

Multifamily Residential Building Fires (2008–2010)

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 102,300 multifamily residential building fires are reported to U.S. fire departments each year and cause an estimated 400 deaths, 4,175 injuries, and 1.2 billion dollars in property loss.
- Multifamily residential building fires account for 28 percent of all residential building fires.
- Seventy percent of multifamily residential building fires are small, confined fires.
- Cooking is the leading cause of multifamily residential building fires (69 percent); nearly all multifamily residential building cooking fires are small, confined fires (96 percent).
- Thirty-one percent of nonconfined multifamily residential building fires extend beyond the room of origin. The leading causes of these larger fires are electrical malfunctions (13 percent), exposures (13 percent), intentionally-set (12 percent), carelessness or other unintentional actions (12 percent), and open flames (10 percent). In contrast, 50 percent of all other nonconfined residential building fires extend beyond the room of origin.
- Cooking areas and kitchens are the primary areas of origin for nonconfined multifamily residential building fires (33 percent).
- Multifamily residential building fire incidence is slightly higher in the cooler months, peaking in December and January.

Annually, from 2008 to 2010, fires in multifamily residential buildings accounted for an estimated 102,300 reported fires. These fires accounted for 28 percent of all residential building fires responded to by fire departments across the Nation.^{1,2} These fires resulted in an annual average loss of 400 deaths and 4,175 injuries as well as 1.2 billion dollars in property loss. Multifamily residential buildings include structures such as apartments, townhouses, rowhouses, condominiums, and other tenement properties. Multifamily residential buildings tend to have stricter building codes than one- and two-family buildings. Many multifamily residential buildings are rental properties, and are usually required to comply with more stringent fire prevention statutes and regulations involving smoke alarms and sprinkler systems.

As a result of the type of building, the more stringent building and code requirements, and the fact that more people live in the building itself than in the predominant one- and two-family residence, fires in multifamily residential buildings tend to have a different profile than fires in other types of residences.

A major difference in the multifamily residential building fire profile is seen in cooking fires. Twice that of other residential buildings, cooking is the cause of 69 percent of multifamily

residential building fires. Multifamily residential buildings also tend to have central heating systems that are maintained by professionals and not the homeowner, thus there are fewer heating fires from poor maintenance or misuse than in one- and two-family dwellings. As well, fire problems related to fireplaces, chimneys, and fireplace-related equipment tend to occur less often in multifamily heating fires since multifamily residential buildings generally lack these features. Finally, multifamily residential buildings usually have fewer fires caused by electrical problems due to construction materials, building codes, and professional maintenance.

This current topical report is an update to the *Multifamily Residential Building Fires* topical report (Volume 12, Issue 3) which was released in May 2011. As part of a series of topical reports that addresses fires in the major residential building types, the remainder of this report addresses the characteristics of multifamily residential building fires reported to the National Fire Incident Reporting System (NFIRS). The focus is on fires reported from 2008 to 2010, the most recent data available at the time of the analysis. Comparisons to one- and two-family residential building fires are noted based on analyses from the *One- and Two-Family Residential Building Fires* (Volume 13, Issue 4) topical report.

For the purpose of this report, the terms “residential fires” and “multifamily fires” are synonymous with “residential building fires” and “multifamily residential building fires,” respectively. “Multifamily fires” is used throughout the body of this report; the findings, tables, charts, headings, and footnotes reflect the full category of “multifamily residential building fires.”

Type of Fire

Building fires are divided into two classes of severity in NFIRS: “confined fires,” which are fires confined to certain types of equipment or objects, and “nonconfined fires,” which are not. Confined building fires are small

fire incidents that are limited in extent, staying within pots or fireplaces or certain other noncombustible containers.³ Confined fires rarely result in serious injury or large content losses, and are expected to have no significant accompanying property losses due to flame damage.⁴ The smaller, confined fires account for 70 percent of the multifamily fires with cooking fires as the predominant type of confined fire (Table 1). Nonconfined fires make up the remaining 30 percent of multifamily fires. In contrast to one- and two-family residences, the relative proportions of confined and nonconfined fires are reversed; nonconfined fires account for the bulk of one- and two-family building fires (60 percent) and confined fires account for the remaining 40 percent.

Table 1. Multifamily Residential Building Fires by Type of Incident (2008–2010)

Incident Type	Percent
Nonconfined fires	30.0
Confined fires	70.0
Cooking fire, confined to container	59.0
Chimney or flue fire, confined to chimney or flue	0.5
Incinerator overload or malfunction, fire confined	0.1
Fuel burner/boiler malfunction, fire confined	4.3
Commercial compactor fire, confined to rubbish	1.0
Trash or rubbish fire, contained	5.0
Total	100.0

Source: NFIRS 5.0.

Loss Measures

Table 2 presents losses, averaged over this three year period, of reported residential fires and multifamily fires.⁵ The average number of fatalities per 1,000 fires and dollar loss per fire for multifamily fires are approximately half of the

same loss measures for all other residential building fires. In addition, the average loss measures for nonconfined multifamily fires are substantially higher than the same loss measures for confined multifamily fires; this is to be expected, since confined fires rarely result in serious injury or large content losses.

