

Hotel and Motel Fires

These topical reports are designed to explore facets of the U.S. fire problem as depicted through data collected in the U.S. Fire Administration's (USFA's) National Fire Incident Reporting System (NFIRS). Each topical report briefly addresses the nature of the specific fire or fire-related topic, highlights important findings from the data, and may suggest other resources to consider for further information. Also included are recent examples of fire incidents that demonstrate some of the issues addressed in the report or that put the report topic in context.

Findings

- An estimated 3,900 hotel and motel fires are reported to U.S. fire departments each year and cause an estimated 15 deaths, 150 injuries, and \$76 million in property loss.
- Hotel and motel fires are considered part of the residential fire problem. However, they comprise only approximately 1 percent of residential building fires.
- Half of hotel and motel fires are small, confined fires.
- Cooking is the leading cause of hotel and motel fires (46 percent). Almost all hotel and motel cooking fires are small, confined fires (97 percent).
- Eighteen percent of nonconfined hotel and motel fires extend beyond the room of origin. The leading causes of these larger fires are electrical malfunctions (24 percent), intentionally set fires (15 percent), and fires caused by open flames (12 percent). In contrast, 42 percent of all nonconfined residential building fires extend beyond the room of origin.
- While bedrooms are the primary origin of nonconfined fires (23 percent), when confined cooking fires are considered, the kitchen or other cooking area is the most prevalent area of fire origin.
- Hotel and motel fires are more prevalent in the cooler months due to increases in heating fires and peak in February (9 percent).

In 1980, the National Fire Protection Association (NFPA) estimated that 12,200 fires occurred in hotels and motels. By 1994, the estimated numbers of fires in hotels and motels had sharply declined—to a level at which the NFPA no longer produced separate annual survey estimates. Deaths and injuries resulting from these fires declined sharply as well. Today, the U.S. Fire Administration estimates that 3,900 hotel and motel fires occur annually in the United States. What changed in the intervening years?

On December 7, 1946, fire broke out in the Winecoff Hotel in Atlanta, GA. The early morning fire spread quickly through the building, trapping many people in the upper floors. With only one exit stairway (that, unfortunately, provided a conduit for the fire as many of its doors had been propped open), no fire alarm system, and no fire sprinkler system, the 119 fatalities from this fire made it the deadliest hotel fire in U.S. history, and prompted many changes in building codes.

Three decades later, the lodging industry experienced a series of catastrophic fires that provided yet another call to action. In a 6-year-period, 190 people died and nearly 1,000 were injured in 3 hotel fires. On November 21, 1980, an early morning fire at the MGM Grand Hotel in Las Vegas, NV, killed 85 occupants and injured over 650. Three months later, on February 10, 1981, 8 people died and

nearly 200 were injured in an evening fire at the Las Vegas Hilton Hotel. And, on December 31, 1986, an afternoon fire at the Dupont Plaza Hotel and Casino in San Juan, Puerto Rico, resulted in 97 fatalities and more than 140 injuries.

Investigations into these three fires revealed that smoke alarms and sprinkler systems could have mitigated the losses and, in many instances, prevented deaths and injuries had they been in place. In the years that followed, substantial code changes were implemented and the lodging industry redefined what “fire safe” meant in their industry.

While fires and fire losses still occur in hotels and motels, these changes and public education about preventing and surviving hotel fires were largely successful in reducing hotel and motel fires and losses. The numbers tell the story. From 2005 to 2007, hotel and motel fires, a subset of residential building fires, accounted for only 1 percent of the residential building fires responded to by fire departments across the Nation.^{1,2} These fires resulted in an annual average of approximately 15 deaths, 150 injuries, and \$76 million in property loss.

This topical report addresses the characteristics of hotel and motel fires reported to the National Fire Incident Reporting System (NFIRS) between 2005 and 2007.

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Type of Fire

Building fires consist of two major categories of incidents: fires that are confined to specific types of equipment or objects (confined fires) and those that are not (nonconfined fires). Confined building fires are small fire incidents that are limited in scope, confined to noncombustible containers, rarely result in serious injury or large content losses,

and are expected to have no significant accompanying property losses due to flame damage.³ Hotel and motel fires are evenly divided between small confined fires and the larger nonconfined fires as shown in Table 1. Cooking fires are the predominate type of confined fire.

Table 1. Hotel and Motel Fires by Type of Incident (2005–2007)

Incident Type	Percent
Nonconfined fires	50.2
Confined fires	49.8
Cooking fire, confined to container	36.9
Chimney or flue fire, confined to chimney or flue	2.1
Incinerator overload or malfunction, fire confined	0.3
Fuel burner/boiler malfunction, fire confined	2.2
Commercial compactor fire, confined to rubbish	0.4
Trash or rubbish fire, contained	8.0
Total	100.0

Source: NFIRS 5.0.

Note: Total may not add to 100 percent due to rounding.

