

Multifamily Residential Building Fires (2012-2014)

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 108,000 multifamily residential building fires were reported to fire departments within the United States each year. These fires caused an estimated 410 deaths, 4,125 injuries, and 1.3 billion dollars in property loss.
- Multifamily residential building fires accounted for 29 percent of all residential building fires.
- Small, confined fires accounted for 70 percent of multifamily residential building fires.
- Cooking, at 73 percent, was the leading reported cause of multifamily residential building fires. Of these cooking fires, 92 percent were small, confined fires with limited damage.
- In 32 percent of nonconfined multifamily residential building fires, the fire extended beyond the room of origin. The leading reported cause of these larger fires was exposures (13 percent). In contrast, 53 percent of all other nonconfined residential building (excluding multifamily building) fires extended beyond the room of origin.
- Cooking areas and kitchens (32 percent) were the primary areas of origin for nonconfined multifamily residential building fires.
- Multifamily residential building fire incidence was slightly higher in the cooler months, peaking in January (9 percent).
- Smoke alarms were present in 63 percent and sprinkler systems were present in 12 percent of nonconfined multifamily residential building fires.

From 2012 to 2014, multifamily residential building fires accounted for an annual estimated 108,000 reported fires. These fires accounted for 29 percent of all residential building fires responded to by fire departments across the nation.^{1,2} These fires resulted in an annual average of 410 deaths, 4,125 injuries, and 1.3 billion dollars in property loss.

Multifamily residential buildings include structures such as apartments, town houses, row houses, condominiums, and other tenement properties. Multifamily residential buildings tend to have stricter building codes than one- and two-family buildings.³ Many multifamily residential buildings are rental properties, and they 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 residences, 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. Cooking was the leading reported cause of 73 percent of multifamily residential building fires, almost twice that of all other types of residential buildings. Multifamily residential buildings also tend to have central heating systems that are maintained by professionals instead of homeowners, thus there are typically fewer heating fires from poor maintenance or misuse than in one- and two-family dwellings. Also, 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 (2011-2013)" (Volume 16, Issue 5) topical report, which was released in July 2015. As part of a series of topical reports that address fires in the major residential building types, the remainder of this report addresses the characteristics of multifamily residential



building fires as reported to the National Fire Incident Reporting System (NFIRS). The focus is on fires reported from 2012 to 2014, the data most currently available at the time of the analysis.⁴ Comparisons to one- and two-family residential building fires are noted based on analyses from the “One- and Two-Family Residential Building Fires (2012–2014)” (Volume 17, Issue 2) 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 endnotes 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 fires that are not confined to certain types of equipment or objects. Confined building fires are small fire incidents that are limited in extent, staying within pots, fireplaces or certain other noncombustible containers.⁵ Confined fires rarely result in serious injury or large content loss, and they are expected to have no significant accompanying property loss due to flame damage.⁶

The smaller, confined fires accounted for 70 percent of the multifamily fires, with cooking fires as the predominant type of confined fire (Table 1). Nonconfined fires made up the remaining 30 percent of multifamily fires. In contrast to one- and two-family residences, the relative proportions of confined and nonconfined fires were reversed; nonconfined fires accounted for the bulk of one- and two-family building fires (60 percent), and confined fires accounted for the remaining 40 percent.

Table 1. Multifamily Residential Building Fires by Type of Incident (2012–2014)

Incident Type	Percent
Nonconfined fires	29.7
Confined fires	70.3
Cooking fire, confined to container	61.2
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	2.9
Commercial compactor fire, confined to rubbish	0.8
Trash or rubbish fire, contained	4.8
Total	100.0

Source: NFIRS 5.0.

Loss Measures

Table 2 presents losses, averaged over this three-year period, of reported multifamily fires and all other residential fires.⁷ The average number of fatalities per 1,000 multifamily fires was less than half that of the same loss measure for all other residential building fires. The average dollar loss per fire for

multifamily fires was more than half that of the same loss measure for all other residential building fires. In addition, the average loss measures for nonconfined multifamily fires were substantially higher than the same loss measures for confined multifamily fires; this is to be expected, however, since confined fires rarely result in serious injury or large content loss.

Table 2. Loss Measures for Multifamily Residential Building Fires (Three-Year Average, 2012–2014)

Measure	Multifamily Residential Building Fires	Confined Multifamily Residential Building Fires	Nonconfined Multifamily Residential Building Fires	Residential Building Fires (Excluding Multifamily)
Average Loss				
Fatalities/1,000 fires	3.0	0.0	10.1	6.5
Injuries/1,000 fires	31.5	8.5	85.8	25.5
Dollar loss/fire	\$10,770	\$170	\$35,850	\$18,650

Source: NFIRS 5.0.