Table 2. Loss Measures for Multifamily Residential Building Fires (3-year average, 2008–2010)

Measure	Residential Building Fires (Excluding Multifamily)	Multifamily Residential Building Fires	Confined Multifamily Residential Building Fires	Nonconfined Multifamily Residential Building Fires
Average Loss:				
Fatalities/1,000 fires	6.4	3.0	0.0	10.1
Injuries/1,000 fires	27.2	33.0	9.5	87.9
Dollar loss/fire	\$18,380	\$9,500	\$170	\$31,270

Source: NFIRS 5.0.

Notes: 1) No deaths in confined multifamily fires were reported to NFIRS during 2008-2010; the resulting loss of 0.0 fatalities per 1,000 fires reflects only data reported to NFIRS.

2) 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.

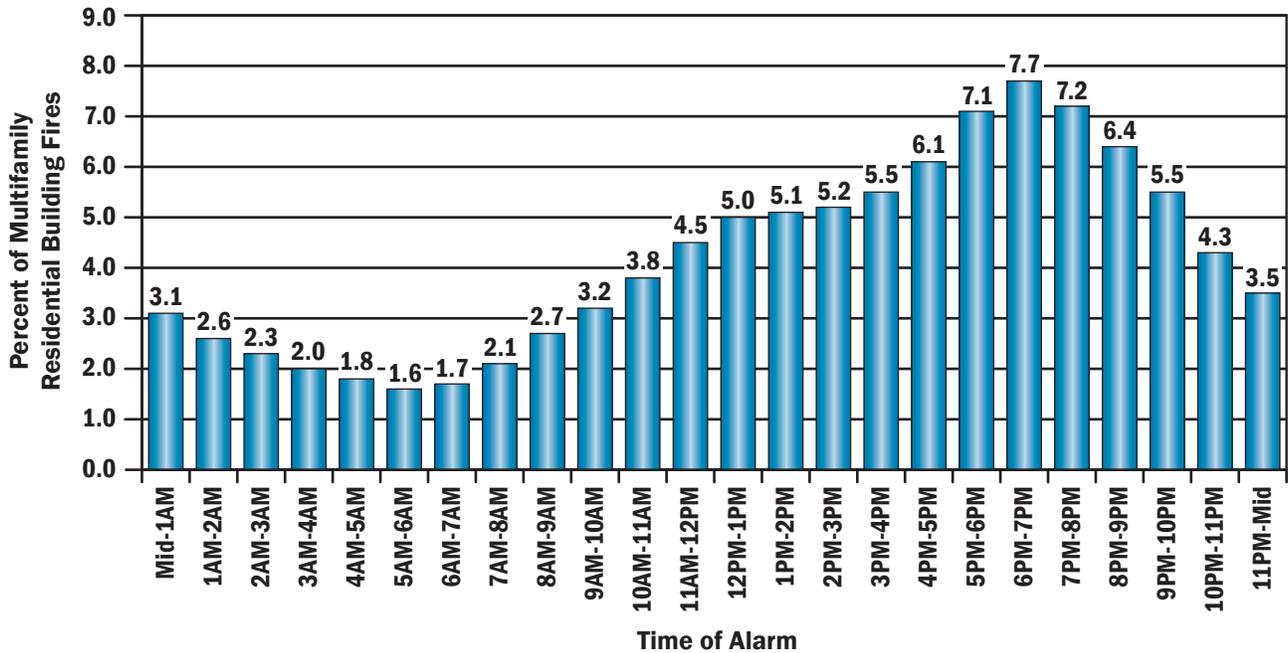
3) When calculating the average dollar loss per fire for 2008 to 2010, the 2008 and 2009 dollar loss values were adjusted to their equivalent 2010 dollar loss values to account for inflation.

When Multifamily Residential Building Fires Occur

As shown in Figure 1, multifamily fires occur most frequently in the early evening hours, peaking during the dinner hours from 5 to 8 p.m.⁶ This peak period is consistent

with the major cause of fires, cooking (discussed in the next section on “Causes of Multifamily Residential Building Fires”), and accounts for 22 percent of multifamily fires. Fires then decline throughout the night, reaching the lowest point during the morning hours (4 to 7 a.m.).

Figure 1. Multifamily Residential Building Fires by Time of Alarm (2008–2010)

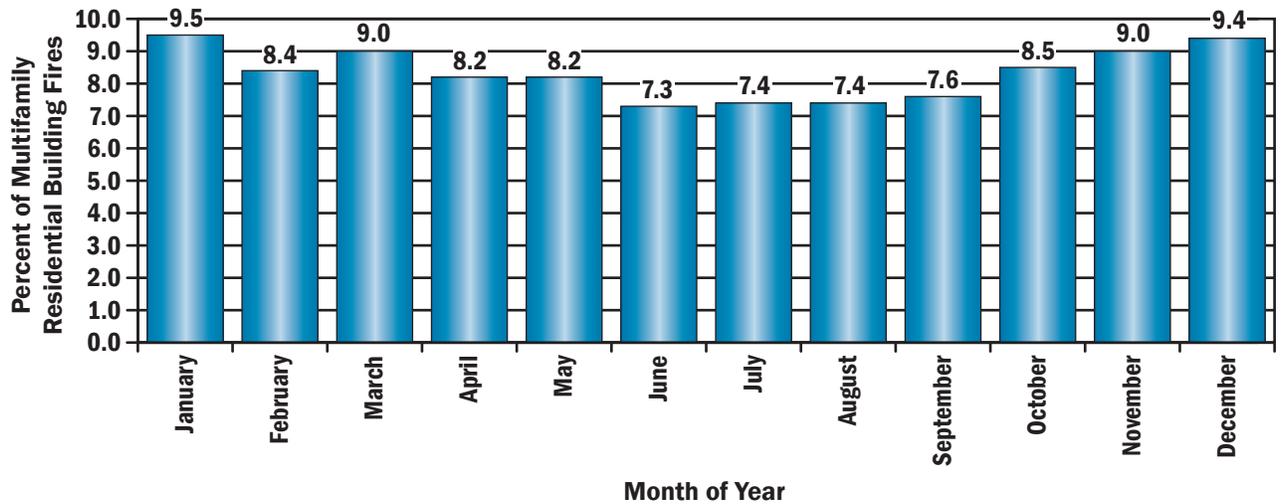


Source: NFIRS 5.0.