Loss Measures

Table 2 presents losses, averaged over this 3-year-period, of reported residential building fires and hotel and motel fires.⁴

Table 2. Loss Measures for Hotel and Motel Fires (3-year-average, 2005–2007)

Measure	Residential Building Fires	Hotel and Motel Fires	Confined Hotel and Motel Fires	Nonconfined Hotel and Motel Fires
Average Loss:				
Fatalities/1,000 fires	5.4	2.5	0.0	5.0
Injuries/1,000 fires	28.1	31.7	8.5	54.7
Dollar loss/fire	\$14,560	\$16,190	\$150	\$32,090

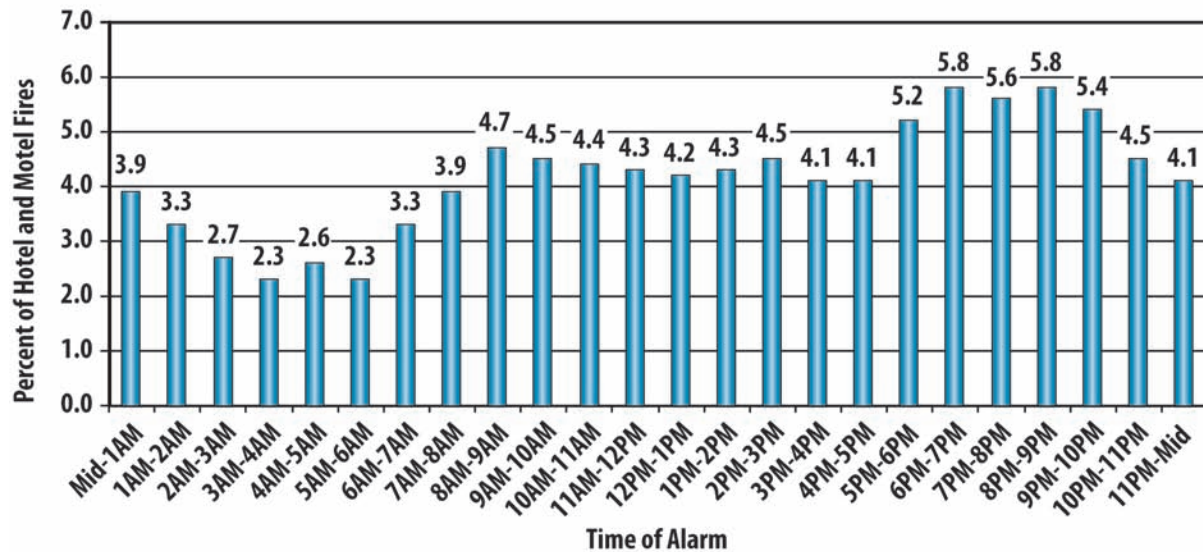
Source: NFIRS 5.0.

Note: Average loss for fatalities and injuries is computed per 1,000 fires; average dollar loss is computed *per fire* and is rounded to the nearest \$10.

When Hotel and Motel Fires Occur

As shown in Figure 1, hotel and motel fires occur most frequently in the early evening hours, peaking from 6 p.m. to 9 p.m. They then decline throughout the night, reaching the lowest point during the morning hours (3 a.m. to 6 a.m.). Fire incidence rises, with an intermediate

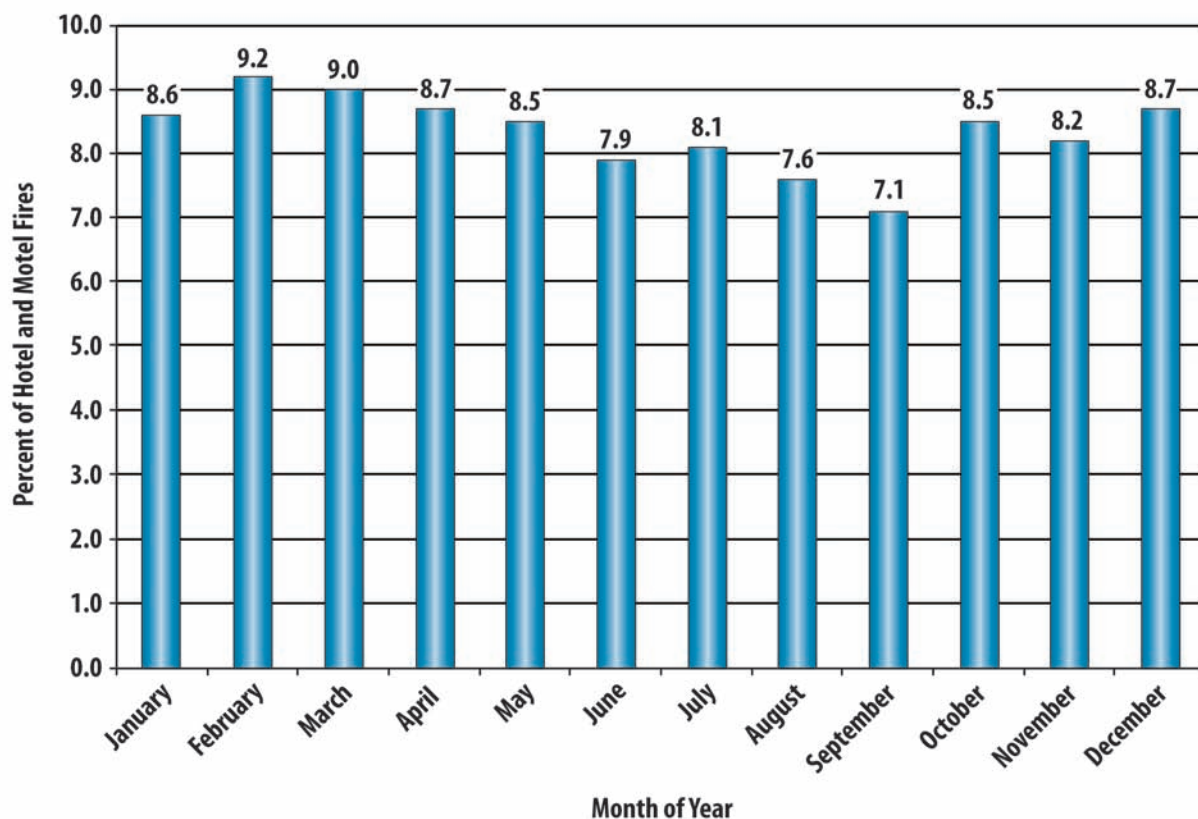
peak during breakfast hours, 8 a.m. to 9 a.m., tapering off slightly before an early afternoon intermediate peak between 2 p.m. and 3 p.m. The 3-hour-evening-period (6 p.m. to 9 p.m.) accounts for 17 percent of hotel and motel fires.⁵

Figure 1. Hotel and Motel Fires by Time of Alarm (2005–2007)

Source: NFIRS 5.0.