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

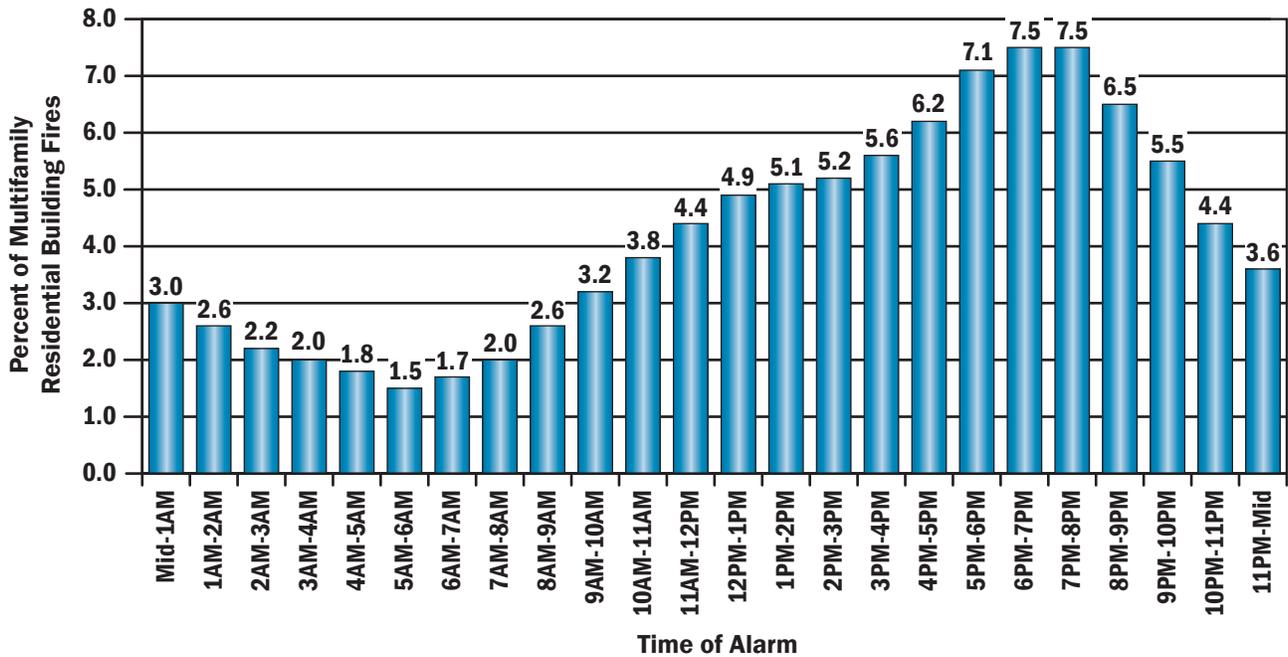
2. The 2012 and 2013 dollar-loss values were adjusted to 2014 dollars.

When Multifamily Residential Building Fires Occur

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

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

Figure 1. Multifamily Residential Building Fires by Time of Alarm (2012–2014)

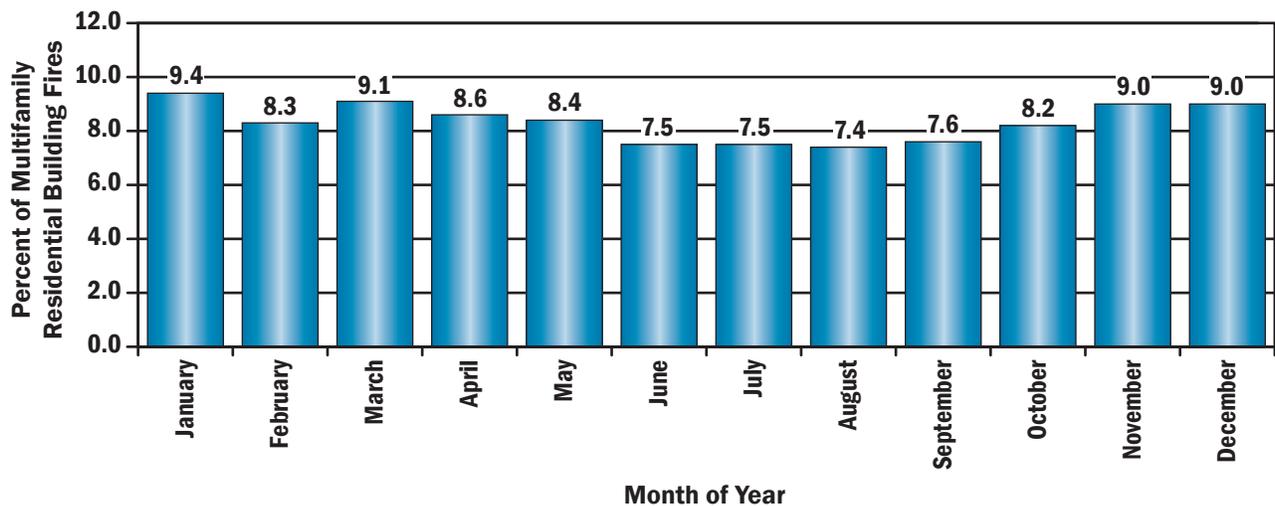


Source: NFIRS 5.0.

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

Figure 2 illustrates that multifamily fire incidence was slightly higher in the cooler months, peaking marginally in January (9 percent). This peak was partially the result of an increase in heating fires. Multifamily fire incidence was lowest during the months of June through September.

Figure 2. Multifamily Residential Building Fires by Month (2012–2014)



Source: NFIRS 5.0.

Causes of Multifamily Residential Building Fires

As shown in Table 3, cooking was by far the leading reported cause of multifamily fires, accounting for 73 percent of all multifamily fires.⁹ The majority of all cooking fires (92

percent) in multifamily residences were small, confined fires with limited damage. The next six causes combined accounted for 18 percent of multifamily fires: heating (5 percent); appliances (3 percent); open flames (3 percent); intentional actions (3 percent);¹⁰ other unintentional, careless actions (3 percent); and smoking (2 percent).¹¹

Table 3. Leading and Secondary Causes of Multifamily Residential Building Fires (2012–2014)

Cause	Percent (Unknowns Apportioned)
Cooking	73.0
Heating	5.3
Appliances	2.9
Open flame	2.7
Intentional	2.5
Other unintentional, careless	2.5
Smoking	2.4

Source: NFIRS 5.0.