Figure 2 illustrates that multifamily fire incidence is slightly higher in the cooler months, peaking in December and January. This peak is partially a result of increases in

heating and seasonal (holiday) cooking fires. Multifamily fire incidence is lowest during the spring and summer months of June, July, and August.

Figure 2. Multifamily Residential Building Fires by Month (2008–2010)



Source: NFIRS 5.0.

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

Causes of Multifamily Residential Building Fires

Cooking is, by far, the leading cause of multifamily fires.⁷ Sixty-nine percent of all multifamily fires are cooking fires as shown in Table 3. By contrast, 32 percent of fires in one- and two-family residential buildings are due to cooking.

Ninety-six percent of all cooking fires in multifamily residences are small, confined fires with limited damage. The next six causes combined account for 21 percent of multifamily fires: heating (6 percent); other unintentional or careless actions (4 percent); electrical malfunctions (3 percent); intentional (3 percent); open flames (3 percent); and equipment misoperation or failure (3 percent).⁸

Table 3. Leading Causes of Multifamily Residential Building Fires (2008–2010)

Cause	Percent (Unknowns Apportioned)
Cooking	69.0
Heating	6.3
Other unintentional, careless	3.7
Electrical malfunction	2.9
Intentional	2.8
Open flame	2.7
Equipment misoperation, failure	2.6

Source: NFIRS 5.0.

The fire cause profile for multifamily buildings is different from the fire cause profile for one- and two-family buildings. While the two leading causes, cooking and heating, are the same, cooking is a substantially more prevalent cause of multifamily fires (69 percent) than of one- and two-family fires (32 percent). Heating is a much smaller cause of multifamily fires (6 percent) than for one- and two-family fires (18 percent). The order and relative size of the remaining causes also differ.

One explanation for the importance of cooking as a cause of multifamily fires may lie in the construction materials, building codes, and professional maintenance of the buildings. For example, many multifamily residential buildings tend to have systems—heating and electrical systems for instance—that are regularly maintained by professionals. As a result, there are fewer fires from lack of maintenance or misuse than in one- and two-family housing. Multifamily buildings also have fewer fire problems related to fireplaces, chimneys, and fireplace-related equipment than one- and two-family residential buildings since multifamily buildings generally lack this equipment.⁹

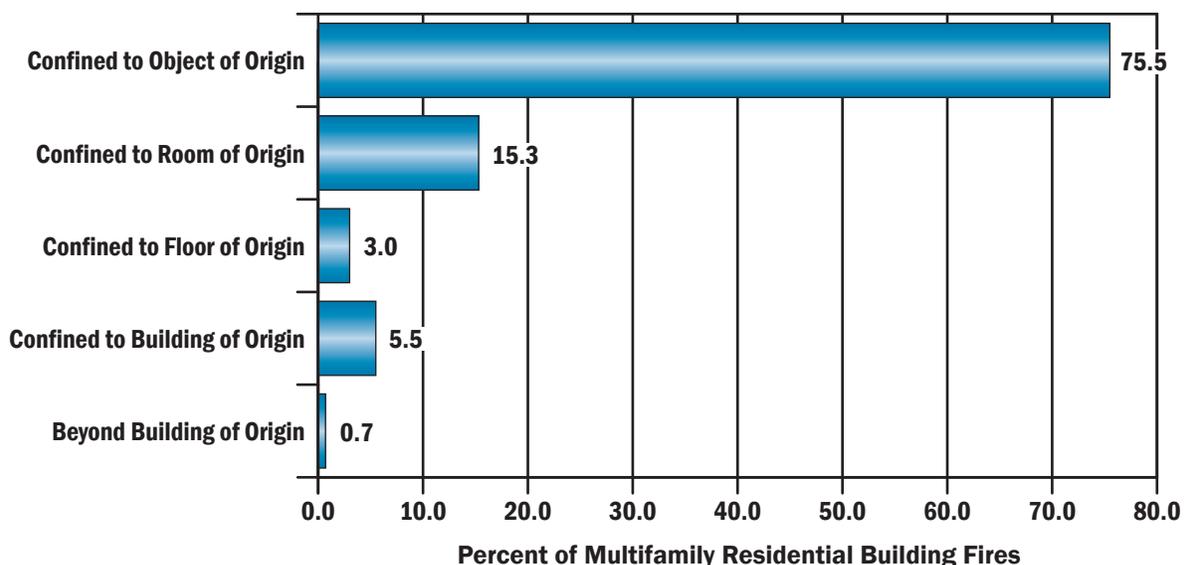
It may also be that confined cooking fires are reported to the fire department more often in multifamily residences. While

these fires are small, contained, and do not cause much damage, someone may hear the alarm in the complex (if the fire is large enough to activate it) or may smell smoke and notify the building manager or the fire department. If it is a newer complex, the alarms are often connected to the building alarm system and the fire department is automatically called. These same small cooking fires in one- and two-family residences may occur as frequently but may not be reported as often. As little damage occurs and only the residents hear the smoke alarm or smell the smoke, the resident may elect not to call the fire department.