Figure 2 illustrates that hotel and motel fire incidence is slightly higher in the cooler months, peaking in February (9 percent). This slight increase is partially a result of increases

in heating fires. Fire incidence declines steadily, reaching the lowest incidence in September (7 percent).

Figure 2. Hotel and Motel Fires by Month (2005–2007)

Source: NFIRS 5.0.

Causes of Hotel and Motel Fires

Forty-six percent of all hotel and motel fires are cooking fires as shown in Table 3. Nearly all of these cooking fires (97 percent) are small, confined fires with limited damage. The next four causes combined account for 26 percent of

hotel and motel fires: fires caused by electrical malfunctions (7 percent), heating fires (7 percent), intentionally set fires (6 percent), and open flame fires (6 percent).⁶

Table 3. Leading Causes of Hotel and Motel Fires (2005–2007)

Cause	Percent (Unknowns Apportioned)
Cooking	45.8
Electrical malfunction	7.3
Heating	7.2
Intentional	5.6
Open flame	5.6

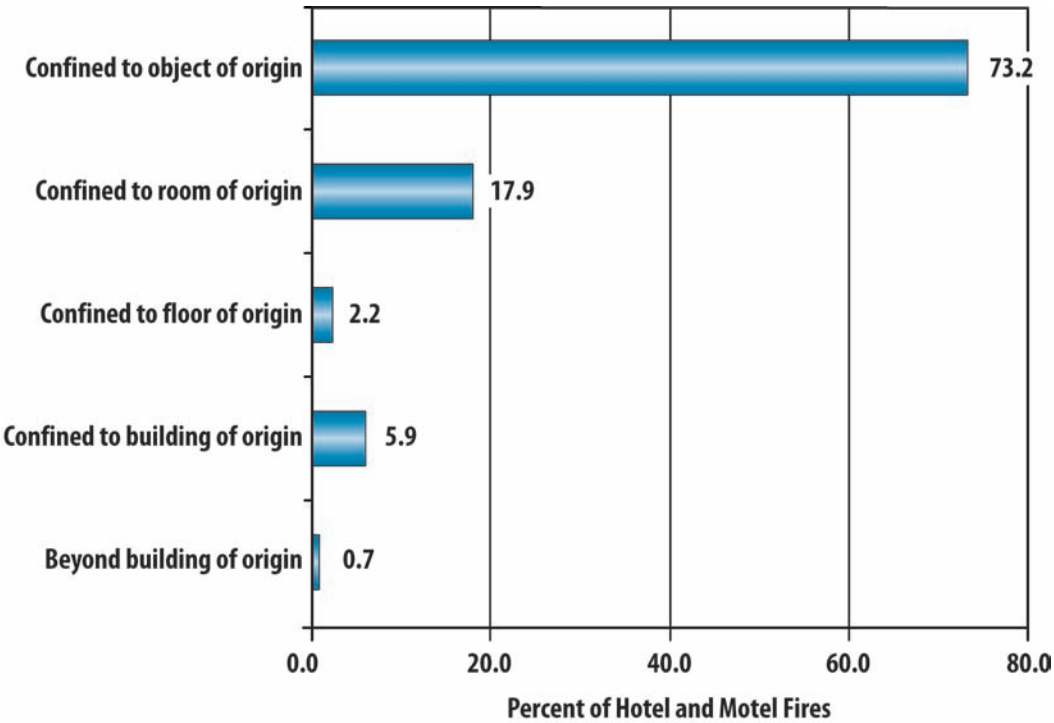
Source: NFIRS 5.0.

Fire Spread in Hotel and Motel Fires

Nearly three-quarters of hotel and motel fires (73 percent) are confined to the object of origin (Figure 3). These fires are primarily coded as confined fires in NFIRS—68 percent of fires confined to the object of origin are confined fires.⁷

Few fires, 9 percent, extend beyond the room of origin. Of the ones that do, they are more likely to involve the entire building.

Figure 3. Extent of Fire Spread in Hotel and Motel Fires (2005–2007)



Source: NFIRS 5.0.

Confined fires are allowed abbreviated NFIRS reporting and many reporting details of these fires are not required and not reported. However, it is known that for time of alarm and cause, confined fires have considerable influence on the overall hotel and motel fire profile. Confined fires are the predominant fire incident between 7 a.m. and 10 a.m. and

again between 4 p.m. and 10 p.m. Of the hotel and motel fires that occur during these two time periods, confined fires account for over half of them (56 percent). As these peak times include breakfast and dinner, it is not surprising that confined cooking fires account for 78 percent of

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the confined fires and 43 percent of all fires in hotels and motels that occur between 7 a.m. and 10 a.m. and again between 4 p.m. and 10 p.m. As well, nearly all (97 percent) cooking fires in hotels and motels are small, confined cooking fires.

