these fires. One hotel fire in 2008 caused $100 million in direct property damage.

These estimates are based on data 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 fire department experience survey.

Keywords: fire statistics, hotel fires, motel fires

**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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Phone: 617-984-7443

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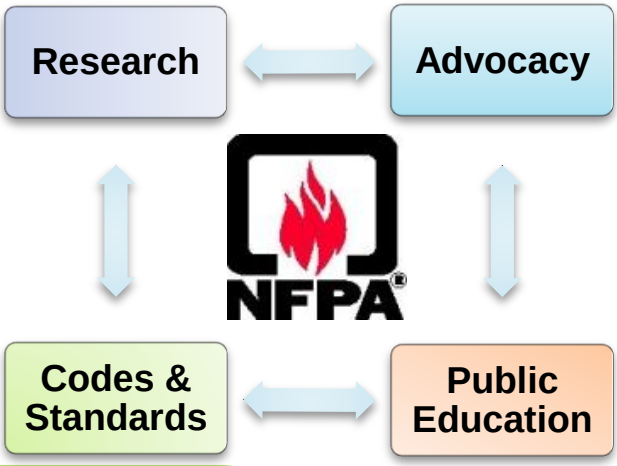
# NFPA Fire Safety Resources

NFPA´s wealth of fire-related research includes historical investigations of technically significant fire incidents, fire data analysis, and the Charles S. Morgan Technical Library, one of the most comprehensive fire literature collections in the world. In addition, NFPA´s Fire Protection Research Foundation is a source of independent fire test data. Find out more at:
www.nfpa.org/research
www.nfpa.org/investigations

Properly installed and maintained smoke alarms are necessary to provide a warning of fire to the occupants. You can find out more information about smoke alarms here: NFPA Smoke Alarm Information

Home fire sprinkler systems provide even greater protection. These systems respond quickly to reduce the heat, flames, and smoke produced by a fire. More information about home fire sprinklers may be found at www.firesprinklerinitiative.org
Simply put, smoke alarms and fire sprinklers save lives.




NFPA develops, publishes, and disseminates nearly 300 consensus codes and standards intended to minimize the probability and effects of fire and other hazards. Safety in hotels and motels begins with:
NFPA 101: Life Safety Code®: www.nfpa.org/101

NFPA 13: Standard for the Installation of Sprinkler Systems: www.nfpa.org/13

NFPA 13R: Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height: www.nfpa.org/13R

For consumers: NFPA provides consumer safety information regarding fire causes, escape planning, fire & safety equipment, and many other topics.

For kids: Sparky.org provides important information for kids delivered via fun games, activities, and cartoons.

For public educators: NFPA offers resources on fire safety education programs, educational messaging, grants & awards, and many other topics.

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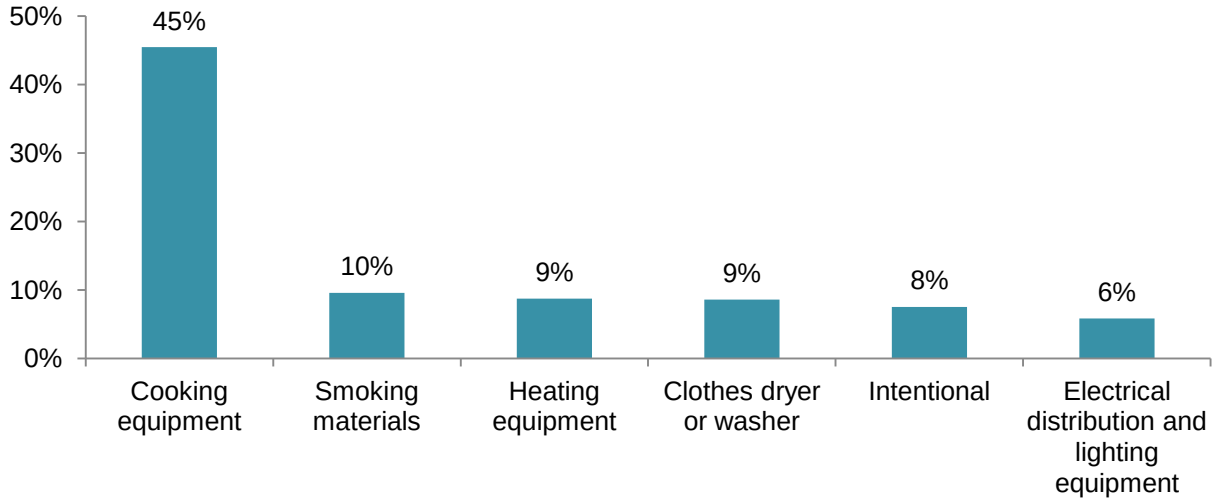
# U.S. Structure Fires in Hotels and Motels Fact Sheet

During 2006-2010, an estimated average of 3,700 structure fires in hotels and motels were reported to U.S. fire departments per year, with associated annual losses of:

- 12 civilian deaths
- 143 civilian injuries
- $127 million in property damage

**Structure Fires in Hotels and Motels**
**By Leading Cause 2006-2010 (Top 6 Shown)**




- Nearly three-quarters (73%) of fires in hotels and motels didn't spread beyond the object of origin.
- Cooking equipment was involved in nearly half (45%) of fires
- Twelve percent of fires in hotels and motels began in a bedroom/guest sleeping room, but these fires were responsible for 31% of civilian injuries and 72% of civilian deaths.
- Smoking materials were the cause of the fire in 79% of civilian deaths

## CODES & STANDARDS USEFUL IN PROTECTING HOTELS AND MOTELS

NFPA 101: Life Safety Code®: www.nfpa.org/101
NFPA 13: Standard for the Installation of Sprinkler Systems: www.nfpa.org/13
NFPA 13R: Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height: www.nfpa.org/13R

**Additional resources can be found at www.nfpa.org**

## Structure Fires in Hotels and Motels

U.S. fire departments responded to an estimated average of 3,700 structure fires per year at hotel or motel properties between 2006 and 2010. These fires had associated annual losses of 12 civilian deaths, 143 civilian injuries, and $127 million in direct property damage per year. Much of the property damage was caused by one unusually large fire, which is described below.

**2008 Monte Carlo Hotel Fire**


On January 25, 2008, a fire began on the roof of the Monte Carlo Resort and Casino in Las Vegas, Nevada. The fire spread down the face of the building, causing extensive damage. The photo above was taken several weeks after the fire occurred, and shows the scale of needed repairs. The entire hotel and casino was closed for an extended time. The incident caused an estimated $100 million in property damage. An article in the May/June 2010 issue of NFPA Journal discusses lessons learned from the fire. (Source: NFPA; Quincy, MA)

Hotels and motels include facilities for year-round or seasonal use. Many hotels and motels are mixed-use properties with sleeping rooms, restaurants, stores, banquet facilities, meeting space, etc. Cooking may be done by hotel staff for catered events or by hotel guests with coffee makers, hot plates, or even ranges or microwave ovens in the rooms. Hotel occupants include staff, overnight guests, and event attendees.

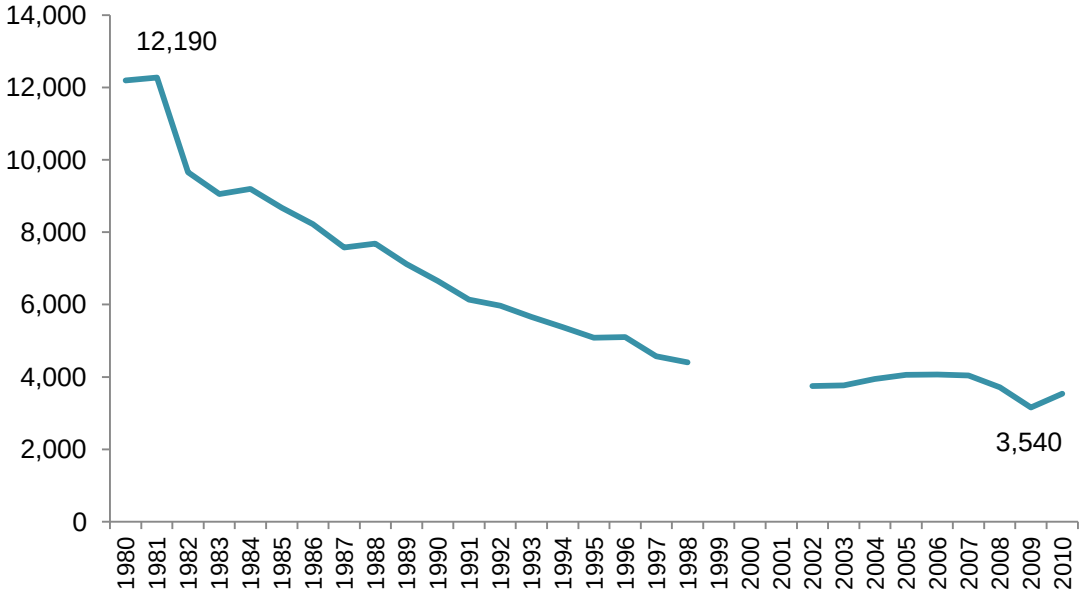
Some properties that call themselves hotels may house long-term residents. Residential hotels that typically serve as primary domiciles are captured under the rooming house category and are not included in this analysis. Some previously published analyses included residential hotels.

The national estimates in this analysis are projections based on fire department assessments of cause, circumstances, and occupancy. These estimates are derived from the U.S. Fire Administration's (USFA's) National Fire Incident Reporting System (NFIRS) and NFPA's annual fire department survey. Only fires reported to public fire departments are included in these statistics. Only data from Version 5.0 of NFIRS were used in the 2006-2010 estimates. Appendix A describes the methodology used.

According to the American Hotel & Lodging Association, there were 49,505 lodging properties with at least 15 guest rooms in 2008. These properties generated over $140 billion in sales[1]. If 49,505 (total number of hotels or motels) is divided by 3,700 (average number of fires per year), the results show that it's possible that 1 of every 13.4 hotels reported a structure fire in a year (assuming there were no repeat calls).