The fire cause profile for multifamily buildings was different from the fire cause profile for one- and two-family buildings. While the two leading reported causes, cooking and heating, were the same, cooking was a substantially more prevalent cause of multifamily fires (73 percent) than of one- and two-family fires (37 percent). Heating was a much smaller cause of multifamily fires (5 percent) than of one- and two-family fires (16 percent). The order and relative size of the remaining causes also differed.

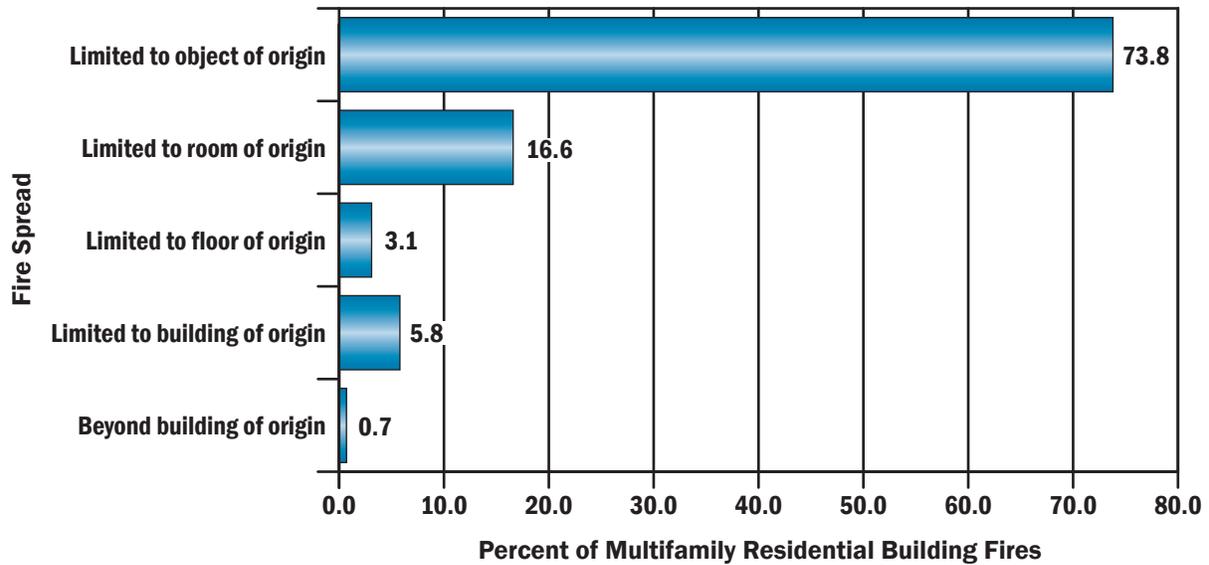
One explanation for the importance of cooking as a cause of multifamily fires may lie in the construction materials, building codes and professional maintenance of the buildings. For example, many multifamily residential buildings tend to have systems — heating and electrical systems, for instance — 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.¹²

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

these fires are small and contained, and they 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 residents may elect not to call the fire department.

Fire Spread in Multifamily Residential Building Fires

Nearly three-quarters of multifamily fires (74 percent) were limited to the object of origin (Figure 3). These fires were primarily coded as confined fires in NFIRS (small, low-loss fires that were confined to noncombustible containers); 93 percent of multifamily fires limited to the object of origin were coded as confined fires. Only 10 percent of multifamily fires extended beyond the room of origin, far fewer than in one- and two-family residences (32 percent).

Figure 3. Extent of Fire Spread in Multifamily Residential Building Fires (2012–2014)

Source: NFIRS 5.0.

Confined Fires

NFIRS allows abbreviated reporting for smaller, confined fires, and many details of these fires are not required to be reported. It is important to note that not all fires where the extent of fire spread is limited to the object of origin are counted as NFIRS confined fires.¹³ For example, a fire in which the fire spread is limited to a mattress or clothes dryer is not defined as a “confined fire” in NFIRS because of the greater potential for spread. Unlike fires in pots or chimneys, there is no container to stop the fire, even though the fire did not spread beyond the object of origin.

Because 70 percent of multifamily fires are confined, the profiles of when multifamily confined fires occurred and their causes dominated the overall multifamily fire profile. As shown in Table 1, confined cooking fires accounted for 61 percent of multifamily fire incidents and dominated the cause of multifamily fires.

The occurrence of confined multifamily fires was greatest during the hours from 5 to 8 p.m., when they accounted for 76 percent of all multifamily fires that occurred during this period. Moreover, confined cooking fires accounted for 90 percent of the confined fires and 68 percent of all fires in multifamily buildings that occurred during this time period.

Confined multifamily fires also peaked in January and declined throughout the spring, reaching the lowest incidence during the month of July.