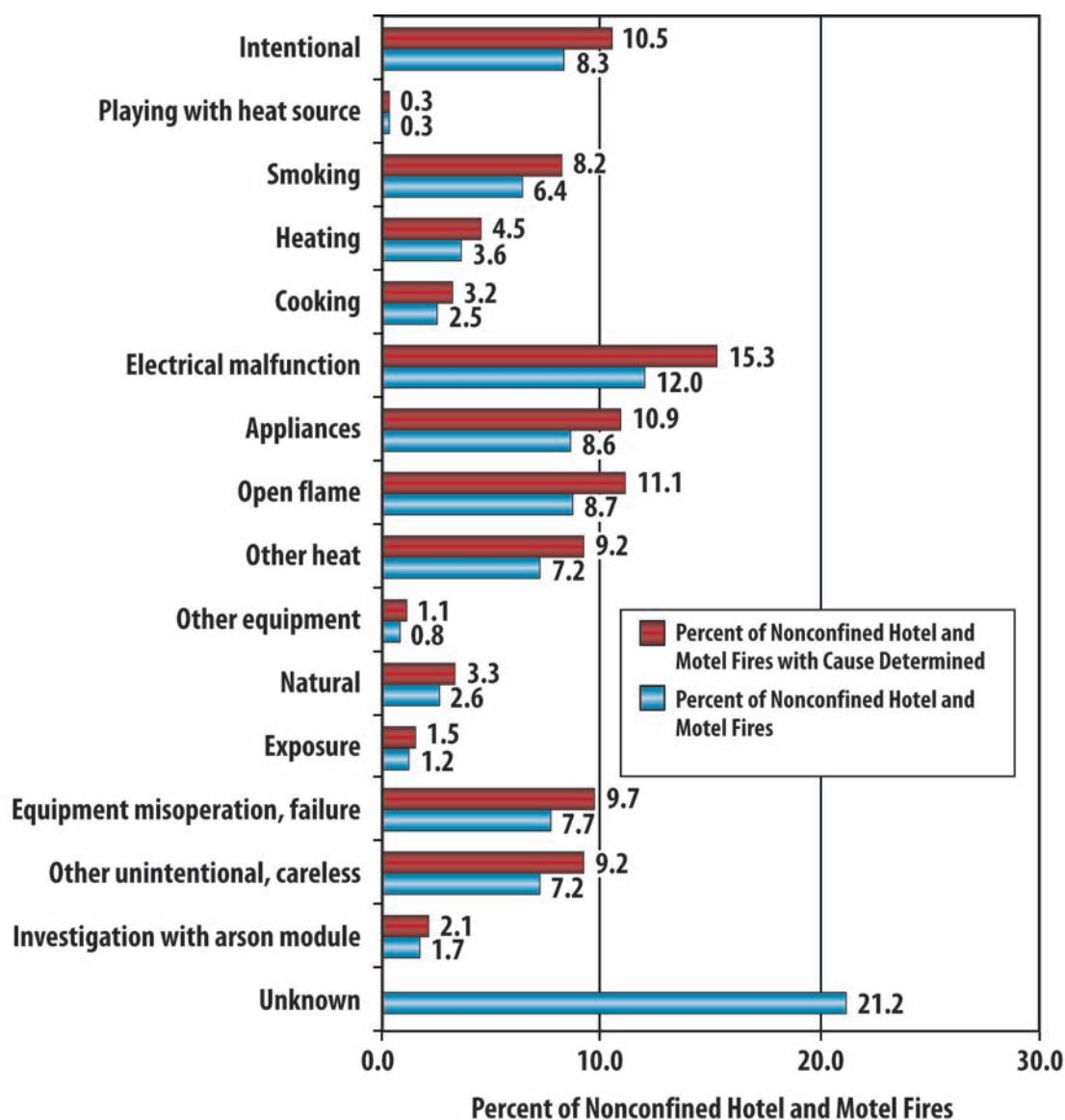
Nonconfined Fires

The next sections of this topical report will address nonconfined hotel and motel fires, the larger and more serious fires, where detailed fire data are available.

Causes of Nonconfined Hotel and Motel Fires

While cooking is the leading cause of hotel and motel fires overall, it only represents 3 percent of all nonconfined hotel and motel fires. Fires caused by electrical malfunctions (15 percent), fires caused by open flames, appliances, and intentionally set fires (approximately 11 percent each) are the leading causes of nonconfined hotel and motel fires (Figure 4).

Figure 4. Causes of Nonconfined Hotel and Motel Fires (2005-2007)



Source: NFIRS 5.0.

Where Nonconfined Hotel and Motel Fires Start (Area of Fire Origin)

Twenty-three percent of nonconfined hotel and motel fires start in the bedroom (Table 4). Fires that begin in laundry areas (12 percent) and cooking areas and kitchens (10 percent) are the next leading areas of fire origin. Less common are fires that start in bathrooms (6 percent) and common rooms or lounge areas (4 percent).

Note that these areas of origin do not include areas associated with confined fires. As confined cooking fires are a substantial percentage of hotel and motel fires, it is likely that the kitchen is, by far, the leading area of fire origin for all hotel and motel fires.