**Structure fires in hotel or motel properties have fallen 71% since 1980.**
In 1980, there were an estimated 12,190 reported structure fires in these properties, compared to 3,540 in 2010. Table 1 and Figure 1 below show the change in fires over time. Estimates for 1999-2001 are unstable due to the change from NFIRS 4.1 to NFIRS 5.0 and are not shown in Figure 1.

**Figure 1.**
**Structure Fires in Hotels and Motels**
**by Year, 1980-2010**

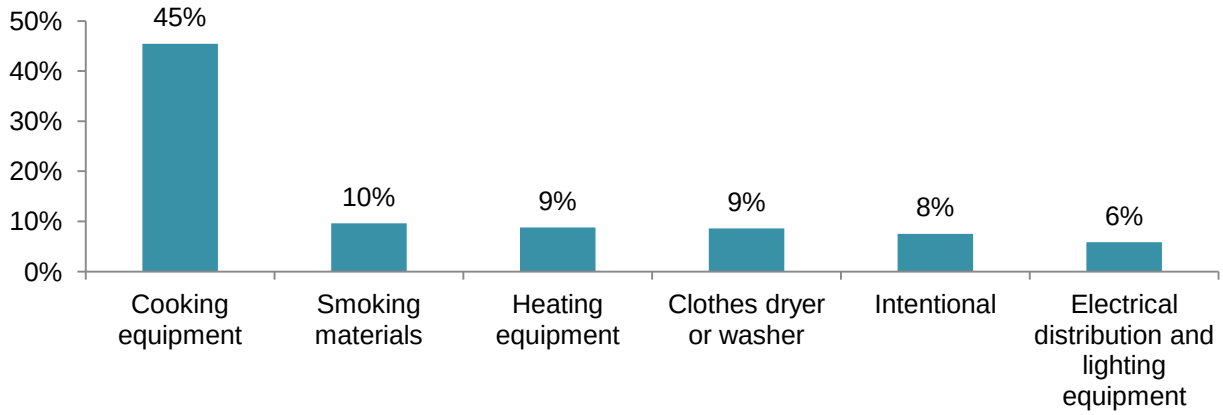



Fires in these properties do not vary significantly by time of year (see Table 2), but they are somewhat more common on weekends (see Table 3). Fires are more common during the evening hours between 6:00 and 9:00 p.m. due to the prevalence of confined cooking fires (see Table 4).

[1] American Hotel & Lodging Association. 2009 Lodging Industry Profile, Washington, DC. Accessed June 13, 2012, < http://www.ahla.com/content.aspx?id=28832>

Cooking equipment was involved in nearly half (45%) of structure fires in hotels and motels, and most of these were fires that were confined to the object of origin (see Figure 2 and Tables 5 and 6). Smoking materials accounted for 10% of the fires, but 79% of deaths. Heating equipment was involved in 9% of fires, and clothes dryers 9% (see Table 5).

**Figure 2.**
**Structure Fires in Hotels and Motels**
**by Leading Cause, 2006-2010 Annual Averages**




Three-quarters of the fires (73%) were "unintentional" in nature, 17% were caused by the failure of equipment or a heat source, and 8% were set intentionally (see Table 7). Abandoned or discarded materials were a factor in 17% of fires and half (49%) of deaths, unattended equipment in 14% of fires, and an electrical failure or malfunction in 12% (see Table 8). Unclassified heat from powered equipment was the heat source in nearly one-quarter (23%) of fires, and radiated or conducted heat from operating equipment was the heat source in 22% (see Table 9).

Not surprisingly, given the prevalence of cooking fires, the kitchen is the leading area of origin (36% of fires) for structure fires in hotels and motels. The 12% percent of fires in these properties that originate in bedrooms are responsible for 72% of deaths. Eight percent of fires begin in a laundry room or area (see Table 10). The leading item first ignited in these fires was cooking materials, including food (31%), followed by rubbish, trash, or waste (7%). Half (50%) of deaths begin with a mattress or bedding (see Table 11). Nearly three-quarters (73%) of hotel or motel fires were confined to the object of origin, and 91% were confined to the room of origin (see Table 12).

According to John Hall's 2012 report, *U.S. Experience with Sprinklers*, fire sprinklers are an effective fire protection technology in hotels:

**Hotels and Motels**[2]

- In 2006-2010, 51% of reported hotel or motel structure fires* indicated some type of sprinkler was present (89% wet pipe, 7% dry pipe, 3% other).

- Wet pipe sprinklers operated in 91% of fires and operated effectively in 89% of fires.**

- Only one or two sprinklers operated in 96% of reported fires where wet pipe sprinklers operated.

- In hotels and motels, deaths per thousand reported fires were 100% lower when wet pipe sprinklers were present, compared to fires with no automatic extinguishing equipment present.

* Excluding buildings under construction.

** Estimates of reliability and effectiveness are based only on fires and installations where the fire should have activated and been controlled by an operational system, therefore excluding buildings under construction, fires with sprinklers not in fire area reported as reason for failure or ineffectiveness, fires reported as too small to activate equipment, and fires reported as confined to cooking vessel, chimney or flue, fuel burner or boiler, commercial compactor, incinerator, or trash.

[2] John R. Hall Jr., *U.S. Experience with Sprinklers*, NFPA Fire Analysis and Research Division, March 2012.

## Many catastrophic fires have occurred in hotels

For much of the 20th century, multiple death fires in hotels were common. Between 1934 and 2006, there were 30 hotel fires with ten or more fatalities in the United States reported to NFPA. The five deadliest are listed below:

1946 - Winecoff Hotel, Atlanta, GA: 119 deaths
1986 - Dupont Plaza Hotel, San Juan, Puerto Rico: 97 deaths
1980 - MGM Grand Hotel, Las Vegas, Nevada: 85 deaths
1946 - LaSalle Hotel, Chicago, Illinois: 61 deaths
1943 - Gulf Motel, Houston, Texas: 54 deaths
Source: NFPA's archive files, *The 1984 Fire Almanac*, and NFPA's Fire Incident Data Organization database.

This image shows the kitchen area of a deli in the MGM Grand Hotel and Casino, the area of origin for a fire that killed 85 people in 1980. NFPA has a full investigation and several *Fire Journal* articles about the incident, which are available on our website at: www.nfpa.org/investigations. (Source: NFPA; Quincy, MA)

**Table 1.**
**Structure Fires in Hotel and Motels, by Year**
**1980-2010**

| Year | Fires | Civilian Deaths | Civilian Injuries | Direct Property Damage(in Millions) (as reported) | Direct Property Damage (in Millions) (in 2010 Dollars) |
|---|---|---|---|---|---|
| 1980 | 12,190 | 62* | 705 | $61 | $162 |
| 1981 | 12,270 | 131 | 682 | $66 | $158 |
| 1982 | 9,660 | 39 | 542 | $40 | $89 |
| 1983 | 9,050 | 70 | 517 | $100 | $218 |
| 1984 | 9,200 | 34 | 523 | $62 | $130 |
| 1985 | 8,670 | 80 | 396 | $70 | $142 |
| 1986 | 8,220 | 57 | 386 | $71 | $140 |
| 1987 | 7,580 | 42 | 362 | $66 | $126 |
| 1988 | 7,680 | 32 | 356 | $82 | $150 |
| 1989 | 7,120 | 24 | 293 | $63 | $110 |
| 1990 | 6,650 | 47 | 472 | $65 | $108 |
| 1991 | 6,140 | 18 | 325 | $69 | $110 |
| 1992 | 5,970 | 26 | 380 | $48 | $74 |
| 1993 | 5,660 | 62 | 418 | $60 | $90 |
| 1994 | 5,380 | 26 | 330 | $56 | $83 |
| 1995 | 5,080 | 33 | 249 | $64 | $92 |
| 1996 | 5,100 | 43 | 324 | $109 | $151 |
| 1997 | 4,570 | 15 | 246 | $69 | $94 |
| 1998 | 4,400 | 24 | 243 | $51 | $69 |
| 1999 | 3,590 | 54 | 380 | $287 | $375 |
| 2000 | 3,540 | 33 | 105 | $78 | $99 |
| 2001 | 3,690 | 6 | 141 | $58 | $71 |
| 2002 | 3,750 | 8 | 126 | $92 | $112 |
| 2003 | 3,770 | 10 | 130 | $57 | $68 |
| 2004 | 3,940 | 3 | 167 | $39 | $45 |
| 2005 | 4,060 | 22 | 145 | $76 | $84 |
| 2006 | 4,070 | 14 | 153 | $74 | $79 |
| 2007 | 4,040 | 4 | 162 | $71 | $75 |
| 2008 | 3,710 | 15 | 152 | $306 | $310 |
| 2009 | 3,160 | 9 | 96 | $90 | $92 |
| 2010 | 3,540 | 16 | 152 | $93 | $93 |

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. Fires are rounded to the nearest ten, civilian injuries are rounded to the nearest one, and direct property damage is rounded to the nearest million dollars. Inflation adjustments were based on the consumer price index found in the U.S. Census Bureau's Statistical Abstract of the United States: 2012, "Table 724, Purchasing Power of the Dollar." Source: NFIRS and NFPA Survey
*Estimate does not include MGM grand fire