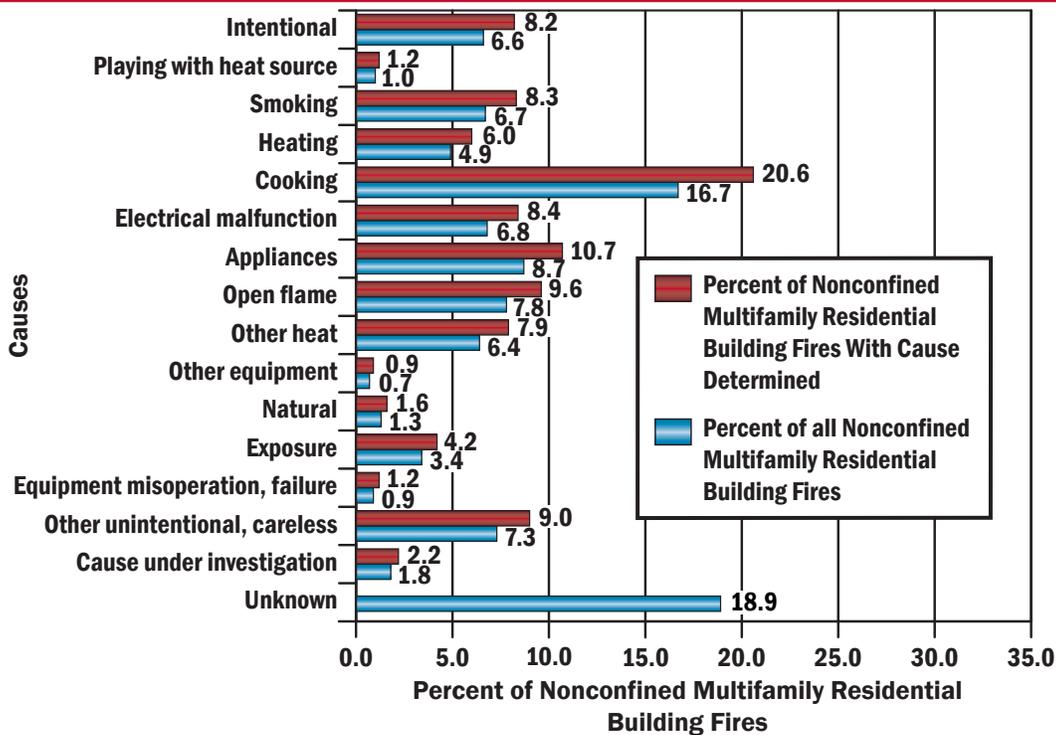
Nonconfined Fires

This section addresses nonconfined multifamily fires — the larger and more serious fires that are not confined to a noncombustible container — 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 was the leading reported cause of nonconfined multifamily fires, as it also was for multifamily fires overall (73 percent), it only accounted for 21 percent of all nonconfined multifamily fires (Figure 4). The next leading reported causes were appliances (11 percent); open flames, such as candles or matches (10 percent); other unintentional, careless actions (9 percent); electrical malfunctions (8 percent); smoking (8 percent); and intentional actions (8 percent). These six causes accounted for 54 percent of the fires.

Figure 4. Causes of Nonconfined Multifamily Residential Building Fires (2012–2014)



Source: NFIRS 5.0.

Notes: 1. Causes are listed in order of the U.S. Fire Administration (USFA) Structure Fire Cause Hierarchy for ease of comparison of fire causes across different aspects of the fire problem. Fires are assigned to one 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. Total percentage of all nonconfined multifamily residential building fires does not add up to 100 percent due to rounding.

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

Nonconfined multifamily fires most often started in cooking areas and kitchens (32 percent), as shown in Table 4. The next leading area of fire origin was bedrooms (13 percent). Additional fires started in family rooms or living rooms (6 percent), exterior balconies or unenclosed porches (6 percent), laundry areas (4 percent), and bathrooms (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 were a

substantial percentage of all multifamily fires. Therefore, it is likely that the kitchen was the leading area of fire origin for all multifamily fires.

Nonetheless, nonconfined multifamily fires that started in the kitchen were not exclusively cooking fires — only 57 percent of fires that started in the kitchen were cooking fires. Other unintentional, careless actions and appliances, such as freezers and refrigerators, accounted for another 20 percent of these kitchen fires, each at 10 percent. Additional nonconfined multifamily fires that started in the kitchen were caused by other heat sources (7 percent) and heating (5 percent).

Table 4. Leading Areas of Fire Origin in Nonconfined Multifamily Residential Building Fires (2012–2014)

Areas of Fire Origin	Percent (Unknowns Apportioned)
Cooking area, kitchen	32.2
Bedrooms	13.1
Common room, den, family room, living room, lounge	6.3
Exterior balcony, unenclosed porch	5.8
Laundry area	4.4
Bathrooms	4.4

Source: NFIRS 5.0.