Fire Spread in Multifamily Residential Building Fires

Approximately three-quarters of multifamily fires (76 percent) are confined to the object of origin (Figure 3). These fires are primarily coded as confined fires in NFIRS (small, low loss fires that are confined to noncombustible containers)—91 percent of multifamily fires confined to the object of origin are coded as confined fires. Only about 9 percent of multifamily fires extend beyond the room of origin, far fewer than in one- and two-family residences (31 percent).

Figure 3. Extent of Fire Spread in Multifamily Residential Building Fires (2008–2010)



Source: NFIRS 5.0.

Confined Fires

NFIRS allows abbreviated reporting for confined fires and many reporting details of these fires are not required, nor are they reported (not all fires confined to the object of origin are counted as confined fires).¹⁰ Because the majority of multifamily fires are coded as confined fires, the profiles of when multifamily confined fires occur and their causes dominate the overall multifamily fire profile.

As shown in Table 1, confined cooking fires account for the majority of multifamily fire incidents and dominate the cause of multifamily fires.

The occurrence of confined multifamily fires is greatest during the hours from 5 to 8 p.m. when they account for 75 percent of fires that occur during this period. Moreover, confined cooking fires account for 87 percent of the confined fires and 66 percent of all fires in multifamily buildings that occur during this same time period.

Confined multifamily fires also peak in December and January coinciding with the increase in seasonal-related (holiday) cooking fires, decline through the spring, reaching the lowest incidence during the months of June and July.

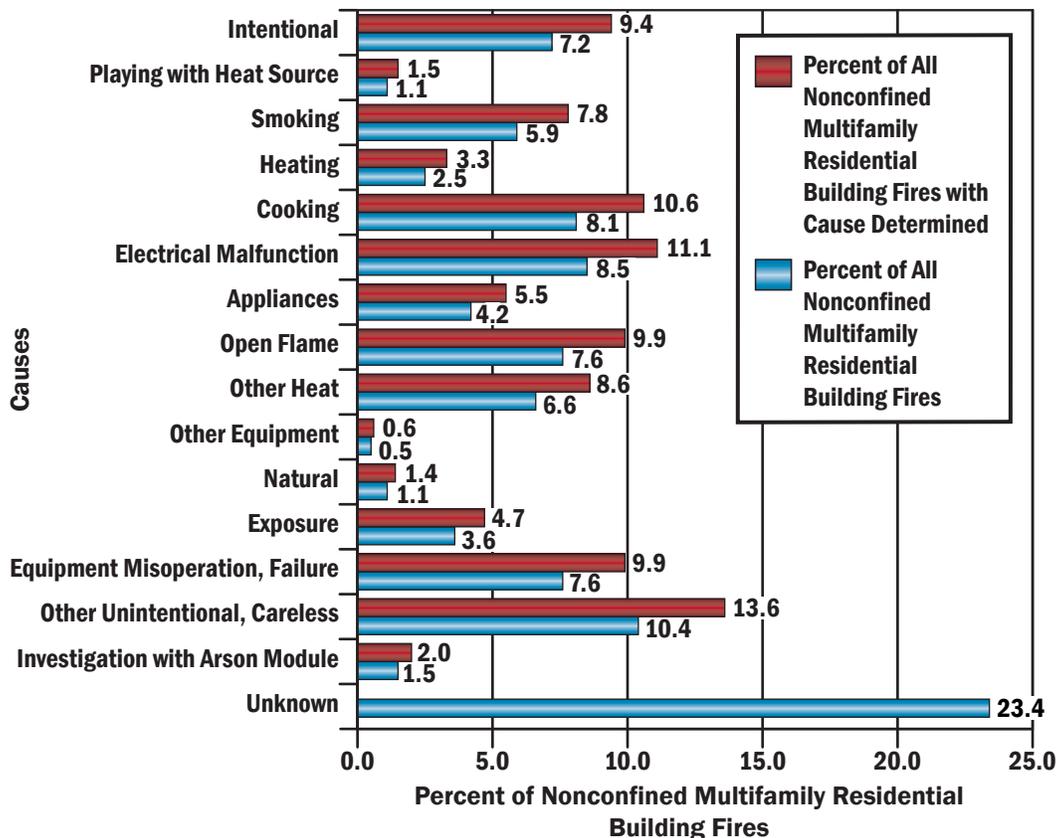
Nonconfined Fires

The next sections of this topical report address nonconfined multifamily fires, the larger and more serious fires, where more detailed fire data are available as they are required to be reported in NFIRS.

Causes of Nonconfined Multifamily Residential Building Fires

While cooking is the leading cause of multifamily fires overall, it only accounts for 11 percent of all nonconfined multifamily fires. Generally, there are no dominating causes of nonconfined multifamily fires. Instead there is a group of five causes, each accounting for 10 to 14 percent, that account for over half (55 percent) of the fires. These leading causes are carelessness or other unintentional actions (14 percent); electrical malfunctions (11 percent); cooking (11 percent); unspecified equipment misoperation or failures (10 percent); and open flames such as candles or matches (10 percent) (Figure 4).¹¹

Figure 4. Causes of Nonconfined Multifamily Residential Building Fires (2008–2010)



Source: NFIRS 5.0.