**Table 2.**
**Structure Fires in Hotel and Motels, by Month**
**2006-2010 Annual Averages**

| Alarm Month | Fires | | Civilian Fatalities | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|---|---|---|---|---|---|---|---|
| January | 330 | (9%) | 1 | (13%) | 21 | (14%) | $48 | (38%) |
| February | 330 | (9%) | 1 | (6%) | 10 | (7%) | $11 | (9%) |
| March | 330 | (9%) | 0 | (0%) | 16 | (12%) | $4 | (3%) |
| April | 310 | (8%) | 0 | (3%) | 11 | (8%) | $5 | (4%) |
| May | 310 | (8%) | 0 | (0%) | 6 | (4%) | $9 | (7%) |
| June | 290 | (8%) | 1 | (9%) | 12 | (8%) | $5 | (4%) |
| July | 320 | (9%) | 1 | (10%) | 14 | (10%) | $6 | (5%) |
| August | 310 | (8%) | 3 | (22%) | 15 | (11%) | $6 | (5%) |
| September | 270 | (7%) | 1 | (7%) | 9 | (6%) | $5 | (4%) |
| October | 300 | (8%) | 1 | (10%) | 9 | (7%) | $11 | (9%) |
| November | 300 | (8%) | 1 | (7%) | 9 | (6%) | $6 | (5%) |
| December | 310 | (8%) | 1 | (13%) | 10 | (7%) | $10 | (8%) |
| Total | 3,700 | (100%) | 12 | (100%) | 143 | (100%) | $127 | (100%) |

Sums may not equal totals due to rounding
Source: NFIRS and NFPA Survey

**Table 3**
**Structure Fires in Hotel and Motels, by Day of Week**
**2006-2010 Annual Averages**

| Day of Week | Fires | | Civilian Fatalities | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|---|---|---|---|---|---|---|---|
| Sunday | 600 | (16%) | 3 | (26%) | 38 | (27%) | $19 | (15%) |
| Monday | 500 | (13%) | 1 | (6%) | 19 | (13%) | $13 | (11%) |
| Tuesday | 480 | (13%) | 2 | (19%) | 17 | (12%) | $8 | (6%) |
| Wednesday | 500 | (14%) | 3 | (26%) | 15 | (11%) | $17 | (13%) |
| Thursday | 490 | (13%) | 1 | (10%) | 17 | (12%) | $14 | (11%) |
| Friday | 520 | (14%) | 1 | (10%) | 17 | (12%) | $48 | (38%) |
| Saturday | 610 | (16%) | 0 | (3%) | 20 | (14%) | $8 | (6%) |
| Total | 3,700 | (100%) | 12 | (100%) | 143 | (100%) | $127 | (100%) |

**Table 4.**
**Structure Fires in Hotel and Motels, by Alarm Hour**
**2006-2010 Annual Averages**

| Alarm Hour | Fires | | Civilian Fatalities | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|---|---|---|---|---|---|---|---|
| Midnight - 3 a.m. | 370 | (10%) | 3 | (23%) | 22 | (15%) | $15 | (12%) |
| 3 - 6 a.m. | 250 | (7%) | 3 | (26%) | 23 | (16%) | $13 | (10%) |
| 6 - 9 a.m. | 430 | (12%) | 2 | (16%) | 12 | (8%) | $7 | (6%) |
| 9 a.m. - Noon | 510 | (14%) | 3 | (23%) | 18 | (13%) | $43 | (34%) |
| Noon - 3 p.m. | 480 | (13%) | 1 | (6%) | 15 | (10%) | $16 | (13%) |
| 3 - 6 p.m. | 490 | (13%) | 0 | (0%) | 13 | (9%) | $8 | (6%) |
| 6 - 9 p.m. | 650 | (18%) | 1 | (6%) | 16 | (11%) | $13 | (10%) |
| 9 p.m. - Midnight | 520 | (14%) | 0 | (0%) | 24 | (17%) | $12 | (9%) |
| Total | 3,700 | (100%) | 12 | (100%) | 143 | (100%) | $127 | (100%) |

Sums may not equal totals due to rounding
Source: NFIRS and NFPA Survey

**Table 5.**
**Structure Fires in Hotel and Motels, by Leading Cause**
**2006-2010 Annual Averages**

| Leading Cause | Fires | | Civilian Fatalities | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|---|---|---|---|---|---|---|---|
| Cooking equipment | 1,680 | (45%) | 1 | (9%) | 30 | (21%) | $5 | (4%) |
| Smoking materials | 360 | (10%) | 9 | (79%) | 24 | (17%) | $5 | (4%) |
| Heating equipment | 320 | (9%) | 0 | (0%) | 13 | (9%) | $9 | (7%) |
| Clothes dryer or washer | 320 | (9%) | 0 | (0%) | 22 | (15%) | $4 | (3%) |
| Intentional | 280 | (8%) | 1 | (11%) | 16 | (11%) | $15 | (12%) |
| Electrical distribution and lighting equipment | 220 | (6%) | 0 | (0%) | 13 | (9%) | $27 | (21%) |
| Candles | 80 | (2%) | 1 | (7%) | 4 | (3%) | $3 | (2%) |

Note: This table summarizes findings from multiple fields, meaning that the same fire may be listed under multiple causes. See Appendix B for details

**Table 6.**
**Structure Fires in Hotel and Motels, by Equipment Involved in Ignition**
**2006-2010 Annual Averages**

| Equipment Involved | Fires | | Civilian Fatalities | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|---|---|---|---|---|---|---|---|
| Cooking equipment | 1,680 | (45%) | 1 | (9%) | 30 | (21%) | $5 | (4%) |
| Confined cooking fire | 1,470 | (40%) | 0 | (0%) | 15 | (11%) | $0 | (0%) |
| Range or cooktop in non-confined fire | 130 | (3%) | 1 | (9%) | 13 | (9%) | $2 | (2%) |
| Microwave oven in non-confined fire | 30 | (1%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Portable cooking or warming equipment in non-confined fire | 30 | (1%) | 0 | (0%) | 1 | (1%) | $0 | (0%) |
| Other known cooking equipment in non-confined fire | 30 | (1%) | 0 | (0%) | 0 | (0%) | $2 | (1%) |
| No equipment involved in ignition | 490 | (13%) | 9 | (80%) | 37 | (26%) | $66 | (52%) |
| Heating equipment | 320 | (9%) | 0 | (0%) | 13 | (9%) | $9 | (7%) |
| Fixed or portable space heater | 110 | (3%) | 0 | (0%) | 4 | (3%) | $6 | (5%) |
| Confined fuel burner or boiler fire | 80 | (2%) | 0 | (0%) | 3 | (2%) | $0 | (0%) |
| Confined chimney or flue fire | 70 | (2%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Water heater | 30 | (1%) | 0 | (0%) | 3 | (2%) | $0 | (0%) |
| Other known heating equipment in non-confined fire | 30 | (1%) | 0 | (0%) | 3 | (2%) | $2 | (2%) |

**Table 6.**
**Structure Fires in Hotel and Motels, by Equipment Involved in Ignition**
**2006-2010 Annual Averages**
**(continued)**

| Equipment Involved | Fires | | Civilian Fatalities | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|---|---|---|---|---|---|---|---|
| Clothes dryer | 320 | (9%) | 0 | (0%) | 22 | (15%) | $4 | (3%) |
| Contained trash or rubbish fire | 280 | (8%) | 0 | (0%) | 4 | (3%) | $0 | (0%) |
| Electrical distribution and lighting equipment | 220 | (6%) | 0 | (0%) | 13 | (9%) | $27 | (21%) |
| Wiring and related equipment | 110 | (3%) | 0 | (0%) | 9 | (6%) | $22 | (18%) |
| Lamp, bulb or lighting | 80 | (2%) | 0 | (0%) | 3 | (2%) | $1 | (1%) |
| Cord or plug | 20 | (1%) | 0 | (0%) | 1 | (1%) | $0 | (0%) |
| Other known electrical distribution or lighting equipment | 20 | (0%) | 0 | (0%) | 0 | (0%) | $3 | (2%) |
| Air conditioner | 100 | (3%) | 0 | (0%) | 3 | (2%) | $2 | (1%) |
| Fan | 70 | (2%) | 0 | (0%) | 8 | (6%) | $1 | (0%) |
| Torcher, burner or soldering iron | 40 | (1%) | 0 | (0%) | 0 | (0%) | $3 | (2%) |
| Unclassified equipment involved in ignition | 20 | (1%) | 0 | (0%) | 0 | (0%) | $1 | (0%) |
| Other known equipment involved in ignition | 170 | (5%) | 1 | (10%) | 14 | (10%) | $12 | (10%) |
| Total | 3,700 | (100%) | 12 | (100%) | 143 | (100%) | $127 | (100%) |

Note: NFPA treats fires in which EII=NNN and heat source is not in the range of 40-99 as an additional unknown.
Totals may not equal sums due to rounding errors.