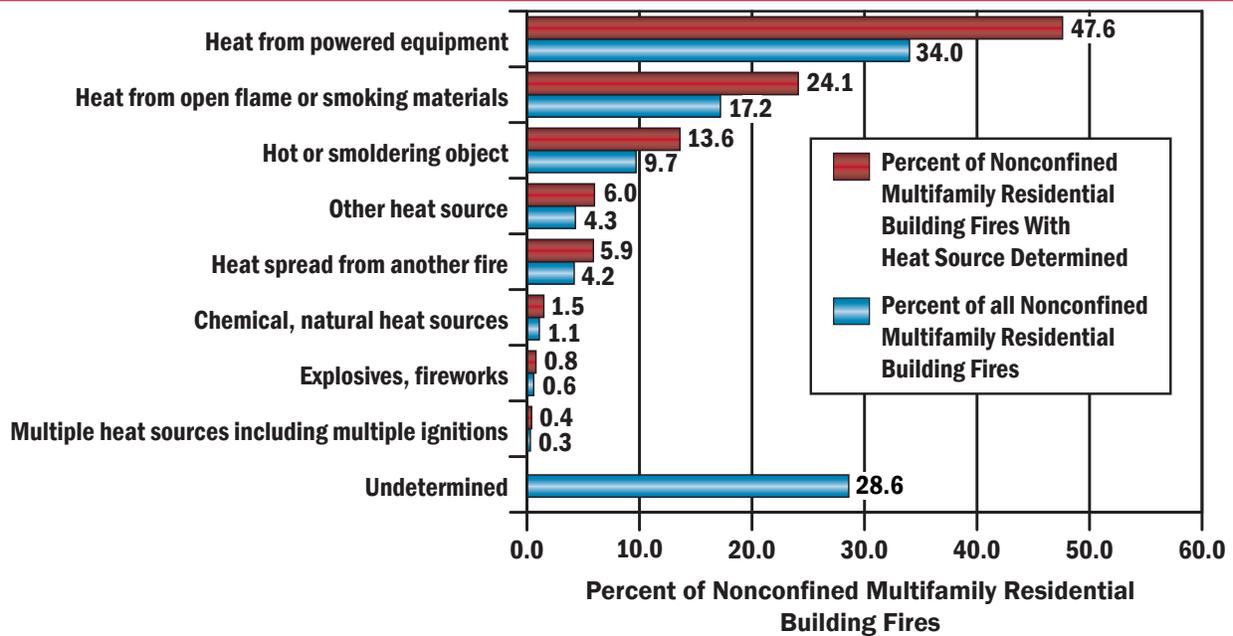
How Nonconfined Multifamily Residential Building Fires Start (Heat Source)

Figure 5 shows sources of heat categories in nonconfined multifamily fires. The heat from powered equipment category accounted for 48 percent of nonconfined multifamily fires. This category includes radiated or conducted heat from operating equipment (18 percent), heat from other powered equipment (16 percent), and electrical arcing (10 percent).

Heat from open flame or smoking materials accounted for 24 percent of nonconfined multifamily fires. This category includes cigarettes (9 percent), heat from miscellaneous open flames or smoking materials (5 percent), lighters and matches (combined, 5 percent), and candles (4 percent).

The third largest heat source category pertains to hot or smoldering objects (14 percent). This category includes miscellaneous hot or smoldering objects (7 percent) and hot embers or ashes (5 percent).

Figure 5. Sources of Heat in Nonconfined Multifamily Residential Building Fires by Major Category (2012–2014)



Source: NFIRS 5.0.

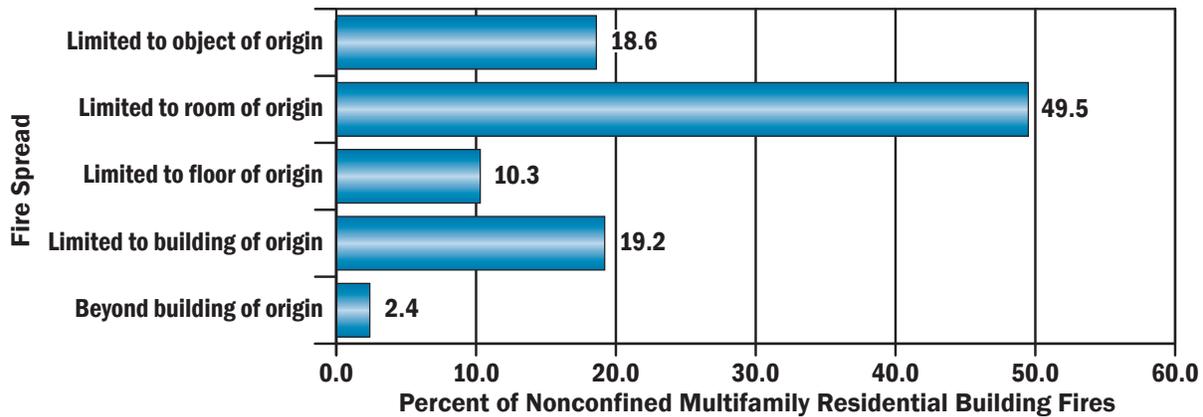
Note: Total of nonconfined multifamily residential building fires with heat source determined does not add up to 100 percent due to rounding.

Fire Spread in Nonconfined Multifamily Fires

Figure 6 shows the extent of fire spread in nonconfined multifamily fires. The majority of nonconfined fires, 68 percent, were limited to the object or room of fire origin. In 50 percent of nonconfined fires, the fire was limited to the room of origin; in another 19 percent of fires, the fire was limited to the object of origin.¹⁴ In 32 percent of nonconfined multifamily fires, the fire extended beyond the room of origin. The leading reported causes of these larger

fires were exposures (13 percent); open flames (10 percent); intentional actions (10 percent); other unintentional, careless actions (10 percent); smoking (10 percent); and electrical malfunctions (10 percent). In contrast, 53 percent of all other nonconfined residential building (excluding multifamily building) fires extended beyond the room of origin. Automatic extinguishing systems (AESs), such as sprinklers, may aid in containing multifamily fires, as discussed in a later section.