Notes: 1) Causes are listed in order of the USFA Cause Hierarchy for ease of comparison of fire causes across different aspects of the fire problem. Fires are assigned to 1 of 16 cause groupings using a hierarchy of definitions, approximately as shown in the chart above. A fire is included in the highest category into which it fits. If it does not fit the top category, then the second one is considered, and if not that one, the third, and so on. For example, if the fire is judged to be intentionally set and a match was used to ignite it, it is classified as intentional and not open flame because intentional is higher in the hierarchy.

2) Totals may not add up to 100 percent due to rounding.

Where Nonconfined Multifamily Residential Building Fires Start (Area of Fire Origin)

Thirty-three percent of nonconfined multifamily fires start in cooking areas and kitchens (Table 4). The next leading areas of fire origin are bedrooms (15 percent) and common rooms or lounge areas (7 percent). A few fires start in bathrooms, laundry areas, or on exterior balconies (each at 4 percent).

Note that these areas of origin do not include areas associated with confined fires as that information generally is not

reported for confined fires. Cooking fires are a substantial percentage of all multifamily fires. Therefore, it is likely that the kitchen is the leading area of fire origin for all multifamily fires.

Nonetheless, nonconfined multifamily fires that start in the kitchen are not exclusively cooking fires—only 30 percent of fires that start in the kitchen are cooking fires. Equipment that malfunctions or fails accounts for 21 percent of kitchen fires with other unintentional or careless fires accounting for another 20 percent.

Table 4. Leading Areas of Fire Origin in Nonconfined Multifamily Residential Building Fires (2008–2010)

Areas of Fire Origin	Percent (Unknowns Apportioned)
Cooking area, kitchen	33.4
Bedrooms	14.5
Common room, den, family room, living room, lounge	7.0
Bathroom, checkroom, lavatory	4.2
Laundry area	4.2
Exterior balcony, unenclosed porch	4.1

Source: NFIRS 5.0.

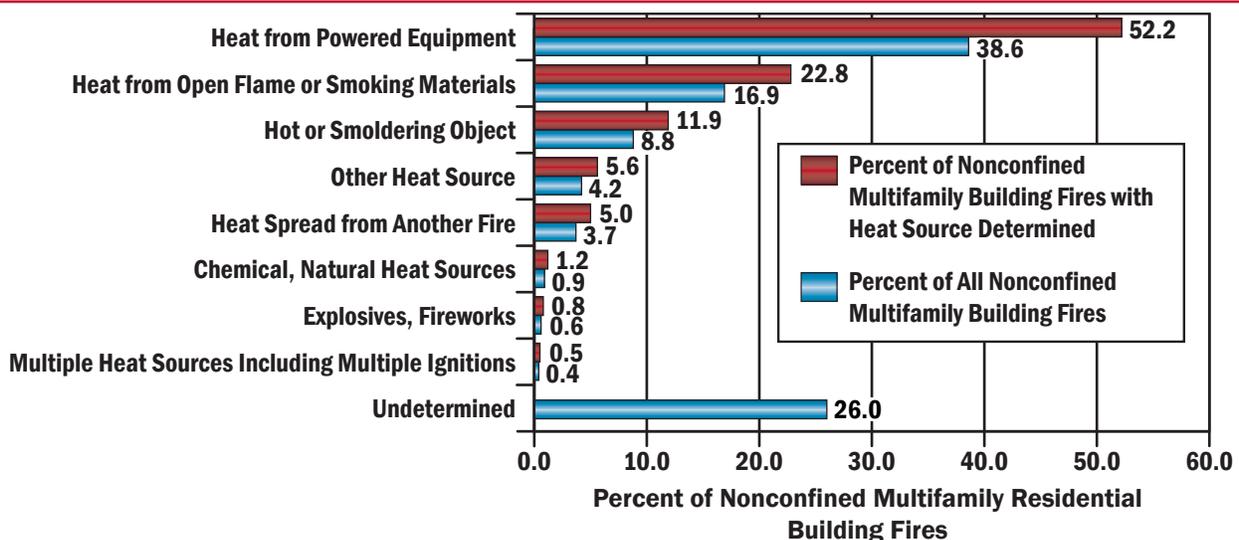
How Nonconfined Multifamily Residential Building Fires Start (Heat Source)

Figure 5 shows sources of heat categories in nonconfined multifamily fires. The heat from the powered equipment category accounts for 52 percent of nonconfined multifamily fires. Among specific items included in this category, radiated or conducted heat from operating equipment accounts for 20 percent of all nonconfined multifamily fires, heat from other powered equipment accounts for 17 percent of

the fires, and electrical arcing accounts for 11 percent of all nonconfined multifamily fires.

Heat from open flame or smoking materials accounts for 23 percent of nonconfined multifamily fires. This category includes cigarettes (7 percent), candles (5 percent), and lighters and matches (combined, 5 percent). The third largest category pertains to hot or smoldering objects (12 percent). This category includes miscellaneous hot or smoldering objects (7 percent) and hot embers or ashes (4 percent).

Figure 5. Sources of Heat in Nonconfined Multifamily Residential Building Fires by Major Category (2008–2010)



Source: NFIRS 5.0.