Source: NFIRS and NFPA Survey

**Table 7.**
**Structure Fires in Hotel and Motels, by Cause**
**2006-2010 Annual Averages**

| Cause | Fires | | Civilian Fatalities | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|---|---|---|---|---|---|---|---|
| Unintentional | 2,710 | (73%) | 10 | (89%) | 100 | (70%) | $78 | (61%) |
| Non-confined | 1,060 | (29%) | 10 | (89%) | 80 | (56%) | $77 | (61%) |
| Confined | 1,650 | (44%) | 0 | (0%) | 20 | (14%) | $0 | (0%) |
| Failure of equipment or heat source | 610 | (17%) | 0 | (0%) | 24 | (17%) | $23 | (18%) |
| Non-confined | 480 | (13%) | 0 | (0%) | 24 | (16%) | $23 | (18%) |
| Confined | 130 | (4%) | 0 | (0%) | 1 | (1%) | $0 | (0%) |
| Intentional | 280 | (8%) | 1 | (11%) | 16 | (11%) | $15 | (12%) |
| Non-confined | 160 | (4%) | 1 | (11%) | 15 | (10%) | $15 | (12%) |
| Confined | 110 | (3%) | 0 | (0%) | 2 | (1%) | $0 | (0%) |
| Unclassified cause | 90 | (2%) | 0 | (0%) | 2 | (1%) | $6 | (5%) |
| Non-confined | 50 | (1%) | 0 | (0%) | 2 | (1%) | $6 | (5%) |
| Confined | 40 | (1%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Other known cause | 20 | (0%) | 0 | (0%) | 0 | (0%) | $5 | (4%) |
| Non-confined | 20 | (0%) | 0 | (0%) | 0 | (0%) | $5 | (4%) |
| Confined | 0 | (0%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Total | 3,700 | (100%) | 12 | (100%) | 143 | (100%) | $127 | (100%) |
| Non-confined | 1,780 | (48%) | 12 | (100%) | 120 | (84%) | $127 | (100%) |
| Confined | 1,930 | (52%) | 0 | (0%) | 22 | (16%) | $0 | (0%) |

Sums may not equal totals due to rounding
Source: NFIRS and NFPA Survey

**Table 8.**
**Structure Fires in Hotel and Motels by Factor Contributing to Ignition**
**2006-2010 Annual Averages**

| Factor Contributing | Fires | | Civilian Fatalities | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|---|---|---|---|---|---|---|---|
| Abandoned or discarded material or product | 610 | (17%) | 6 | (49%) | 24 | (17%) | $4 | (3%) |
| Non-confined | 230 | (6%) | 6 | (49%) | 19 | (13%) | $4 | (3%) |
| Confined | 380 | (10%) | 0 | (0%) | 5 | (4%) | $0 | (0%) |
| Equipment unattended | 530 | (14%) | 1 | (6%) | 7 | (5%) | $2 | (1%) |
| Non-confined | 70 | (2%) | 1 | (6%) | 4 | (3%) | $2 | (1%) |
| Confined | 460 | (12%) | 0 | (0%) | 3 | (2%) | $0 | (0%) |
| Electrical failure or malfunction | 450 | (12%) | 0 | (0%) | 21 | (14%) | $15 | (11%) |
| Non-confined | 410 | (11%) | 0 | (0%) | 19 | (14%) | $15 | (11%) |
| Confined | 50 | (1%) | 0 | (0%) | 1 | (1%) | $0 | (0%) |
| Heat source too close to combustibles | 440 | (12%) | 1 | (7%) | 20 | (14%) | $9 | (7%) |
| Non-confined | 230 | (6%) | 1 | (7%) | 17 | (12%) | $9 | (7%) |
| Confined | 200 | (6%) | 0 | (0%) | 3 | (2%) | $0 | (0%) |
| Unclassified misuse of material or product | 360 | (10%) | 4 | (33%) | 28 | (19%) | $3 | (2%) |
| Non-confined | 150 | (4%) | 4 | (33%) | 23 | (16%) | $3 | (2%) |
| Confined | 210 | (6%) | 0 | (0%) | 5 | (3%) | $0 | (0%) |
| Mechanical failure or malfunction | 300 | (8%) | 0 | (0%) | 10 | (7%) | $4 | (3%) |
| Non-confined | 210 | (6%) | 0 | (0%) | 10 | (7%) | $4 | (3%) |
| Confined | 90 | (2%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Unclassified factor contributed to ignition | 230 | (6%) | 1 | (13%) | 10 | (7%) | $7 | (5%) |
| Non-confined | 110 | (3%) | 1 | (13%) | 7 | (5%) | $7 | (5%) |
| Confined | 120 | (3%) | 0 | (0%) | 4 | (3%) | $0 | (0%) |
| Failure to clean | 230 | (6%) | 0 | (0%) | 7 | (5%) | $3 | (2%) |
| Non-confined | 90 | (3%) | 0 | (0%) | 6 | (4%) | $3 | (2%) |
| Confined | 140 | (4%) | 0 | (0%) | 1 | (1%) | $0 | (0%) |
| Equipment not being operated properly | 100 | (3%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Non-confined | 20 | (1%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Confined | 70 | (2%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Unintentionally turned on or not turned off | 90 | (2%) | 0 | (0%) | 4 | (3%) | $0 | (0%) |
| Non-confined | 30 | (1%) | 0 | (0%) | 4 | (3%) | $0 | (0%) |
| Confined | 60 | (2%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Improper container or storage | 60 | (2%) | 0 | (0%) | 2 | (2%) | $0 | (0%) |
| Non-confined | 30 | (1%) | 0 | (0%) | 2 | (2%) | $0 | (0%) |
| Confined | 30 | (1%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |

**Table 8.**
**Structure Fires in Hotel and Motels by Factor Contributing to Ignition**
**2006-2010 Annual Averages**
**(continued)**

| Factor Contributing | Fires | | Civilian Fatalities | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|---|---|---|---|---|---|---|---|
| Other known factor contributing to ignition | 410 | (11%) | 0 | (0%) | 20 | (14%) | $83 | (65%) |
| Non-confined | 260 | (7%) | 0 | (0%) | 18 | (13%) | $83 | (65%) |
| Confined | 150 | (4%) | 0 | (0%) | 1 | (1%) | $0 | (0%) |
| Total Fires | 3,700 | (100%) | 12 | (100%) | 143 | (100%) | $127 | (100%) |
| Non-confined | 1,780 | (48%) | 12 | (100%) | 120 | (84%) | $127 | (100%) |
| Confined | 1,930 | (52%) | 0 | (0%) | 22 | (16%) | $0 | (0%) |
| Total Factors | 3,810 | (103%) | 12 | (107%) | 152 | (106%) | $129 | (102%) |
| Non-confined | 1,850 | (50%) | 12 | (107%) | 129 | (90%) | $129 | (101%) |
| Confined | 1,960 | (53%) | 0 | (0%) | 22 | (16%) | $0 | (0%) |

*Multiple entries allowed in this field, so total factors add up to more than total fires
Sums may not equal totals due to rounding, fires in which the factor contributing to ignition was coded as none, unknown, or not reported were allocated proportionally among fires with known factor(s) contributing to ignition
Source: NFIRS and NFPA Survey

**Table 9.**
**Structure Fires in Hotel and Motels, by Heat Source**
**2006-2010 Annual Averages**

| Heat Source | Fires | | Civilian Fatalities | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|---|---|---|---|---|---|---|---|
| Unclassified heat from powered equipment | 840 | (23%) | 0 | (0%) | 20 | (14%) | $7 | (6%) |
| Non-confined | 340 | (9%) | 0 | (0%) | 17 | (12%) | $7 | (6%) |
| Confined | 500 | (13%) | 0 | (0%) | 4 | (3%) | $0 | (0%) |
| Radiated or conducted heat from operating equipment | 820 | (22%) | 1 | (5%) | 31 | (22%) | $6 | (5%) |
| Non-confined | 290 | (8%) | 1 | (5%) | 25 | (17%) | $6 | (5%) |
| Confined | 530 | (14%) | 0 | (0%) | 6 | (4%) | $0 | (0%) |
| Smoking Materials | 360 | (10%) | 9 | (79%) | 24 | (17%) | $5 | (4%) |
| Non-confined | 180 | (5%) | 9 | (79%) | 23 | (16%) | $5 | (4%) |
| Confined | 170 | (5%) | 0 | (0%) | 1 | (1%) | $0 | (0%) |
| Arcing | 300 | (8%) | 0 | (0%) | 13 | (9%) | $11 | (9%) |
| Non-confined | 280 | (8%) | 0 | (0%) | 12 | (8%) | $11 | (9%) |
| Confined | 20 | (1%) | 0 | (0%) | 1 | (1%) | $0 | (0%) |
| Unclassified hot or smoldering object | 270 | (7%) | 1 | (5%) | 9 | (6%) | $5 | (4%) |
| Non-confined | 130 | (3%) | 1 | (5%) | 6 | (4%) | $5 | (4%) |
| Confined | 140 | (4%) | 0 | (0%) | 3 | (2%) | $0 | (0%) |
| Unclassified heat source | 250 | (7%) | 0 | (0%) | 6 | (4%) | $5 | (4%) |
| Non-confined | 80 | (2%) | 0 | (0%) | 3 | (2%) | $5 | (4%) |
| Confined | 170 | (5%) | 0 | (0%) | 3 | (2%) | $0 | (0%) |
| Spark, ember or flame from operating equipment | 210 | (6%) | 0 | (0%) | 7 | (5%) | $61 | (48%) |
| Non-confined | 100 | (3%) | 0 | (0%) | 6 | (4%) | $61 | (48%) |
| Confined | 100 | (3%) | 0 | (0%) | 1 | (1%) | $0 | (0%) |
| Hot ember or ash | 160 | (4%) | 1 | (5%) | 5 | (4%) | $3 | (2%) |
| Non-confined | 80 | (2%) | 1 | (5%) | 5 | (4%) | $3 | (2%) |
| Confined | 80 | (2%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Candle | 80 | (2%) | 1 | (7%) | 4 | (3%) | $3 | (2%) |
| Non-confined | 70 | (2%) | 1 | (7%) | 4 | (3%) | $3 | (2%) |
| Confined | 10 | (0%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Lighter | 80 | (2%) | 0 | (0%) | 8 | (6%) | $3 | (2%) |
| Non-confined | 50 | (1%) | 0 | (0%) | 7 | (5%) | $3 | (2%) |
| Confined | 30 | (1%) | 0 | (0%) | 1 | (1%) | $0 | (0%) |

**Table 9.**
**Structure Fires in Hotel and Motels, by Heat Source**
**2006-2010 Annual Averages**
**(continued)**

| Heat Source | Fires | | Civilian Fatalities | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|---|---|---|---|---|---|---|---|
| Heat from direct flame or convection currents | 60 | (2%) | 0 | (0%) | 0 | (0%) | $1 | (1%) |
| Non-confined | 10 | (0%) | 0 | (0%) | 0 | (0%) | $1 | (1%) |
| Confined | 50 | (1%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Match | 60 | (2%) | 0 | (0%) | 1 | (1%) | $1 | (0%) |
| Non-confined | 20 | (1%) | 0 | (0%) | 1 | (1%) | $1 | (0%) |
| Confined | 30 | (1%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Other known heat source | 220 | (6%) | 0 | (0%) | 14 | (10%) | $16 | (13%) |
| Non-confined | 130 | (3%) | 0 | (0%) | 12 | (8%) | $16 | (13%) |
| Confined | 90 | (2%) | 0 | (0%) | 3 | (2%) | $0 | (0%) |
| Total | 3,700 | (100%) | 12 | (100%) | 143 | (100%) | $127 | (100%) |
| Non-confined | 1,780 | (48%) | 12 | (100%) | 120 | (84%) | $127 | (100%) |
| Confined | 1,930 | (52%) | 0 | (0%) | 22 | (16%) | $0 | (0%) |