Figure 6. Extent of Fire Spread in Nonconfined Multifamily Residential Building Fires (2012–2014)



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 was the misuse of material or product (49 percent). Abandoned or discarded materials (18 percent) and a heat source too close to combustible

materials (15 percent) were the leading specific factors contributing to ignition in this category.

Operational deficiency contributed to 20 percent of nonconfined multifamily fires. Unattended equipment was the leading factor in the operational deficiency category, and it accounted for 12 percent of all nonconfined multifamily fires. Electrical failures and malfunctions was the third leading category of factors contributing to ignition at 14 percent.

Table 5. Factors Contributing to Ignition for Nonconfined Multifamily Residential Building Fires by Major Category (Where Factors Contributing to Ignition Were Specified, 2012–2014)

Factors Contributing to Ignition Category	Percent of Nonconfined Multifamily Residential Building Fires (Unknowns Apportioned)
Misuse of material or product	48.6
Operational deficiency	20.4
Electrical failure, malfunction	14.2
Fire spread or control	7.7
Other factors contributing to ignition	6.5
Mechanical failure, malfunction	5.5
Natural condition	1.6
Design, manufacture, installation deficiency	0.8

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; the total will exceed 100 percent.

Alerting/Suppression Systems in Multifamily Residential Building Fires

Fire fatalities and injuries have declined over the last 35 years, partly due to new technologies to detect and extinguish fires. Smoke alarms are present in most homes. In addition, the use of residential sprinklers is widely supported by the fire service and is gaining support within residential communities.

Smoke alarm data is available for both confined and nonconfined fires, although for confined fires, the data

is very limited in scope. As different levels of data are reported 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 dataset and are not scaled to national estimates of smoke alarms or sprinklers 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.¹⁵

Smoke alarms were reported as present in 63 percent of nonconfined multifamily fires. In 19 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 (63 percent) consisted of:

- Present and operated — 38 percent.
- Present but did not operate — 14 percent (fire too small, 8 percent; alarm failed to operate, 7 percent).¹⁶
- Present but operational status unknown — 10 percent.¹⁷

When the subset of incidents where smoke alarms were reported as present was analyzed separately as a whole, smoke alarms were reported to have operated in 61 percent of these incidents. The alarms failed to operate in 11 percent of the incidents, and the fire was too small to activate the alarm in another 12 percent. Additionally, the operational status of the alarm was undetermined in 16 percent of these incidents.

Nationally, only 3 percent of households do not have smoke alarms.¹⁸ From 2012 to 2014, no smoke alarms were present in at least 19 percent of the nonconfined fires in multifamily buildings — and perhaps more if fires without information on smoke alarms were also taken into account.¹⁹ A large proportion of reported fires without smoke alarms may reflect the effectiveness of the alarms themselves: Smoke alarms do not prevent fires, but they may prevent a fire from being reported if it is detected at an early stage and extinguished before the fire department becomes involved. Alternatively, fires in homes without smoke alarms may **not** be detected at an early stage, causing them to grow large, require fire department intervention, and thus be reported.²⁰

Properly installed and maintained smoke alarms provide an early warning signal to everyone in a home if a fire occurs. Smoke alarms help save lives and property. USFA continues to partner with other government agencies and fire service organizations to improve and develop new smoke alarm technologies. More information on smoke alarm technologies, performance, disposal and storage, training bulletins, and public education and outreach materials can be found at http://www.usfa.fema.gov/prevention/technology/smoke_fire_alarms.html.

Table 6. NFIRS Smoke Alarm Data for Nonconfined Multifamily Residential Building Fires (2012–2014)

Presence of Smoke Alarms	Smoke Alarm Operational Status	Smoke Alarm Effectiveness	Count	Percent
Present	Fire too small to activate smoke alarm		5,019	7.6
	Smoke alarm operated	Smoke alarm alerted occupants; occupants responded	18,962	28.8
		Smoke alarm alerted occupants; occupants failed to respond	1,167	1.8
		No occupants	2,410	3.7
		Smoke alarm failed to alert occupants	454	0.7
		Undetermined	2,345	3.6
	Smoke alarm failed to operate		4,411	6.7
	Undetermined		6,442	9.8
Null/Blank		2	0.0	
None present			12,773	19.4
Undetermined			11,846	18.0
Total reported incidents			65,831	100.0

Source: NFIRS 5.0.

- Notes: 1. The data presented in this table are raw data counts from the NFIRS dataset summed (not averaged) from 2012–2014. They do not represent national estimates of smoke alarms in nonconfined multifamily fires. They are presented for informational purposes.
 2. Total does 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 53 percent of confined multifamily fires (Table 7). In 15 percent of confined multifamily fires, the occupants were not alerted by the smoke alarm.²¹ In 32 percent of the confined fires, the smoke alarm effectiveness was unknown.

Table 7. NFIRS Smoke Alarm Data for Confined Multifamily Residential Building Fires (2012–2014)

Smoke Alarm Effectiveness	Count	Percent
Smoke alarm alerted occupants	83,148	53.4
Smoke alarm did not alert occupants	22,649	14.5
Unknown	49,944	32.1
Total reported incidents	155,741	100.0

Source: NFIRS 5.0.

Note: The data presented in this table are raw data counts from the NFIRS dataset summed (not averaged) from 2012-2014. They do not represent national estimates of smoke alarms in confined multifamily fires. They are presented for informational purposes.