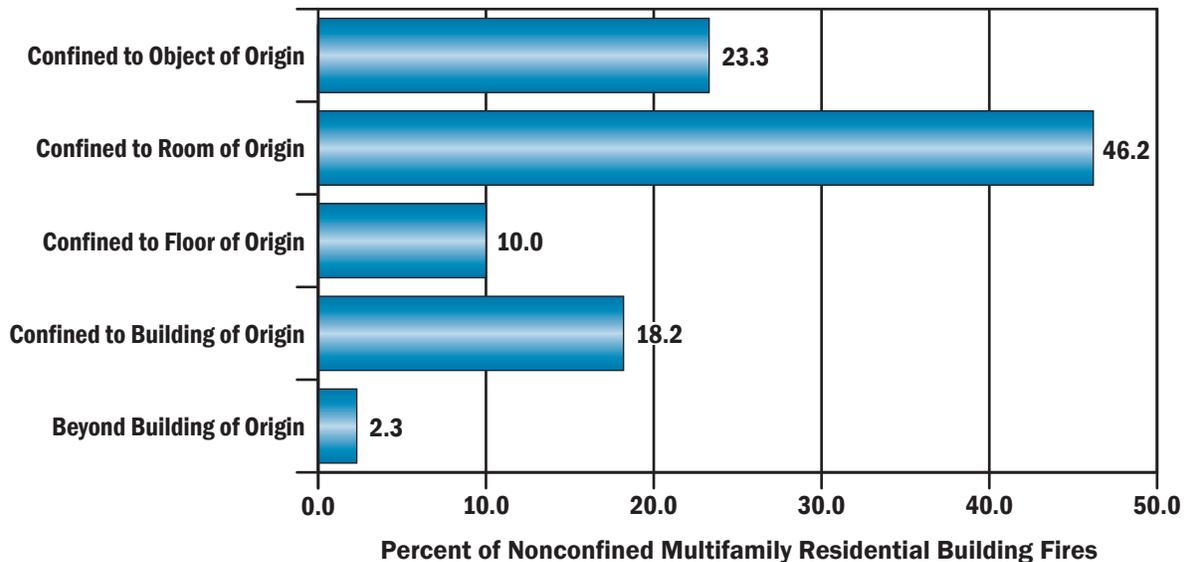
Note: Totals may not add up to 100 percent due to rounding.

Fire Spread in Nonconfined Multifamily Fires

Figure 6 shows the fire spread in nonconfined multifamily fires. The majority of nonconfined fires, 69 percent, are limited to the object or room of fire origin—in 46 percent of nonconfined fires, the fire is confined to the room of origin; in another 23 percent of fires, the fire is confined to the object of origin. Thirty-one percent of nonconfined multifamily fires extend beyond the room of origin. The

leading causes of these larger fires are electrical malfunctions (13 percent); exposures (13 percent); intentionally-set (12 percent); carelessness or other unintentional actions (12 percent); and open flames (10 percent). In contrast, 50 percent of all other nonconfined residential building (excluding multifamily building) fires extend beyond the room of origin. Automatic extinguishing systems (AESs) may have a role in containing multifamily fires as discussed in a later section.

Figure 6. Extent of Fire Spread in Nonconfined Multifamily Residential Building Fires (2008–2010)



Source: NFIRS 5.0.

Factors Contributing to Ignition in Nonconfined Multifamily Residential Building Fires

Table 5 shows the categories of factors contributing to ignition for nonconfined multifamily fires. By far, the leading category contributing to the ignition of nonconfined multifamily fires is the misuse of material or product (46 percent). Abandoned or discarded materials (15 percent of all nonconfined multifamily fires) and a heat source too close to combustible materials (14 percent of all nonconfined

multifamily fires) are the leading specific factors contributing to ignition in this category.

Operational deficiency contributes to 22 percent of nonconfined multifamily fires. Unattended equipment is the leading factor in the operational deficiency category and accounts for 14 percent of all nonconfined multifamily fires. Electrical failures and malfunctions is the third leading category of factors contributing to ignition at 15 percent.

Table 5. Factors Contributing to Ignition for Nonconfined Multifamily Residential Building Fires by Major Category (Where Factors Contributing to Ignition are Specified, 2008–2010)

Factors Contributing to Ignition Category	Percent of Nonconfined Multifamily Residential Building Fires (Unknowns Apportioned)
Misuse of material or product	46.2
Operational deficiency	22.4
Electrical failure, malfunction	14.8
Fire spread or control	7.3
Other factors contributing to ignition	6.4
Mechanical failure, malfunction	5.5
Natural condition	1.3
Design, manufacture, installation deficiency	0.9

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.

Alerting/Suppression Systems in Multifamily Residential Building Fires

Smoke alarm data are available for both confined and non-confined fires, although for confined fires, the data are very limited in scope. As different levels of data are collected on smoke alarms in confined and nonconfined fires, the analyses are performed separately. Note that the data presented in Tables 6 to 8 are the raw counts from the NFIRS data set and are not scaled to national estimates of smoke alarms in multifamily fires. In addition, NFIRS does not allow for the determination of the type of smoke alarm—that is, if the smoke alarm was photoelectric or ionization, or the location of the smoke alarm with respect to the area of fire origin.

Smoke Alarms in Nonconfined Fires

Because of various avenues of fire notification in multifamily buildings, the detailed smoke alarm analyses in the next section focus on all nonconfined fires in multifamily buildings.¹²

Smoke alarms were reported as present in 61 percent of nonconfined multifamily fires. In 21 percent of nonconfined multifamily fires, no smoke alarms were present. In another 18 percent of these fires, firefighters were unable to determine if a smoke alarm was present (Table 6).