Estimates of matches, lighters, smoking materials, and candles included a proportional share of fires in which the heat source was heat from an unclassified open flame or smoking material.
Sums may not equal totals due to rounding
Source: NFIRS and NFPA Survey

**Table 10.**
**Structure Fires in Hotel and Motels, by Area of Origin**
**2006-2010 Annual Averages**

| Area of Origin | Fires | | Civilian Fatalities | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|---|---|---|---|---|---|---|---|
| Kitchen or cooking area | 1,340 | (36%) | 0 | (3%) | 31 | (22%) | $6 | (5%) |
| Non-confined | 200 | (5%) | 0 | (3%) | 15 | (10%) | $6 | (5%) |
| Confined | 1,150 | (31%) | 0 | (0%) | 17 | (12%) | $0 | (0%) |
| Bedroom | 460 | (12%) | 8 | (72%) | 44 | (31%) | $14 | (11%) |
| Non-confined | 380 | (10%) | 8 | (72%) | 43 | (30%) | $14 | (11%) |
| Confined | 80 | (2%) | 0 | (0%) | 1 | (1%) | $0 | (0%) |
| Laundry room or area | 280 | (8%) | 0 | (0%) | 13 | (9%) | $5 | (4%) |
| Non-confined | 230 | (6%) | 0 | (0%) | 12 | (8%) | $5 | (4%) |
| Confined | 60 | (2%) | 0 | (0%) | 1 | (1%) | $0 | (0%) |
| Lavatory, bathroom, locker room or check room | 170 | (4%) | 0 | (0%) | 11 | (7%) | $3 | (2%) |
| Non-confined | 110 | (3%) | 0 | (0%) | 9 | (6%) | $3 | (2%) |
| Confined | 50 | (1%) | 0 | (0%) | 1 | (1%) | $0 | (0%) |
| Common room, living room, family room, lounge or den | 90 | (3%) | 2 | (14%) | 5 | (3%) | $1 | (1%) |
| Non-confined | 60 | (2%) | 2 | (14%) | 5 | (3%) | $1 | (1%) |
| Confined | 40 | (1%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Confined chimney or flue fire | 70 | (2%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Non-confined | 0 | (0%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Confined | 70 | (2%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Trash or rubbish chute, area or container | 70 | (2%) | 0 | (0%) | 2 | (1%) | $0 | (0%) |
| Non-confined | 0 | (0%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Confined | 70 | (2%) | 0 | (0%) | 2 | (1%) | $0 | (0%) |
| Unclassified function area | 70 | (2%) | 1 | (11%) | 10 | (7%) | $3 | (2%) |
| Non-confined | 50 | (1%) | 1 | (11%) | 10 | (7%) | $3 | (2%) |
| Confined | 20 | (1%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Heating equipment room | 70 | (2%) | 0 | (0%) | 3 | (2%) | $2 | (2%) |
| Non-confined | 30 | (1%) | 0 | (0%) | 2 | (1%) | $2 | (2%) |
| Confined | 30 | (1%) | 0 | (0%) | 1 | (1%) | $0 | (0%) |
| Hallway, corridor, or mall | 60 | (2%) | 0 | (0%) | 2 | (2%) | $0 | (0%) |
| Non-confined | 30 | (1%) | 0 | (0%) | 2 | (2%) | $0 | (0%) |
| Confined | 40 | (1%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |

**Table 10.**
**Structure Fires in Hotel and Motels, by Area of Origin**
**2006-2010 Annual Averages**
**(continued)**

| Area of Origin | Fires | | Civilian Fatalities | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|---|---|---|---|---|---|---|---|
| Unclassified outside area | 60 | (2%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Non-confined | 20 | (1%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Confined | 40 | (1%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Unclassified area of origin | 60 | (2%) | 0 | (0%) | 0 | (0%) | $1 | (1%) |
| Non-confined | 30 | (1%) | 0 | (0%) | 0 | (0%) | $1 | (1%) |
| Confined | 30 | (1%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Other known area of origin | 900 | (24%) | 0 | (0%) | 22 | (15%) | $92 | (72%) |
| Non-confined | 640 | (17%) | 0 | (0%) | 22 | (15%) | $92 | (72%) |
| Confined | 260 | (7%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Total | 3,700 | (100%) | 12 | (100%) | 143 | (100%) | $127 | (100%) |
| Non-confined | 1,780 | (48%) | 12 | (100%) | 120 | (84%) | $127 | (100%) |
| Confined | 1,930 | (52%) | 0 | (0%) | 22 | (16%) | $0 | (0%) |

Sums may not equal totals due to rounding
Source: NFIRS and NFPA Survey

**Table 11.**
**Structure Fires in Hotel and Motels, by Item First Ignited**
**2006-2010 Annual Averages**

| Item First Ignited | Fires | | Civilian Fatalities | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|---|---|---|---|---|---|---|---|
| Cooking materials, including food | 1,160 | (31%) | 1 | (5%) | 22 | (15%) | $2 | (1%) |
| Non-confined | 100 | (3%) | 1 | (5%) | 8 | (6%) | $1 | (1%) |
| Confined | 1,060 | (29%) | 0 | (0%) | 13 | (9%) | $0 | (0%) |
| Rubbish, trash, or waste | 260 | (7%) | 0 | (0%) | 7 | (5%) | $1 | (0%) |
| Non-confined | 50 | (1%) | 0 | (0%) | 4 | (3%) | $1 | (0%) |
| Confined | 210 | (6%) | 0 | (0%) | 3 | (2%) | $0 | (0%) |
| Unclassified item first ignited | 230 | (6%) | 1 | (5%) | 6 | (4%) | $2 | (1%) |
| Non-confined | 100 | (3%) | 1 | (5%) | 5 | (4%) | $2 | (1%) |
| Confined | 130 | (4%) | 0 | (0%) | 1 | (1%) | $0 | (0%) |
| Mattress or bedding | 220 | (6%) | 6 | (50%) | 23 | (16%) | $6 | (5%) |
| Non-confined | 200 | (6%) | 6 | (50%) | 23 | (16%) | $6 | (5%) |
| Confined | 20 | (0%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Electrical wire or cable insulation | 210 | (6%) | 0 | (0%) | 10 | (7%) | $6 | (5%) |
| Non-confined | 190 | (5%) | 0 | (0%) | 10 | (7%) | $6 | (5%) |
| Confined | 20 | (1%) | 0 | (0%) | 1 | (1%) | $0 | (0%) |
| Linen other than bedding | 210 | (6%) | 0 | (0%) | 12 | (8%) | $3 | (2%) |
| Non-confined | 160 | (4%) | 0 | (0%) | 10 | (7%) | $3 | (2%) |
| Confined | 40 | (1%) | 0 | (0%) | 2 | (1%) | $0 | (0%) |
| Flammable or combustible liquids or gases, piping or filter | 120 | (3%) | 0 | (0%) | 9 | (6%) | $2 | (1%) |
| Non-confined | 60 | (2%) | 0 | (0%) | 9 | (6%) | $2 | (1%) |
| Confined | 60 | (2%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Structural member or framing | 110 | (3%) | 0 | (0%) | 1 | (1%) | $10 | (8%) |
| Non-confined | 100 | (3%) | 0 | (0%) | 1 | (1%) | $10 | (8%) |
| Confined | 0 | (0%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Appliance housing or casing | 100 | (3%) | 0 | (0%) | 4 | (3%) | $1 | (1%) |
| Non-confined | 60 | (2%) | 0 | (0%) | 4 | (3%) | $1 | (1%) |
| Confined | 50 | (1%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Magazine, newspaper, or writing paper | 80 | (2%) | 0 | (0%) | 3 | (2%) | $1 | (1%) |
| Non-confined | 30 | (1%) | 0 | (0%) | 3 | (2%) | $1 | (1%) |
| Confined | 50 | (1%) | 0 | (0%) | 1 | (1%) | $0 | (0%) |

**Table 11.**
**Structure Fires in Hotel and Motels s, by Item First Ignited**
**2006-2010 Annual Averages**
**(continued)**

| Item First Ignited | Fires | | Civilian Fatalities | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|---|---|---|---|---|---|---|---|
| Dust, fiber, lint, including sawdust or excelsior | 70 | (2%) | 0 | (0%) | 4 | (3%) | $1 | (1%) |
| Non-confined | 50 | (1%) | 0 | (0%) | 4 | (3%) | $1 | (1%) |
| Confined | 20 | (1%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Clothing | 70 | (2%) | 0 | (0%) | 3 | (2%) | $0 | (0%) |
| Non-confined | 50 | (1%) | 0 | (0%) | 3 | (2%) | $0 | (0%) |
| Confined | 20 | (1%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Unclassified furniture or utensil | 70 | (2%) | 0 | (0%) | 3 | (2%) | $2 | (2%) |
| Non-confined | 50 | (1%) | 0 | (0%) | 3 | (2%) | $2 | (2%) |
| Confined | 10 | (0%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Unclassified organic materials | 60 | (2%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Non-confined | 20 | (1%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Confined | 40 | (1%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Box, carton, bag, basket, or barrel | 60 | (2%) | 0 | (0%) | 1 | (1%) | $0 | (0%) |
| Non-confined | 30 | (1%) | 0 | (0%) | 1 | (1%) | $0 | (0%) |
| Confined | 30 | (1%) | 0 | (0%) | 0 | (0%) | $0 | (0%) |
| Other known item first ignited | 680 | (18%) | 5 | (40%) | 32 | (22%) | $89 | (70%) |
| Non-confined | 520 | (14%) | 5 | (40%) | 30 | (21%) | $89 | (70%) |
| Confined | 160 | (4%) | 0 | (0%) | 2 | (1%) | $0 | (0%) |
| Total | 3,700 | (100%) | 12 | (100%) | 143 | (100%) | $127 | (100%) |
| Non-confined | 1,780 | (48%) | 12 | (100%) | 120 | (84%) | $127 | (100%) |
| Confined | 1,930 | (52%) | 0 | (0%) | 22 | (16%) | $0 | (0%) |