Table 4. Leading Areas of Fire Origin in Nonconfined Hotel and Motel Fires (2005–2007)

Areas of Fire Origin	Percent (Unknowns Apportioned)
Bedrooms	22.9
Laundry area	12.3
Cooking area, kitchen	10.3
Bathroom, checkroom, lavatory	6.3
Common room, den, family room, living room, lounge	3.7

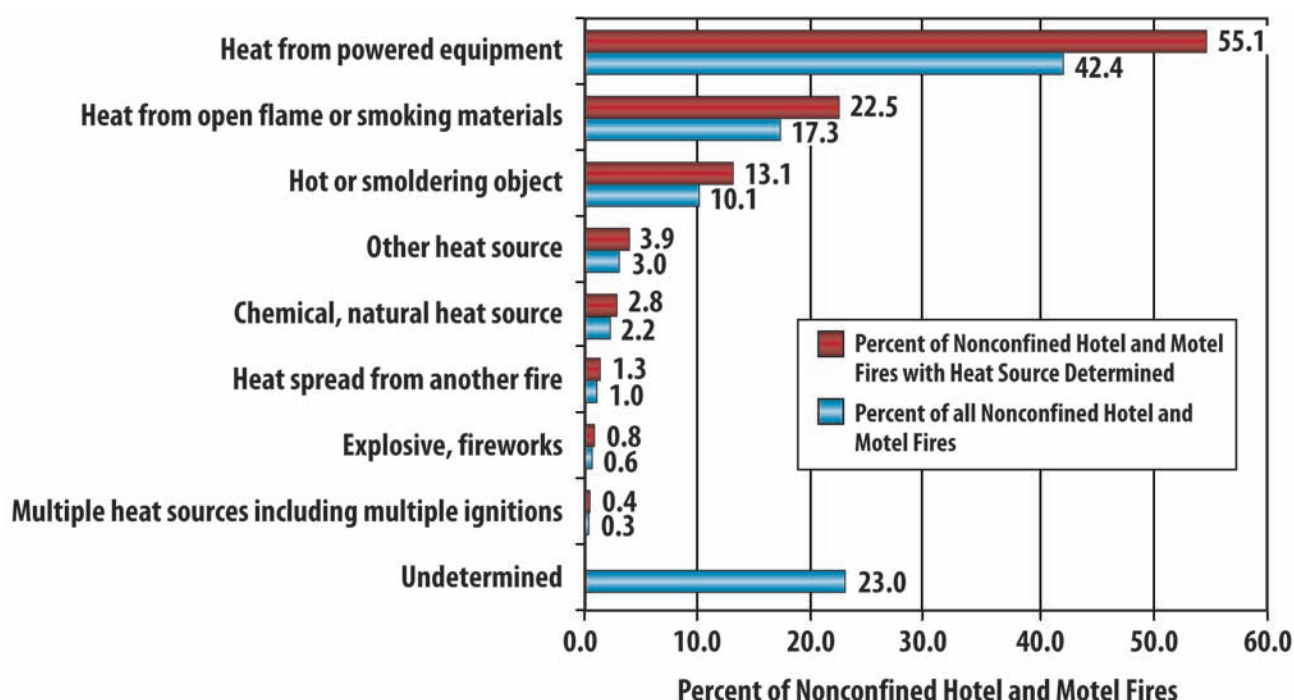
Source: NFIRS 5.0.

How Nonconfined Hotel and Motel Fires Start (Heat Source)

Figure 5 shows sources of heat in nonconfined hotel and motel fires. Heat from powered equipment accounts for 55 percent of nonconfined hotel and motel fires. Within that category, radiated or conducted heat from operating equipment accounts for 16 percent of all fires, electrical arcing accounts for 16 percent of all fires, and heat from other powered equipment accounts for 18 percent of all nonconfined hotel and motel fires.

Heat from open flame or smoking materials accounts for 23 percent of nonconfined hotel and motel fires. This category includes candles, cigarettes, lighters, and matches. The third largest category pertains to hot or smoldering objects (13 percent). This category includes hot embers or ashes, molten, hot material, and heat sparked from friction.

Figure 5. Sources of Heat in Nonconfined Hotel and Motel Fires (2005–2007)



Source: NFIRS 5.0.

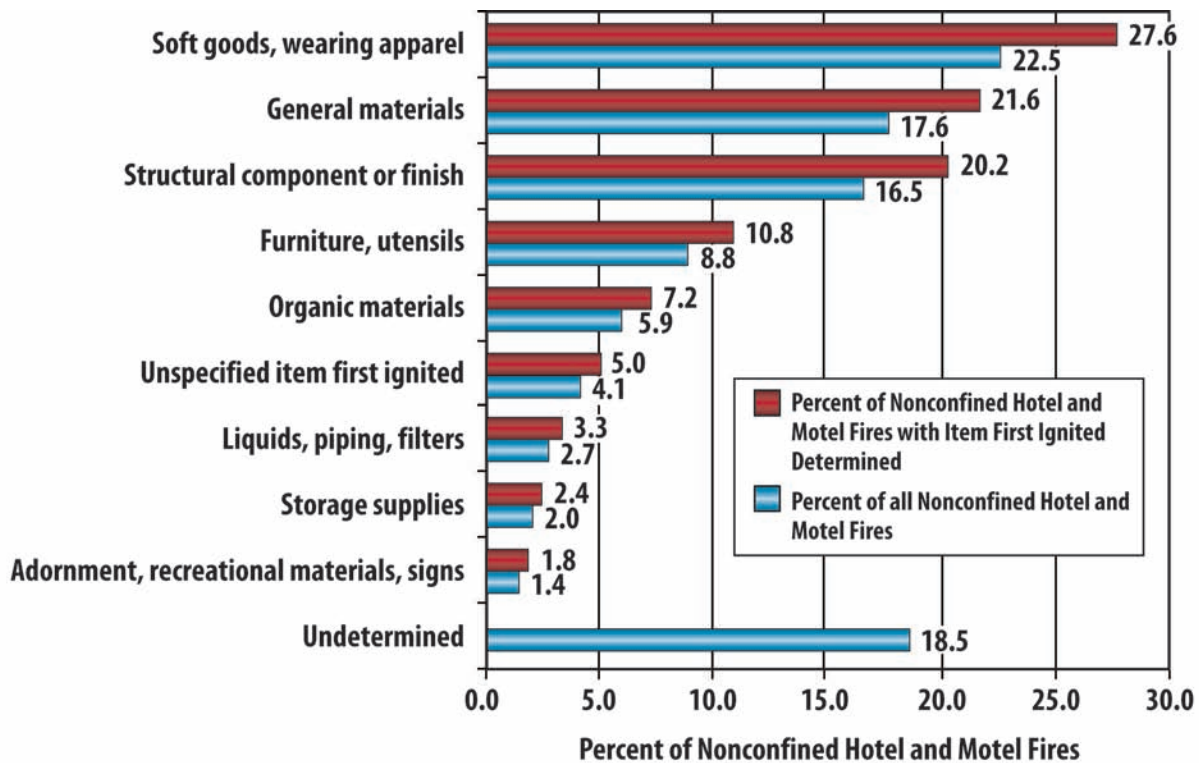
What Ignites First in Hotel and Motel Fires