When operational status is considered, the percentage of smoke alarms reported as present (61 percent) consists of:

- smoke alarms present and operated—37 percent;
- present, but did not operate—14 percent (fire too small, 7 percent; alarm did not operate, 8 percent);¹³ and,
- present, but operational status unknown—10 percent.

When the subset of incidents where smoke alarms were reported as present are analyzed separately, smoke alarms were reported to have operated in 60 percent of the incidents and failed to operate in 12 percent. In 11 percent of this subset, the fire was too small to activate the alarm. The operational status of the alarm was undetermined in 16 percent of these incidents.

Table 6. NFIRS Smoke Alarm Data for Nonconfined Multifamily Residential Building Fires (2008–2010)

Presence of Smoke Alarms	Smoke Alarm Operational Status	Smoke Alarm Effectiveness	Count	Percent
Present	Fire too small to activate smoke alarm		4,423	6.8
	Smoke alarm operated	Smoke alarm alerted occupants; occupants responded	17,581	27.1
		Smoke alarm alerted occupants; occupants failed to respond	1,129	1.7
		No occupants	2,380	3.7
		Smoke alarm failed to alert occupants	517	0.8
		Undetermined	2,123	3.3
	Smoke alarm failed to operate		4,919	7.6
Undetermined		6,449	9.9	
None present			13,713	21.1
Undetermined			11,760	18.1
Total incidents			64,994	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 nonconfined multifamily fires. They are presented for informational purposes. Total may not add up to 100 percent due to rounding.

Smoke Alarms in Confined Fires

Although less information about smoke alarm status is collected for confined fires, the data still give important insights. Smoke alarms operated and alerted occupants in

51 percent of confined multifamily fires (Table 7). In 14 percent of confined multifamily fires, the occupants were not alerted by the smoke alarm.¹⁴ In 35 percent of these confined fires, the smoke alarm effectiveness was unknown.

Table 7. NFIRS Smoke Alarm Data for Confined Multifamily Residential Building Fires (2008–2010)

Smoke Alarm Effectiveness	Count	Percent
Smoke alarm alerted occupants	76,609	50.5
Smoke alarm did not alert occupants	21,570	14.2
Unknown	53,474	35.3
Total incidents	151,653	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 confined multifamily fires. They are presented for informational purposes.

Automatic Extinguishment Systems in Nonconfined Multifamily Residential Building Fires

AES data—primarily sprinkler systems in residential buildings—are also available for both confined and nonconfined fires but, for confined fires, an AES was present in only

1 percent of reported incidents.¹⁵ Eleven percent of nonconfined multifamily fires had full or partial AESs present (Table 8). The presence of suppression systems, sprinkler systems most likely,¹⁶ was higher in nonconfined multifamily fires than in nonmultifamily nonconfined fires (2 percent only), possibly as a result of code requirements.

Table 8. NFIRS Automatic Extinguishing System Data for Nonconfined Multifamily Residential Building Fires (2008–2010)

AES Presence	Count	Percent
AES present	6,538	10.1
Partial system present	284	0.4
AES not present	55,283	85.1
Unknown	2,889	4.4
Total incidents	64,994	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 multifamily fires. They are presented for informational purposes.

Examples

The following are some recent examples of multifamily fires reported by the media:

- March 2012: A roaring fire at a 93-year-old apartment building just south of downtown Minneapolis, MN, started in an electrical room in the basement. Although no serious injuries were reported, the early morning fire in the 32-unit brick building forced dozens of people out of their homes. The fire department’s arson unit pinpointed the fire’s origin to the electrical room; however, investigators could only determine the cause to be “an unspecified electrical malfunction.”¹⁷
- March 2012: A husband and wife narrowly escaped their burning apartment in Azle, TX. The woman was injured when the flames forced her to jump from a second story window. The unit where the fire started was a total loss and four other units also had smoke and water damage. The fire started in the area of a couch, and investigators believe the fire may have been smoking-related.¹⁸

- March 2012: An early morning, two alarm fire in Berkeley, CA, left a three-story, six-unit apartment building uninhabitable and displaced about 10 occupants. A preliminary investigation by the Berkeley Fire Department deemed the fire accidental and determined it stemmed from a water heater closet.¹⁹
- March 2012: An apartment fire in West Jackson, MS, started shortly after 8 p.m. Once on scene, firefighters saw flames billowing from the rooftop of the building. Witnesses stated that a child playing with matches started the fire; however, no injuries were reported. The official cause of the fire was still under investigation.²⁰

NFIRS Data Specifications for Multifamily Residential Building Fires

Data for this report were extracted from the NFIRS annual Public Data Release (PDR) files for 2008, 2009, and 2010. Only version 5.0 data were extracted.

Multifamily residential building fires are defined as:

- Aid Types 3 (mutual aid given) and 4 (automatic aid given) are excluded to avoid double counting of incidents.
- Incident Types 111 to 123 (excluding Incident Type 112):

Incident Type	Description
111	Building fire
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

Notes: 1) Incident Types 113 to 118 do not specify if the structure is a building.
2) Incident Type 112 was included in data analyses prior to 2008 as previous analyses showed that Incident Types 111 and 112 were used interchangeably. As of 2008, Incident Type 112 is excluded.