Sums may not equal totals due to rounding
Source: NFIRS and NFPA Survey

**Table 12.**
**Structure Fires in Hotel and Motels, by Extent of Flame Damage**
**2006-2010 Annual Averages**

| Extent of Flame Damage | Fires | | Civilian Fatalities | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|---|---|---|---|---|---|---|---|
| Confined fires (defined by incident type) | 1,930 | (52%) | 0 | (0%) | 22 | (16%) | $0 | (0%) |
| Confined to object of origin | 770 | (21%) | 2 | (17%) | 34 | (23%) | $6 | (5%) |
| Confined to room of origin | 680 | (18%) | 5 | (47%) | 49 | (35%) | $10 | (8%) |
| Confined to floor of origin | 90 | (2%) | 1 | (6%) | 12 | (8%) | $9 | (7%) |
| Confined to building of origin | 220 | (6%) | 2 | (20%) | 24 | (17%) | $88 | (70%) |
| Beyond building of origin | 30 | (1%) | 1 | (10%) | 1 | (1%) | $12 | (10%) |
| Total | 3,700 | (100%) | 12 | (100%) | 143 | (100%) | $127 | (100%) |

Sums may not equal totals due to rounding
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. Fires reported to federal or state fire departments or industrial fire brigades are not included in these estimates.

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/documentation/design/NFIRS_Paper_Forms_2008.pdf.

NFIRS has a wide variety of data elements and code choices. The NFIRS database contains coded information. Many code choices describe several conditions. These cannot be broken down further. For example, area of origin code 83 captures fires starting in vehicle engine areas, running gear areas or wheel areas. It is impossible to tell the portion of each from the coded data.

**Methodology may change slightly from year to year.**
NFPA is continually examining its methodology to provide the best possible answers to specific questions, methodological and definitional changes can occur. *Earlier editions of the same report may have used different methodologies to produce the same analysis, meaning that the estimates are not directly comparable from year to year.*

**NFPA's fire department experience survey provides estimates of the big picture.**
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; 3) the number and nature of non-fire incidents; and (4) 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.

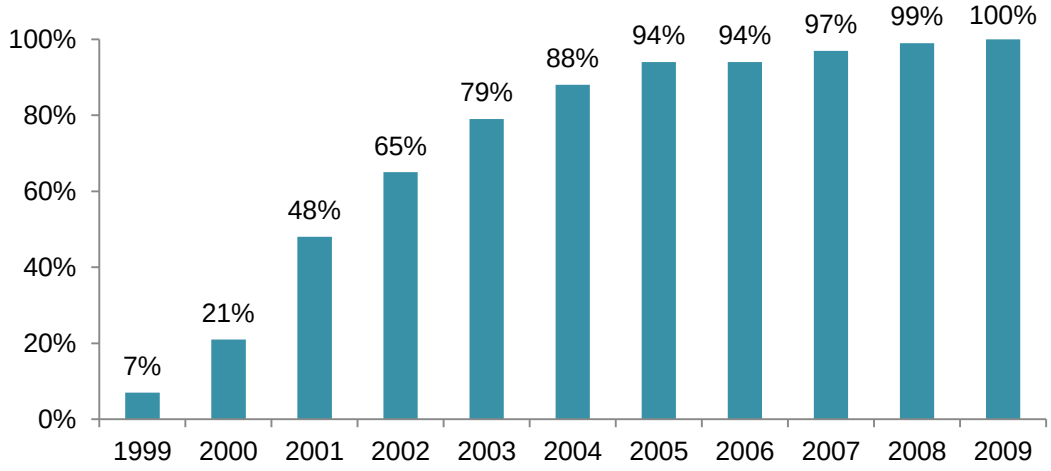
Scaling ratios are obtained by comparing NFPA's projected totals of residential structure fires, non-residential structure fires, vehicle fires, and outside and other fires, and associated civilian deaths, civilian injuries, and direct property damage with comparable totals in NFIRS. Estimates of specific fire problems and circumstances are obtained by multiplying the NFIRS data by the scaling ratios. Reports for incidents in which mutual aid was given are excluded from NFPA's analyses.

Analysts at the NFPA, the USFA and the Consumer Product Safety Commission developed the specific basic 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. The essentials of the approach described by Hall and Harwood are still used, but some modifications have been necessary to accommodate the changes in NFIRS 5.0.

Figure A.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.

**Figure A.1. Fires Originally Collected in NFIRS 5.0 by Year**




From 1999 data on, analyses are based on scaling ratios using only data originally collected in NFIRS 5.0:

NFPA survey projections
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.

NFIRS 5.0 introduced 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. Some analyses, particularly those that examine cooking equipment, heating equipment, fires caused by smoking materials, and fires started by playing with fire, may examine the confined fires in greater detail. Because the confined fire incident types describe certain scenarios, the distribution of unknown data differs from that of all fires. Consequently, allocation of unknowns must be done separately.

Some analyses of structure fires show only Non-confined fires. In these tables, percentages shown are of Non-confined structure fires rather than all structure fires. This approach has the advantage of showing the frequency of specific factors in fire causes, but the disadvantage of possibly overstating the percentage of factors that are seldom seen in the confined fire incident types and of understating the factors specifically associated with the confined fire incident types.

Other analyses include entries for confined fire incident types in the causal tables and show percentages based on total structure fires. In these cases, the confined fire incident type is treated as a general causal factor.

For most fields other than Property Use and Incident Type, 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. *Casualty and loss projections can be heavily influenced by the inclusion or exclusion of unusually serious fire.*

In the formulas that follow, the term "all fires" refers to all fires in NFIRS on the dimension studied. The percentages of fires with known or unknown data are provided for Non-confined fires and associated losses, and for confined fires only.

**Cause of Ignition:** This field is used chiefly to identify intentional fires. "Unintentional" in this field is a specific entry and does not include other fires that were not intentionally set: failure of equipment or heat source, act of nature, or "other" (unclassified)." The last should be used for exposures but has been used for other situations as well. Fires that were coded as under investigation and those that were coded as undetermined after investigation were treated as unknown.

**Factor Contributing to Ignition:** In this field, 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%. Although Factor Contributing to Ignition is only required when the cause of ignition was coded as: 2) unintentional, 3) failure of equipment or heat source; or 4) act of nature, data is often present when not required. Consequently, any fire in which no factor contributing to ignition was entered was treated as unknown.

In some analyses, all entries in the category of mechanical failure, malfunction (factor contributing to ignition 20-29) are combined and shown as one entry, "mechanical failure or malfunction." This category includes:

21. Automatic control failure;
22. Manual control failure;
23. Leak or break. Includes leaks or breaks from containers or pipes. Excludes operational deficiencies and spill mishaps;
25. Worn out;
26. Backfire. Excludes fires originating as a result of hot catalytic converters;
27. Improper fuel used; Includes the use of gasoline in a kerosene heater and the like; and
20. Mechanical failure or malfunction, other.

Entries in "electrical failure, malfunction" (factor contributing to ignition 30-39) may also be combined into one entry, "electrical failure or malfunction." This category includes:

31. Water-caused short circuit arc;
32. Short-circuit arc from mechanical damage;
33. Short-circuit arc from defective or worn insulation;

34. Unspecified short circuit arc;
35. Arc from faulty contact or broken connector, including broken power lines and loose connections;
36. Arc or spark from operating equipment, switch, or electric fence;
37. Fluorescent light ballast; and
30. Electrical failure or malfunction, other.

**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, shown below.

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, fuse;
68. Backfire from internal combustion engine. Excludes flames and sparks from an exhaust system, (11); and
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, much of the data predates the change. Individuals who have already been trained with the older definition may not change their practices. 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

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

In addition, the partially unclassified codes for broad equipment groupings (i.e., code 100 - heating, ventilation, and air conditioning, other; code 200 - electrical distribution, lighting and power transfer, other; etc.) were allocated proportionally across the individual code choices in their respective broad groupings (heating, ventilation, and air conditioning; electrical distribution, lighting and power transfer, other; etc.). Equipment that is totally unclassified is not allocated further. This approach has the same downside as the allocation of heat source 60 described above. Equipment that is truly different is erroneously assigned to other categories.