Twenty-eight percent of the items first ignited in nonconfined hotel and motel fires fall under the “soft goods, wearing apparel category” (Figure 6). This category includes bedding (blankets, sheets, or comforter), clothing (not on a person), and linens. The second leading category, “general materials,” accounts for 22 percent of nonconfined

hotel and motel fires and third is “structural component or finish” (20 percent).

Electrical wire, cable insulation (10 percent), linen other than bedding (9 percent), and bedding including blankets, sheets, and comforters (7 percent) are the specific items most often first ignited in nonconfined hotel and motel fires.

Figure 6. Item First Ignited in Nonconfined Hotel and Motel Fires (2005–2007)

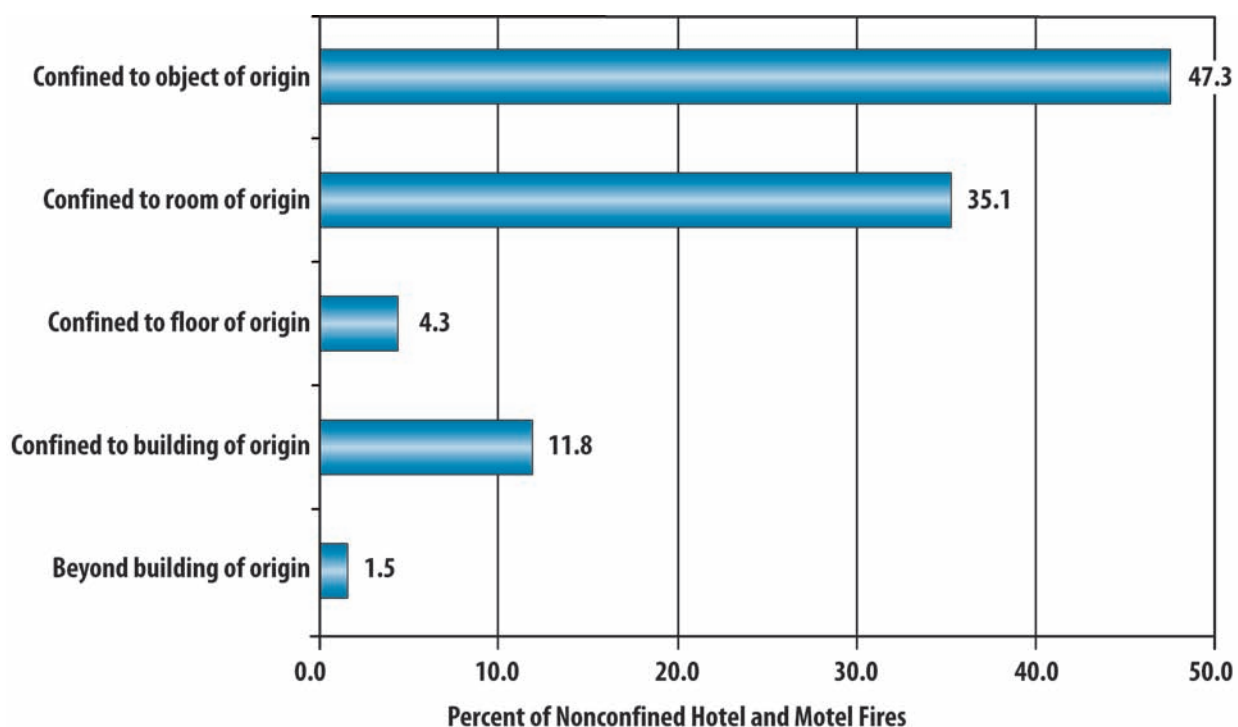


Source: NFIRS 5.0.

Fire Spread

Figure 7 shows the fire spread in nonconfined hotel and motel fires. The majority of even the nonconfined fires, 82 percent, are limited to the object or room of fire origin—in 47 percent of nonconfined fires, the fire is confined to the object of origin; in another 35 percent of fires, the fire is confined to the room of origin. Eighteen percent of nonconfined hotel and motel fires extend beyond the room of

origin. The leading causes of these larger fires are electrical malfunctions (24 percent), intentionally set fires (15 percent), and fires caused by open flames (12 percent). In contrast, 42 percent of all nonconfined residential building fires extend beyond the room of origin. Automatic extinguishing systems (AESs) may have a role in containing hotel and motel fires as discussed in a later section.

Figure 7. Extent of Fire Spread in Nonconfined Hotel and Motel Fires (2005–2007)

Source: NFIRS 5.0.