- Property Use 429:

Property Use	Description
429	Multifamily dwelling. Includes apartments, condos, town houses, row-houses, tenements.

Notes:

¹ National estimates are based on 2008–2010 native version 5.0 data from the National Fire Incident Reporting System (NFIRS), residential structure fire loss estimates from the National Fire Protection Association’s (NFPA’s) annual surveys of fire loss, and the U.S. Fire Administration’s (USFA’s) residential building fire loss estimates. Fires are rounded to the nearest 100, deaths to the nearest 5, injuries to the nearest 25, and loss to the nearest \$100 million.

² In 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, confined fire incidents that have a residential property use, but do not have a structure type specified are presumed to be buildings. Nonconfined fire incidents that have a residential property use without a structure type specified are considered to be invalid incidents (structure type is a required field) and are not included.

³ In NFIRS, confined fires are defined by Incident Type codes 113 to 118.

⁴ NFIRS 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 code 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.

- Structure Type:
 - For Incident Types 113 to 118:
 - 1—Enclosed building,
 - 2—Fixed portable or mobile structure, and
 - Structure Type not specified (null entry).
 - For Incident Types 111 and 120 to 123:
 - 1—Enclosed building, and
 - 2—Fixed portable or mobile structure.

The analyses contained in this report reflect the current methodologies used by the U.S. Fire Administration (USFA). The USFA is committed to providing the best information on the United States fire problem and continually examines its data and methodology to fulfill this goal. Because of this commitment, data collection strategies and methodological changes are possible and do occur. As a result, analyses and estimates of the fire problem may change slightly over time. Previous analyses and estimates on specific issues (or similar issues) may have used different methodologies or data definitions and may not be directly comparable to the current ones.

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⁵ The 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 is $(1,000*(400/102,300)) = 3.9$ deaths per 1,000 multifamily fires and the fire injury rate is $(1,000*(4,175/102,300)) = 40.8$ injuries per 1,000 multifamily fires.

⁶ For 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.

⁷ The USFA Structure Fire Cause Methodology was used to determine the cause of multifamily residential building fire incidents. The cause definitions can be found at http://www.usfa.fema.gov/fireservice/nfirs/tools/fire_cause_category_matrix.shtm.

⁸ Total does not equal 21 percent due to rounding.

⁹ U.S. Department of Housing and Urban Development (HUD) and U.S. Census Bureau, American Housing Survey Branch, “American Housing Survey for the United States: 2009,” Table 2-25.

¹⁰ As noted previously, 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. In NFIRS, confined fires are defined by Incident Type codes 113 to 118.

¹¹ Total does not equal 55 percent due to rounding.

¹² The discussion in the “Smoke Alarms in Nonconfined Fires” section of this report includes nonconfined fires that occur in both *occupied* and *unoccupied* multifamily residential buildings. There are two principal reasons for including both states of occupancy in the analysis. First, requirements that smoke alarms be interconnected in multifamily units are being included in an increasing number of local building codes. As a result, interconnected alarms may be present in more recently constructed multifamily residential buildings in many jurisdictions. Second, in all multifamily residential buildings, the proximity or closeness of the dwelling units to one another heightens the possibility that an occupant would hear an alarm, smell smoke, or see flames coming from a neighboring unit. So, even though a fire may start in an unoccupied unit, it is possible that a fire department will be notified either automatically or by an occupant in a neighboring unit, who may become alerted to the presence of a fire either by the sounding of an interconnected alarm or by other physical cues.

¹³ Total does not equal 14 percent due to rounding.

¹⁴ In 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, the smoke alarm was present and operated but the occupant was already aware of the fire, or there were no occupants present at the time of the fire.

¹⁵ As confined fires codes are designed to capture fires contained to noncombustible containers, it is not recommended to code a fire incident as a small, low- or no-loss confined fire incident if the automatic extinguishing system (AES) operated and contained the fire as a result. The preferred method is to code the fire as a standard fire incident with fire spread confined to the object of origin and provide the relevant information on AES presence and operation.

¹⁶ From the 2009 American Housing Survey, 11.7 to 12.9 percent of multiunit housing units have sprinklers inside the home. The percentage range reflects the differences in NFIRS’s definition of multifamily and that of the American Housing Survey. HUD and U.S. Census Bureau, American Housing Survey Branch, “American Housing Survey for the United States: 2009,” Table 2-25.

¹⁷ Paul Walsh, Maya Rao, “Unspecified malfunction blamed for Mpls apartment fire,” *startribune.com*, March 12, 2012, <http://www.startribune.com/local/minneapolis/142321545.html> (accessed March 19, 2012).

¹⁸ Shelly Slater, “Couple barely survives apartment fire in Azle,” *wfaa.com*, March 15, 2012, <http://www.wfaa.com/news/local/Couple-barely-survives-apartment-fire-in-Azle-142847545.html> (accessed March 19, 2012).

¹⁹ Weiru Fang, “In aftermath of Dwight apartment building fire, questions remain,” *www.dailycal.org*, March 16, 2012, <http://www.dailycal.org/2012/03/16/in-aftermath-of-dwight-apartment-building-fire-questions-remain/> (accessed March 19, 2012).

²⁰ Kourtney Paige, “Apartment Fire in West Jackson,” *www.fox40tv.com*, March 10, 2012, <http://www.fox40tv.com/news/local/story/Apartment-Fire-in-West-Jackson/x5KCRArpnEqUL19Xqotwdw.csp?rss=2331> (accessed March 19, 2012).