In some analyses, various types of equipment are grouped together.

| Code Grouping | EII Code | NFIRS definitions |
|---|---|---|
| Central heat | 132 | Furnace or central heating unit |
| | 133 | Boiler (power, process or heating) |
| Fixed or portable space heater | 131 | Furnace, local heating unit, built-in |
| | 123 | Fireplace with insert or stove |
| | 124 | Heating stove |
| | 141 | Heater, excluding catalytic and oil-filled |
| | 142 | Catalytic heater |
| | 143 | Oil-filled heater |
| Fireplace or chimney | 120 | Fireplace or chimney |
| | 121 | Fireplace, masonry |
| | 122 | Fireplace, factory-built |
| | 125 | Chimney connector or vent connector |
| | 126 | Chimney – brick, stone or masonry |
| | 127 | Chimney-metal, including stovepipe or flue |
| Fixed wiring and related equipment | 210 | Unclassified electrical wiring |
| | 211 | Electrical power or utility line |
| | 212 | Electrical service supply wires from utility |
| | 213 | Electric meter or meter box |
| | 214 | Wiring from meter box to circuit breaker |
| | 215 | Panel board, switch board or circuit breaker board |
| | 216 | Electrical branch circuit |
| | 217 | Outlet or receptacle |
| | 218 | Wall switch |
| | 219 | Ground fault interrupter |
| Transformers and power supplies | 221 | Distribution-type transformer |
| | 222 | Overcurrent, disconnect equipment |
| | 223 | Low-voltage transformer |
| | 224 | Generator |
| | 225 | Inverter |
| | 226 | Uninterrupted power supply (UPS) |
| | 227 | Surge protector |
| | 228 | Battery charger or rectifier |
| | 229 | Battery (all types) |
| Lamp, bulb or lighting | 230 | Unclassified lamp or lighting |
| | 231 | Lamp-tabletop, floor or desk |
| | 232 | Lantern or flashlight |
| | 233 | Incandescent lighting fixture |

| Code Grouping | EII Code | NFIRS definitions |
|---|---|---|
| | 234 | Fluorescent light fixture or ballast |
| | 235 | Halogen light fixture or lamp |
| | 236 | Sodium or mercury vapor light fixture or lamp |
| | 237 | Work or trouble light |
| | 238 | Light bulb |
| | 241 | Nightlight |
| | 242 | Decorative lights – line voltage |
| | 243 | Decorative or landscape lighting – low voltage |
| | 244 | Sign |
| Cord or plug | 260 | Unclassified cord or plug |
| | 261 | Power cord or plug, detachable from appliance |
| | 262 | Power cord or plug- permanently attached |
| | 263 | Extension cord |
| Torch, burner or soldering iron | 331 | Welding torch |
| | 332 | Cutting torch |
| | 333 | Burner, including Bunsen burners |
| | 334 | Soldering equipment |
| Portable cooking or warming equipment | 631 | Coffee maker or teapot |
| | 632 | Food warmer or hot plate |
| | 633 | Kettle |
| | 634 | Popcorn popper |
| | 635 | Pressure cooker or canner |
| | 636 | Slow cooker |
| | 637 | Toaster, toaster oven, counter-top broiler |
| | 638 | Waffle iron, griddle |
| | 639 | Wok, frying pan, skillet |
| | 641 | Breadmaking machine |

Equipment was not analyzed separately for confined fires. Instead, each confined fire incident type was listed with the equipment or as other known equipment.

**Item First Ignited.** In most analyses, mattress and pillows (item first ignited 31) and bedding, blankets, sheets, and comforters (item first ignited 32) are combined and shown as "mattresses and bedding." In many analyses, wearing apparel not on a person (code 34) and wearing apparel on a person (code 35) are combined and shown as "clothing." In some analyses, flammable and combustible liquids and gases, piping and filters (item first ignited 60-69) are combined and shown together.

**Area of Origin.** Two areas of origin: bedroom for more than five people (code 21) and bedroom for less than five people (code 22) are combined and shown as simply "bedroom." Chimney is no longer a valid area of origin code for Non-confined fires.

**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. The same rounded value may account for a slightly different percentage share. Because percentages are expressed in integers and not carried out to several decimal places, percentages that appear identical 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 Version 5.0 of the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS 5.0). 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/. Actual estimates are projections based derived from NFPA"s annual fire department experience survey and the procedures below.

**Cooking equipment and heating equipment** are calculated by summing Non-confined 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. Reports on specific causal factors may include analysis of confined fires and consequently have higher estimates of specific causes.*

**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. Intentional include those of an incendiary nature and those resulting from a deliberate misuse of the heat source. 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." 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.

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 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. A proportional share of fires involving unclassified cooking kitchen and cooking equipment (code 600) are included here.

**Identified heating equipment** (codes 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. A proportional share of fires involving unclassified heating, ventilation, and air conditioning equipment (code 100) are included here.

**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.

**Exposures** are fires that are caused by the spread of or from another fire. These fires are identified by factor contributing to ignition 71. This code is automatically applied for all fires with exposure numbers greater than zero. As with playing with fire, Fires in which the factor contribution to ignition was undetermined (UU), entered as none (NN) or left blank are considered unknown and allocated proportionally.

## Appendix C: Selected Published Incidents

The following are selected published incidents in hotels and motels. Included are short articles from the "Firewatch" or "Bi-monthly" columns in *NFPA Journal* or it predecessor *Fire Journal* and incidents from either the large-loss fires report or catastrophic fires report. If available, investigation reports or NFPA Alert Bulletins are included and provide detailed information about the fires.

It is important to remember that this is anecdotal information. Anecdotes show what can happen; they are not a source to learn about what typically occurs.

NFPA's Fire Incident Data Organization (FIDO) identifies significant fires through a clipping service, the Internet and other sources. Additional information is obtained from the fire service and federal and state agencies. FIDO is the source for articles published in the "Firewatch" column of the *NFPA Journal* and many of the articles in this report.

### Sprinkler Controls Hotel Laundry Fire, Kansas

A 99-room hotel with seven floors above grade and five below sustained limited fire damage when a sprinkler activated and controlled a fire in a laundry room in the building's sub-basement.

The concrete-and-steel structure, which was 200 feet (61 meters) long and 120 feet (37 meters) wide, was equipped with wet-pipe sprinklers with a water flow alarm, and a fire detection system with heat detectors had been installed in the room of origin.

The central station alarm company reported the fire at 11:30 p.m. Firefighters initiated a high-rise response to locate and extinguish the fire, which they discovered in the hotel's fourth sub-basement.

Investigators determined that cotton and linen items contaminated with animal or vegetable oils had been put in a clothes dryer but removed before they were completely dry. They were put in large baskets while still damp, and the trapped heat warmed the contaminated materials to their ignition points.

The building, valued at $10 million, was undamaged, and its contents, valued at $5 million, sustained $5,000 in damages. There were no injuries.

Kenneth J. Tremblay, 2011, *NFPA Journal*, March/April, 27.

### Sprinkler Douses Hotel Room Fire, South Dakota

A single sprinkler extinguished a fire involving the plastic cover of a fluorescent light and other combustibles in the bathroom of a hotel guest room before firefighters arrived at the scene.

The three-story, wood-frame hotel, which was 200 feet (61 meters) long and 100 feet (30 meters) wide, contained 93 rooms. Smoke detectors in the hallways and single-station smoke alarms in the guest rooms were monitored by a central station alarm company, as was the hotel's wet-pipe sprinkler system.

The room's occupants had called the front desk to report that they smelled smoke in their room when the fire alarm operated at 12:46 a.m. Responding firefighters found that a sprinkler located just 8 inches (20 centimeters) from the light fixture had already extinguished the blaze.

Investigators determined that arcing and resistive heating at the point at which the fluorescent bulb connected to the fixture had produced enough heat to ignite the light's plastic cover, causing it to melt or fall down onto towels below. Some heat damage was noted on the walls, but fire spread was limited by the sprinkler.

Damage to the hotel and its contents, valued at $3.1 million, was limited to $5,100. There were no injuries.

Kenneth J. Tremblay, 2011, "Firewatch," *NFPA Journal*, January/February, 24-25 .

**Fire Damage to Hotel Exceeds $3 Million, Illinois**
A fire that started in the attic of a 70-unit, three-story hotel burned until a passerby noticed it and stopped in to tell the manager, who called the fire department around 9:30 a.m.

The lightweight wood-frame hotel, which was 249 feet (76 meters) long and 58 feet (18 meters) wide, had a fire detection system that provided coverage in the occupied areas and a wet-pipe sprinkler system. The attic had no sprinklers, detection, or draft stops.

Responding firefighters saw fire coming from the center of the attic and spreading in both directions. The incident commander originally sent crews to the third floor but pulled them out of the building as the roof began to collapse within 15 minutes of their arrival. Crews then used three elevated master streams to knock the fire down before reentering the hotel to extinguish hot spots.

The fire heavily damaged the third floor and the attic, and water and smoke damaged the floors below. The exact cause of the fire is unknown.

Structural damage to the building, valued at $3 million, came to $2 million, while damage to its contents, valued at $1.5 million, was estimated at $1 million. There were no injuries.

Ken Tremblay, 2010, "Firewatch", *NFPA Journal*, September/October, 29.

**Man Dies in Motel Fire, Illinois**
A 48-year-old man died of smoke inhalation and heat stress in an early morning fire of undetermined origin that began in his motel room.

The two-story, 73-room motel had concrete block walls and an original flat roof that was covered in 1985 with a second, wood-framed, pitched roof that created a 5-foot (1.5 meter) overhang over the second-floor balcony. This new roof structure, which was covered by asphalt shingles, ran the entire length of the building. The underside of the overhang was made of aluminum with ventilation penetrations. The motel's smoke alarms did not sound an alarm in the manager's office. There were no sprinklers.

A motel staff person discovered the fire when she went to investigate a commotion on the second-floor balcony and found guests who said that smoke was coming into their room. Grabbing a cordless phone, the staffer called the manager, who told her to check out the situation and call 911 if there was a problem. When she discovered black smoke coming from a guest room, she dialed 911 at 3:47 a.m.

She and a hotel guest then tried to enter the room sing a master key, but found that the door's dead bolt had been locked. With permission from the staff person, the guest kicked the door in, and the two saw flames around the bed and fire reaching the ceiling. They saw the victim on the bed, but heavy black smoke prevented them from rescuing him.

When fire fighters arrived, they found that the room's window had failed. They used hose streams from several directions to try to knock down the heavy fire in the victim's room, but when they tried to ventilate through the room's ceiling, they saw heavy fire in the attic overhead. The incident commander ordered everyone out of the building for fear that the roof would collapse.