Factors Contributing to Ignition in Nonconfined Hotel and Motel Fires

Table 5 shows the factors contributing to ignition of non-confined hotel and motel fires. By far, the leading factor contributing to the ignition of hotel and motel fires is the misuse of material or product (43 percent). A heat source too close to combustible materials (33 percent) and abandoned or discarded materials (31 percent) accounts for the majority of the fires in this category.

Electrical failure or malfunction is a contributing factor in 22 percent of nonconfined hotel and motel fires. Operational deficiency and mechanical failures and malfunctions are the third and fourth leading factors at 15 and 12 percent respectively. The remaining factors account for 13 percent of nonconfined hotel and motel fires.

Table 5. Factors Contributing to Ignition for Nonconfined Hotel and Motel Fires (Where Factors Contributing to Ignition are Specified, 2005–2007)

Factors Contributing to Ignition	Percent of Nonconfined Hotel and Motel Fires
Misuse of material or product	42.8
Electrical failure, malfunction	22.2
Operational deficiency	15.2
Mechanical failure, malfunction	12.3
Other factors contributing to ignition	6.3
Fire spread or control	3.4
Natural condition	1.7
Design, manufacture, installation deficiency	1.1

Source: NFIRS 5.0.

Notes: 1) Includes only incidents where factors that contributed to the ignition of the fire were specified.

2) Multiple factors contributing to fire ignition may be noted for each incident; total will exceed 100 percent.

Suppression/Alerting Systems in Hotel and Motel Fires

Smoke alarm data are available for both confined and non-confined fires, although for confined fires, the data are very limited in scope. AES data are only available for nonconfined fires.

Smoke alarms were present in 72 percent of nonconfined hotel and motel fires and were known to have operated in 44 percent of nonconfined hotel and motel fires. In 14 percent of nonconfined hotel and motel fires, there were no smoke alarms present (Table 6). In another 13 percent of these fires, firefighters were unable to determine if a smoke alarm was present. In 10 percent of nonconfined hotel and

motel fires where smoke alarms were present, the alarm failed to operate.

In 20 percent of confined hotel and motel fires, the smoke alarm effectiveness was unknown (Table 7). Smoke alarms operated and alerted occupants in 69 percent of these confined fires. In 11 percent of confined hotel and motel fires, the occupants were not alerted by the smoke alarm.⁸ Note that the data presented in Table 6 and Table 7 are the raw counts from the NFIRS data set and not scaled to national estimates of smoke alarms in hotel and motel fires.

Table 6. NFIRS Smoke Alarm Data for Nonconfined Hotel and Motel Fires (NFIRS, 2005-2007)

Presence of Smoke Alarms	Smoke Alarm Operational Status	Smoke Alarm Effectiveness	Count	Percent
Present	Fire too small to activate smoke alarm		320	9.0
	Smoke alarm operated	Smoke alarm alerted occupants, occupants responded	1,246	34.9
		Smoke alarm alerted occupants, occupants failed to respond	107	3.0
		No occupants	122	3.4
		Smoke alarm failed to alert occupants	21	0.6
		Undetermined	79	2.2
	Smoke alarm failed to operate		254	7.1
	Undetermined		432	12.1
None present			510	14.3
Undetermined			475	13.3
Total Incidents			3,566	100.0

Source: NFIRS 5.0.

Notes: The data presented in this table are raw data counts from the NFIRS data set. They do not represent national estimates of smoke alarms in hotel and motel fires. They are presented for informational purposes. Total may not add to 100 percent due to rounding.

Table 7. NFIRS Smoke Alarm Data for Confined Hotel and Motel Fires (NFIRS, 2005-2007)

Smoke Alarm Effectiveness	Count	Percent
Smoke alarm alerted occupants	2,434	68.9
Smoke alarm did not alert occupants	382	10.8
Unknown	717	20.3
Total Incidents	3,533	100.0

Source: NFIRS 5.0.

Notes: The data presented in this table are raw data counts from the NFIRS data set. They do not represent national estimates of smoke alarms in hotel and motel fires. They are presented for informational purposes. Total may not add to 100 percent due to rounding.

Overall, full or partial AESs were present in 41 percent of nonconfined hotel and motel fires (Table 8). The presence of suppression systems was substantially higher in nonconfined hotel and motel fires than in all residential building

nonconfined fires (3 percent only). This use of AES may account for the containment of nonconfined hotel and motel fires to the room or object of origin as seen in Figure 7.

Table 8. NFIRS Automatic Extinguishing System (AES) Data for Nonconfined Hotel and Motel Fires (2005–2007)

AES Presence	Count	Percent
AES present	1,445	40.5
Partial system present	9	0.3
AES not present	1,910	53.6
Unknown	202	5.7
Total Incidents	3,566	100.0

Source: NFIRS 5.0.
Notes: The data presented in this table are raw data counts from the NFIRS data set. They do not represent national estimates of AESs in nonconfined hotel and motel fires. They are presented for informational purposes. Totals may not add to 100 percent due to rounding.

Examples

The following are some recent examples of hotel and motel fires. These were all reported by the media.