Automatic Extinguishing Systems in Nonconfined Multifamily Residential Building Fires

AES data — primarily from sprinkler systems in residential buildings — is also available for both confined and nonconfined fires, but for confined fires, an AES was present in only 1 percent of reported residential incidents.²² Full or partial AESs were present in 12 percent of nonconfined multifamily fires (Table 8). The presence of suppression systems, sprinkler systems most likely,²³ was greater in nonconfined multifamily fires than in nonconfined fires in all other residential buildings (2 percent only), possibly as a result of code requirements.

Residential sprinkler systems help to reduce the risk of deaths and injuries, homeowner insurance premiums, and uninsured property losses. Yet many homes do not

have AESs, although they are often found in hotels and businesses. Sprinklers are required by code in hotels and many multifamily residences. There are major movements in the U.S. fire service to require sprinklers in all new homes. At present, however, they are largely absent in residences nationwide.²⁴

USFA and fire service officials across the nation are working to promote and advance residential fire sprinklers. More information on costs and benefits, performance, training bulletins, and public education and outreach materials regarding residential sprinklers can be found at http://www.usfa.fema.gov/prevention/technology/home_fire_sprinklers.html. Additionally, USFA's position statement on residential sprinklers is available at http://www.usfa.fema.gov/about/sprinklers_position.html.

Table 8. NFIRS Automatic Extinguishing System Data for Nonconfined Multifamily Residential Building Fires (2012–2014)

Automatic Extinguishing System Presence	Count	Percent
Automatic extinguishing system present	7,772	11.8
Partial system present	371	0.6
Automatic extinguishing system not present	54,068	82.1
Unknown	3,620	5.5
Total reported incidents	65,831	100.0

Source: NFIRS 5.0.

Note: The data presented in this table are raw data counts from the NFIRS dataset summed (not averaged) from 2012-2014. 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:

- February 2016: One person died in a four-unit apartment building fire located in Liberal, Kansas. Upon arrival, Liberal Fire Department crews found the person sleeping inside a smoke-filled apartment. The person was taken to a hospital and died about an hour later from smoke inhalation. The fire, caused by unattended cooking, was contained to one apartment, and damage was estimated at \$30,000.²⁵

- January 2016: According to the Toledo Fire Department, a fire that damaged a South Toledo, Ohio, garden apartment was intentionally set. When crews arrived at approximately 8:15 p.m., smoke and fire were visible in a bottom-floor window. The apartment where the fire started was occupied, but there were no reports of any injuries. Damage was estimated at \$20,000. The cause of the fire is under investigation.²⁶

- January 2016: A morning fire in a North Hollywood, California, apartment building took 30 Los Angeles Fire Department (LAFD) firefighters 14 minutes to extinguish. The fire, which was mostly contained to a first-floor unit, displaced four residents and caused a total of \$105,000 in damage. In addition, one woman was taken to the hospital with symptoms of smoke inhalation. An LAFD representative said that the fire was caused by carelessness with candles that led to the ignition of drapes.²⁷

NFIRS Data Specifications for Multifamily Residential Building Fires

Data for this report were extracted from the NFIRS annual Public Data Release files for 2012, 2013 and 2014. Only Version 5.0 data were extracted.

Multifamily residential building fires were defined using the following criteria:

- Aid Types 3 (mutual aid given) and 4 (automatic aid given) were 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

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

Notes:

¹ National estimates are based on 2012–2014 native Version 5.0 data from NFIRS, residential structure fire loss estimates from the National Fire Protection Association’s (NFPA’s) annual surveys of fire loss, and USFA’s residential building fire loss estimates: http://www.usfa.fema.gov/data/statistics/order_download_data.html. Further information on USFA’s residential building fire loss estimates can be found in the “National Estimates Methodology for Building Fires and Losses,” August 2012, http://www.usfa.fema.gov/downloads/pdf/statistics/national_estimate_methodology.pdf. For information on NFPA’s survey methodology, see NFPA’s report on fire loss in the U.S.: <http://www.nfpa.org/~media/Files/Research/NFPA%20reports/Overall%20Fire%20Statistics/osfireloss.pdf>. In this topical report, fires are rounded to the nearest 100, deaths to the nearest five, injuries to the nearest 25, and dollar loss to the nearest \$100 million.

- Property Use 429:

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

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

The analyses contained in this report reflect the current methodologies used by USFA. USFA is committed to providing the best and most currently available information on the U.S. 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.

Information regarding USFA’s national estimates for residential building fires as well as the data sources used to derive the estimates can be found in the document “Data Sources and National Estimates Methodology Overview for U.S. Fire Administration’s Topical Fire Report Series (Volume 17),” http://www.usfa.fema.gov/downloads/pdf/statistics/data_sources_and_national_estimates_methodology_vol17.pdf. This document also addresses the specific NFIRS data elements analyzed in the topical reports, as well as “unknown” data entries and missing data.

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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 structures 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 occur in 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 “One- and two-family residential buildings” include detached dwellings, manufactured homes, mobile homes not in transit, and duplexes.

⁴ Fire department participation in NFIRS is voluntary; however, some states do require their departments to participate in the state system. Additionally, if a fire department is a recipient of a Fire Act Grant, participation is required. From 2012 to 2014, 67 percent of NFPA’s annual average estimated 1,304,300 fires to which fire departments responded were captured in NFIRS. Thus, NFIRS is not representative of all fire incidents in the U.S. and is not a “complete” census of fire incidents. Although NFIRS does not represent 100 percent of the incidents reported to fire departments each year, the enormous dataset exhibits stability from one year to the next, without radical changes. Results based on the full dataset are generally similar to those based on part of the data.