Investigators determined that the fire started near the base of the bed, but they could not determine the cause. Witnesses reported that they didn't hear any smoke alarms sounding when the room's door was forced open, and investigators found many of the hardwired smoke detectors in other rooms had been disconnected. Investigators also said that if the attic and second roof had complied with current codes, the fire would have stopped before it spread throughout the attic.

The fire spread caused an estimated $2 million in damage to the building and $250,000 to its contents.

Ken Tremblay, 2010, "Firewatch", *NFPA Journal*, July/August, 27-28.

**Sprinklers Control Hotel Fire, Illinois**

Sprinklers operated to control a fire that began when a hotel guest fell asleep while smoking and her cigarette ignited the bedding.

The two-story hotel, constructed of concrete, was 100 feet (30 meters) long and 40 feet (12 meters) wide. It had a pitched roof covered with asphalt shingles. A dry-pipe sprinkler system and fire detection system were both monitored by an off-site fire alarm company.

Smoke from the fire caused the room's smoke alarm to activate, and this was followed by the activation of a sprinkler, which controlled the blaze until firefighters arrived at 1:11 a.m. The fire department completed extinguishment using a 1 ¾ inch (4-centimeter) hose line.

By the time firefighters arrived, the hotel staff and guests had evacuated, and all were accounted for except the occupant of the room of origin. She had been seen by either staff or other guests after she self-evacuated, but she left the scene shortly thereafter. When she was eventually located, she admitted to falling asleep while smoking, causing the mattress and bedding to ignite. Investigators determined that she was under the influence of alcohol and had stayed at the hotel so as not to drive home.

Fire damage was limited to the room of origin, although there was some smoke damage on the second floor and water damage in the room of origin, an adjacent room, and the room directly below the fire. The building, valued at $2 million, sustained $10,000 worth of damage. The contents of the room of origin, valued at $5,000, were a total loss. There were no injuries.

Ken Tremblay, 2009, "Firewatch", *NFPA Journal*, September/October, 26-27.

**Sprinkler Controls Hotel Fire Started by Candle, Colorado**

A single sprinkler successfully extinguished a fire started by a candle in an occupied guest bedroom of a four-story hotel. The waterflow activated the building's fire alarm system, alerting guests and staff to the presence of the fire.

The 158-unit hotel was built of steel and concrete panels and had a flat, built-up roof. A wet-pipe sprinkler system provided full coverage and monitored waterflow tied to the fire detection and alarm system. Both systems were monitored by a central monitoring company.

The fire alarm operated at 12:25 a.m. and alerted the front desk staffer, who silenced the alarm. Occupants were advised to evacuate, and some went down to the lobby. Firefighters arriving within minutes of the alarm noted light smoke on the first floor and located the operating sprinkler in the first-floor guest room. By that time, the sprinkler had extinguished the blaze.

Investigators determined that a candle on the night stand between the room's beds ignited a T-shirt on the night stand, and the fire spread to bedding, mattress, and headboard of one of the beds. The room's occupant was in the bathroom when the fire started and told investigators, "When I came out of the bathroom, there was smoke and water everywhere." He was not injured. The hotel staff told investigators that guests are not allowed to use candles in their rooms.

Asked why she had shut off the fire alarm when it activated, the staffer admitted she was wrong to do so.

Damage to the hotel and its contents, valued at over $5 million, was estimated at $10,000 and $5,000, respectively. There were no injuries.

Kenneth J. Tremblay, 2009, "Firewatch", *NFPA Journal*, May/June, 38-39.

**Large-Loss Fire in a 49-Unit Motel in Texas**

Property Characteristics and Operating Status:

This three-story, 49-unit motel was of unprotected wood-frame construction and was under construction. (It was due to open in a very short time.) The structure covered 60,000 square feet (5,600 square meters). It was not reported if anyone was at the site at the time.

Fire Protection Systems:

There was no information on any detection system. There was a dry-pipe sprinkler present. Its operation and coverage were not reported.

Fire Development:

No details were reported.

Contributing Factors and Other Details:
Loss to the building was listed at $8,000,000 and $500,000 to the contents.

Stephen G. Badger, 2008, *Large-Loss Fires in the United States in 2007*, NFPA Fire Analysis and Research, Quincy, MA"

**Large-Loss Fire in 80-Unit Hotel in California**
Property Characteristics and Operating Status:
This four-story, 80-unit hotel of unprotected wood-frame construction was under construction, in the framing stages. The ground floor area and operating status were not reported.

Fire Protection Systems:
A detection system and automatic suppression system were being installed at the time. The types and coverage of the systems were not reported, but neither was yet operable.

Fire Development:
A fire of unknown cause broke out on the second story. Fire spread was very rapid due to the framing material. The building was fully engulfed when firefighters arrived. Radiant heat caused heavy damage to surrounding buildings, vehicles and vegetation. Arriving firefighters were unable to mount an interior attack due to the large volume of fire. Master stream devices were set up to attack the fire.

Contributing Factors and Other Details:
Loss was listed as $2,500,000 to the original building and $6,000,000 to the exposures.

Stephen G. Badger, 2008, *Large-Loss Fires in the United States in 2007*, NFPA Fire Analysis and Research, Quincy, MA"

**Large-Loss Fire in 40-Story Hotel/Casino in New Jersey**
Property Characteristics and Operating Status:
This 40-story hotel casino was of protected noncombustible construction and covered 375,000 square feet (34,800 square meters). It was under construction and workers were at the site when the fire broke out.

Fire Protection Systems:
There was a detector system present but it was not operable at the time of the fire. There was no automatic suppression equipment.

Fire Development:
An incendiary fire was set in plastic sheeting on the exterior of the building. The fire spread up the outside of the building. No other information was reported.

Contributing Factors and Other Details:
Damage was mainly to the exterior.

Stephen G. Badger, 2008, *Large-Loss Fires in the United States in 2007*, NFPA Fire Analysis and Research, Quincy, MA

**Vacant Hotel Fire Causes $15 Million in Direct Property Damage, Florida**
In February 2007, a fire was reported at 1:19 p.m. in a three-story vacant Florida hotel of unprotected ordinary construction. No one was in the building at the time of the fire. There was a complete coverage detection system but its type was not reported. The detection system had been manually disabled because it was a vacant building. There was an unknown type complete-coverage sprinkler system present. The system had been shut down prior to the fire due to rusted pipes in the entire pipe grid. This incendiary fire was set on the first story after gasoline was spread throughout the building. As a result, fire spread rapidly to the upper stories. Firefighters initiated an interior attack, but withdrew when ceiling pieces started to fall. Direct property damage was estimated at $15,000,000.

Adapted from Stephen G. Badger's *Large-Loss Fires in the United States in 2007*, NFPA Fire Analysis and Research, Quincy, MA, 2008.

**Sprinkler Extinguishes Fire in Hotel, Pennsylvania**
A single sprinkler extinguished an intentionally set fire on the fifth floor of an occupied hotel. The multistory hotel was protected throughout by an automatic sprinkler system.

Firefighters responded to the 8:10 p.m. alarm and arrived two minutes later to find no smoke or fire visible from the exterior of the building. After speaking to the staff, who reported smoke and water conditions of the fifth floor, the incident commander deployed two aerial ladder trucks on two sides of the building. As engine companies established a water supply and fed the building's fire department connection, an engine and ladder company sent to the upper floors reported water flowing from the fourth floor.

When firefighters arrived on the fifth floor, they found a single sprinkler activated in a maintenance closet in the service elevator lobby. After searching the upper floors and finding only light smoke above the fire floor, firefighters shut down the sprinkler system on the fifth floor until a new sprinkler could be installed and the system restored.

Investigators determined that someone had intentionally ignited a piece of rolled carpet that had been stored in the closet. The carpet had burned until the sprinkler activated and extinguished the fire.

The hotel, valued at nearly $4 million, sustained losses estimated at $5,000. There were no injuries.

Kenneth J. Tremblay, 2008, "Firewatch", *NFPA Journal*, November/December, 22-23.

**Sprinkler Extinguishes Fire in Hotel Room, California**
A single sprinkler extinguished a fire in a hotel room that began when the guest unintentionally ignited his bedding with a lighter or cigarette.

The 2-story, 63-room, wood-frame hotel, which measured 80 by 100 feet (23 by 30 meters), had hardwired smoke alarms with battery backup in the guest rooms. The building was protected throughout by an automatic sprinkler system.

Firefighters were called to the scene at 8:38 p.m. by a 911 call from the hotel and by the off-site alarm monitoring facility. They stretched hoselines to the room of fire origin but found they did not need them for suppression. Smoke was ventilated and the activated sprinkler was replaced.

According to investigators, bedding was ignited unintentionally with a lighter or smoking materials. The room's occupant tried to extinguish the fire but was unsuccessful and left the room. One sprinkler activated and extinguished the fire.

The building, valued at $3 million, sustained $3,000 in property damage and a $2,000 loss of contents. There were no injuries.

Kenneth J. Tremblay, 2008, "Firewatch", *NFPA Journal*, November/December, 21.

**Fire in Hotel Ruled Suicide, Minnesota**

Firefighters had to remove a door to gain access to a hotel room in which a guest intent on taking his life had barricaded himself with furniture. He had also barricaded a window with a bed and nightstand.

The three-story, nonsprinklered, wood-frame hotel, which was 28 feet (6 meters) long and 20 feet (9 meters) wide, was covered with a brick veneer. Hardwired smoke alarms with battery backup were installed in each room, but investigators could not determine whether the smoke alarm in the victim's room operated.

The 27-year-old man, who had rented the third-floor room the day before the fire, propped the furniture against the door and started the fire by igniting ordinary combustibles. A passerby saw the flames through the window and called 911 at 3:38 a.m.

Firefighters forced their way into the room, extinguished the fire, and removed the victim, but efforts to resuscitate him failed. Damage to the building is estimated at $100,000; damage to the contents is estimated at $10,000. No one else was injured.

Kenneth J. Tremblay, 2006, "Firewatch", *NFPA Journal*, May/June, 34.