- April 2009: Fire in an Indianapolis, IN, hotel left 3 people with minor injuries and dozens looking for other places to stay. Firefighters contained the fire and evacuated everyone inside the hotel. The cause of the fire is still undetermined.⁹
- April 2009: A fire at the Carroll Valley Resort in Fairfield, PA, was started from a discarded cigarette. The cigarette was thrown into a pile of pine needles which spread fire from a pine tree to the hotel roof. No one was injured, and firefighters were able to extinguish the fire. Regardless of the lack of a sprinkler system, the hotel sustained only minor damage, partially due to favorable weather conditions and temperatures.¹⁰
- April 2009: Limited water pressure made it difficult to extinguish a devastating fire at a Ramada Inn in Longview, TX. More than 50 crews responded to the fire. Investigators believe the fire started in the attic but have not determined an official cause. The hotel was deemed to be a complete loss.¹¹
- February 2009: An unspecified electrical problem caused a fire at the Villa Town Hotel in Lubbock, TX. Hotel guests were evacuated, and the fire was contained. Investigators noted that electrical problems were common in older buildings with relatively older electrical work.¹²

Conclusion

The incidence of hotel and motel fires has substantially decreased, probably from stricter codes and public education. While only 1 residential building fire in 100 is a hotel or motel fire, the potential for loss of life, injuries, and damage is substantial. The challenge for communities and the fire service is to pinpoint the reasons why and how hotel and motel fires still occur and to address these issues to prevent future fires, fire casualties, and property damage.

NFIRS Data Specifications for Hotel and Motel Fires

Data for this report were extracted from the NFIRS annual Public Data Release (PDR) files for 2005, 2006, and 2007. Only version 5.0 data were extracted.

Hotel and Motel fires are defined as:

- Incident Types 111 to 123:

Incident Type	Description
111	Building fire
112	Fires in structure other than in a building
113	Cooking fire, confined to container
114	Chimney or flue fire, confined to chimney or flue
115	Incinerator overload or malfunction, fire confined
116	Fuel burner/boiler malfunction, fire confined
117	Commercial compactor fire, confined to rubbish
118	Trash or rubbish fire, contained
120	Fire in mobile property used as a fixed structure, other
121	Fire in mobile home used as fixed residence
122	Fire in motor home, camper, recreational vehicle
123	Fire in portable building, fixed location

Note that Incident Types 113 to 118 do not specify if the structure is a building.

Incident Type 112 is included as previous analyses have shown that Incident Types 111 and 112 are used interchangeably.

- Aid Types 3 (mutual aid given) and 4 (automatic aid given) are excluded to avoid double counting of incidents.
- Property use 449 is included to specify hotel and motel, commercial.

- Structure Type:
 - 1—Enclosed building,
 - 2—Fixed portable or mobile structure, and
 - Structure Type not specified (null entry).

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Notes:

¹National estimates are based on 2005-2007 native version 5.0 data from the National Fire Incident Reporting System (NFIRS) and residential structure fire loss estimates from the National Fire Protection Association's annual surveys of fire loss. Fires are rounded to the nearest 100, deaths to the nearest 5, injuries to the nearest 25, and loss to the nearest \$million.

²In NFIRS, version 5.0, a structure is a constructed item of which a building is one type. In previous versions of NFIRS, the term "residential structure" commonly referred to buildings where people live. To coincide with this concept, the definition of a residential structure fire for NFIRS 5.0 has, therefore, changed to include only those fires where the NFIRS 5.0 Structure Type is 1 or 2 (enclosed building and fixed portable or mobile structure) with a residential property use. Such fires are referred to as "residential buildings" to distinguish these buildings from other structures on residential properties that may include fences, sheds, and other uninhabitable structures. In addition, incidents that have a residential property use, but do not have a structure type specified are presumed to be buildings.

³NFIRS distinguishes between "content" and "property" loss. Content loss includes loss to the contents of a structure due to damage by fire, smoke, water, and overhaul. Property loss includes losses to the structure itself or to the property itself. Total loss is the sum of the content loss and the property loss. For confined fires, the expectation is that the fire did not spread beyond the container (or rubbish for Incident Type 118) and hence, there was no property damage (damage to the structure itself) from the flames. There could be, however, property damage as a result of smoke, water, and overhaul.

⁴The average fire death and fire injury loss rates computed from the national estimates will not agree with average fire death and fire injury loss rates computed from NFIRS data alone. The fire death rate computed from national estimates would be $(1,000 * (15/3,900)) = 3.8$ deaths per 1,000 hotel and motel fires and the fire injury rate would be $(1,000 * (150/3,900)) = 38.5$ injuries per 1,000 hotel and motel fires.

⁵For the purposes of this report, the time of the fire alarm is used as an approximation for the general time the fire started. However, in NFIRS, it is the time the fire was reported to the fire department.

⁶The U.S. Fire Administration cause hierarchy was used to determine the cause of hotel and motel fire incidents: http://www.usfa.dhs.gov/fireservice/nfirs/tools/fire_cause_category_matrix.shtm

⁷In NFIRS, confined fires are defined by Incident Type codes 113 to 118.

⁸In confined fires, the entry "smoke alarm did not alert occupants" can mean: no smoke alarm was present, the smoke alarm was present but did not operate, or the smoke alarm was present and operated but the occupant was already aware of the fire.

⁹"3 minor injuries in Indianapolis hotel fire," chicagotribune.com/news, April 12, 2009. <http://archives.chicagotribune.com/2009/apr/12/travel/chi-ap-in-indianapolishotel> (accessed April 30, 2009).

¹⁰Katharine Harmon, "Fire damages Carroll Valley Resort," eveningsun.com, April 16, 2009. http://www.eveningsun.com/ci_12150161?source=most_viewed (accessed April 21, 2009).

¹¹Jamaal E. O'Neal, "Crews fight hotel fire, limited water pressure," news-journal.com, April 15, 2009.

http://www.news-journal.com/news/content/news/stories/2009/04/15/04152009_ramada_fire.html (accessed April 30, 2009).

¹²"Electrical problem blamed for motel blaze," lubbockonline.com, February 3, 2009. http://www.lubbockonline.com/stories/020309/loc_384475693.shtml (accessed April 30, 2009).