⁵ In NFIRS, confined fires are defined by Incident Type codes 113-118.

⁶ NFIRS distinguishes between “content” and “property” loss. Content loss includes losses 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. However, there could be property damage as a result of smoke, water and overhaul.

⁷ The average fire death and fire injury loss rates computed from the national estimates do 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 $(1,000 * (410/108,000)) = 3.8$ deaths per 1,000 multifamily residential building fires, and the fire injury rate is $(1,000 * (4,125/108,000)) = 38.2$ injuries per 1,000 multifamily residential building fires.

⁸ For the purposes of this report, the time of the fire alarm is used as an approximation for the general time at which the fire started. However, in NFIRS, it is the time at which the fire was reported to the fire department.

⁹ The USFA Structure Fire Cause Methodology was used to determine the cause of multifamily residential building fires. The cause methodology and definitions can be found in the document “National Fire Incident Reporting System Version 5.0 Fire Data Analysis Guidelines and Issues,” July 2011, http://www.usfa.fema.gov/downloads/pdf/nfirs/nfirs_data_analysis_guidelines_issues.pdf.

¹⁰ Fires caused by intentional actions include, but are not limited to, fires that are deemed to be arson. Intentional fires are those fires that are deliberately set and include fires that result from the deliberate misuse of a heat source and fires of an incendiary nature (arson) that require fire service intervention. For information and statistics on arson fires only, refer to the Uniform Crime Reporting Program arson statistics from the U.S. Department of Justice, FBI, Criminal Justice Information Services Division, <http://www.fbi.gov/about-us/cjis/ucr/ucr>.

¹¹ Total does not add up to 18 percent due to rounding.

¹² The American Housing Survey does not indicate the number of fireplaces, chimneys and fireplace-related equipment per se. It does collect data on fireplaces, etc., as the primary heating unit, which applies to this analysis. U.S. Department of Housing and Urban Development (HUD) and U.S. Census Bureau, 2013 American Housing Survey, “General Characteristics by Units in Structure-All Occupied Units (National),” Table C-12-AO, http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=AHS_2013_C12AO&prodType=table (accessed March 21, 2016).

¹³ As noted previously, confined building fires are small fire incidents that are limited in scope, are confined to noncombustible containers, rarely result in serious injury or large content loss, and are expected to have no significant accompanying property loss due to flame damage. In NFIRS, confined fires are defined by Incident Type codes 113-118.

¹⁴ Total does not add up to 68 percent due to rounding.

¹⁵ The discussion in the Smoke Alarms in Nonconfined Fires section of this report includes nonconfined fires that occurred 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. Thus, 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.

¹⁶ Total does not add up to 14 percent due to rounding.

¹⁷ Total does not add up to 63 percent due to rounding.

¹⁸ Greene, Michael and Craig Andres, “2004-2005 National Sample Survey of Unreported Residential Fires,” Division of Hazard Analysis, Directorate for Epidemiology, U.S. Consumer Product Safety Commission, July 2009.

¹⁹ Here, no smoke alarms were present in **at least** 19 percent of the nonconfined fires in multifamily residential buildings — the 19 percent that were known to not have smoke alarms and some portion (or as many as all) of the fires where the smoke alarm presence was undetermined.

²⁰ The “2004-2005 National Sample Survey of Unreported Residential Fires,” however, suggests that this may not be the case. It is observed that “if this conjecture is true, it would suggest that the percentage decrease in fire department-attended fires would have been greater than unattended fires in the 20 year period between the surveys.”

²¹ 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/s was already aware of the fire; or there were no occupants present at the time of the fire.

²² As confined fire 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 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.

²³ From the 2011 American Housing Survey, 12.7 to 14.0 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 U.S.: 2011,” TableS01: 2011 National-Health and Safety Characteristics-All Occupied Units by Units by Structure Type (created with the American Housing Survey Table Creator, <http://sasweb.ssd.census.gov/ahs/ahstablecreator.html>).

²⁴ HUD and U.S. Census Bureau, 2011 American Housing Survey, “Health and Safety Characteristics-All Occupied Units (National),” Table S-01-AO, http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=AHS_2011_S01AO&prodType=table (accessed March 28, 2016).

²⁵ “Unattended Cooking Blamed for Deadly Liberal Apartment Fire,” [www.cjonline.com](http://www.cjonline.com/news/2016-02-17/unattended-cooking-blamed-deadly-liberal-apartment-fire), February 17, 2016, <http://www.cjonline.com/news/2016-02-17/unattended-cooking-blamed-deadly-liberal-apartment-fire> (accessed April 4, 2016).

²⁶ “South Toledo Apartment Fire Intentionally Set,” www.toledoblade.com, January 22, 2016, <http://www.toledoblade.com/Police-Fire/2016/01/22/South-Toledo-apartment-fire-intentionally-set.html> (accessed April 4, 2016).

²⁷ Rosenberg, Steven, “Candles Spark Fire in North Hollywood Apartment,” www.dailynews.com, January 11, 2016, <http://www.dailynews.com/general-news/20160111/candles-spark-fire-in-north-hollywood-apartment> (accessed April 4, 2016).