Topical Fire Report Series — Volume 13, Issue 8 / September 2012

Heating Fires in Residential Buildings (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 50,100 heating fires in residential buildings occur each year in the United States.
- Heating was the second leading cause of all residential building fires following cooking.
- Residential building heating fires peaked in the early evening hours from 5 to 9 p.m. with the highest peak from 6 to 8 p.m. This 4-hour period accounted for 30 percent of all residential building heating fires.
- Residential building heating fires peaked in January (21 percent) and declined to the lowest point during the summer months from June to August. Heating fires during the summer months tended to be confined fuel burner/boiler malfunction fires (62 percent).
- Confined fires, those fires confined to chimneys, flues, or fuel burners, accounted for 87 percent of residential building heating fires.
- Thirty percent of the nonconfined residential building heating fires occurred because the heat source was too close to combustibles.

From 2008 to 2010, an estimated average of 50,100 heating fires in residential buildings occurred in the United States each year and resulted in an annual average of approximately 150 deaths, 575 injuries, and $326 million in property loss.[1, 2, 3] The term "heating fires" applies to those fires that are caused by central heating units, fixed or portable local heating units, fireplaces, heating stoves, chimneys, and water heaters.[4]

From 2008 to 2010, heating was the second leading cause and accounted for 14 percent of all residential building fires responded to by fire departments across the Nation.[5] Previously, especially during the late 1970s and early 1980s, heating was, by far, the leading cause of residential building fires. Stimulated, in part, by an energy shortage, this surge in heating fires was the result of the sudden increased use of alternative heating, particularly wood heating stoves and space heaters. Since then, the overall numbers of heating fires have substantially decreased. In 1983, there were 200,000 heating fires, but by 2010, that number had fallen to an estimated 46,800 (Table 1).[6, 7]

Table 1. National Estimates of Residential Building Heating Fires and Losses by Year (2008–2010)

Year	Residential Building Heating Fires	Residential Building Heating Fire Deaths	Residential Building Heating Fire Injuries	Residential Building Heating Fire Dollar Loss
2008	53,300	145	600	$345,000,000
2009	50,200	160	550	$306,000,000
2010	46,800	145	575	$326,000,000

Sources: NFIRS 5.0, 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.
Notes: 1) Fires are rounded to the nearest 100, deaths to the nearest 5, injuries to the nearest 25, and loss to the nearest million dollars.
2) The 2008 and 2009 dollar-loss values were adjusted to their equivalent 2010 dollar-loss values to account for inflation.

This topical report addresses the characteristics of residential building heating fires reported to the National Fire Incident Reporting System (NFIRS) from 2008 to 2010. For the purpose of this report, the term "residential heating fires" is synonymous with "residential building heating fires" as residential heating fires commonly mean those fires caused by heating that occur in buildings. "Residential heating fires" is used throughout the body of this report; the findings, tables, charts, headings, and footnotes reflect the full category, "residential building heating 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, fireplaces, or certain other noncombustible containers.[8] 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.[9] Eighty-seven percent of residential heating fires were confined fires as shown in Table 2. By comparison, from 2008 to 2010, 49 percent of all residential building fires were confined fires.[10]

Table 2. Residential Building Heating Fires by Type of Incident (2008–2010)

Incident Type	Percent
Nonconfined fires	13.2
Confined fires	86.8
Chimney or flue fire, confined to chimney or flue	56.5
Fuel burner/boiler malfunction, fire confined	30.4
Total	100.0

Source: NFIRS 5.0.

Loss Measures

Table 3 presents losses, averaged over the 3-year period from 2008 to 2010, for residential heating fires and all other residential building fires (i.e., excluding heating fires) reported to NFIRS.[11] The average loss of fatalities, injuries, and dollar loss for residential heating fires was less than those for all other residential building fires. As can be expected, the average losses associated with nonconfined residential heating fires were notably high since nonconfined fires generally are larger fires resulting in serious injury and more content losses.

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

Measure	Residential Building Heating Fires	Confined Residential Building Heating Fires	Nonconfined Residential Building Heating Fires	Residential Building Fires (Excluding Heating Fires)
Average Loss:				
Fatalities/1,000 Fires	1.5	0.0	11.6	3.9
Injuries/1,000 Fires	8.6	1.6	54.8	29.2
Dollar Loss/Fire	$3,960	$200	$28,780	$13,550

Source: NFIRS 5.0.

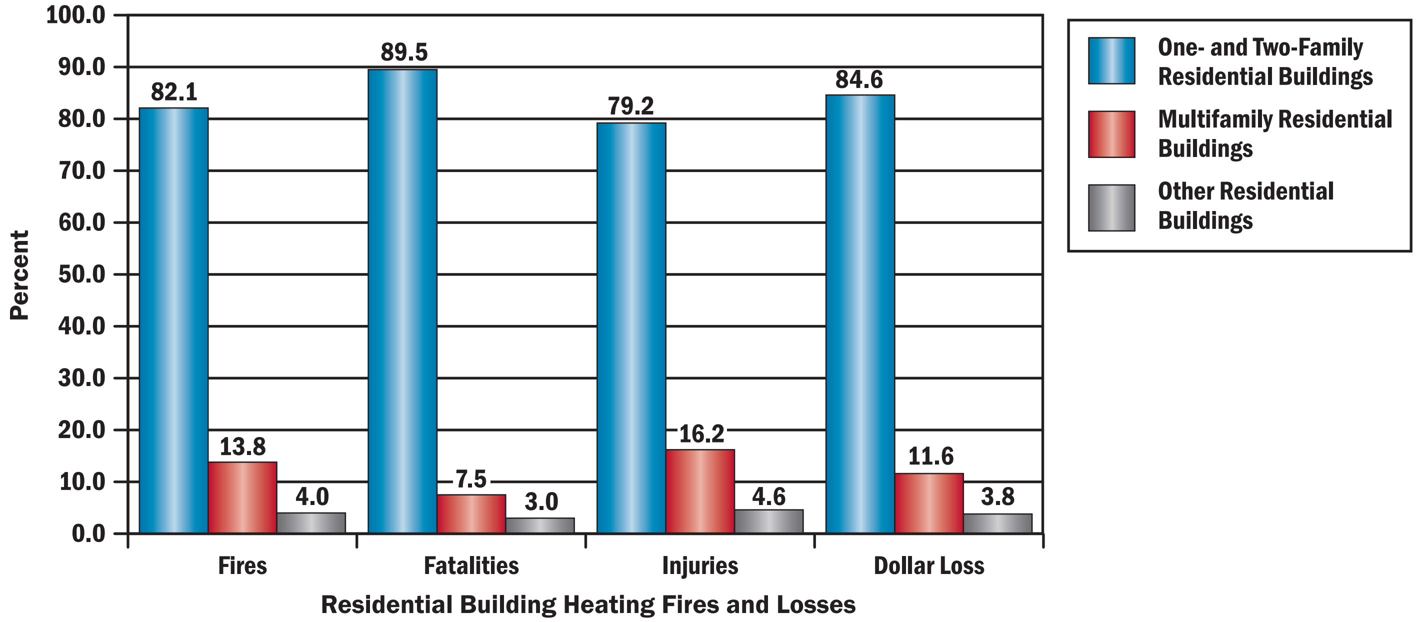
Notes: 1) No deaths in confined fires were reported to NFIRS during 2008–2010; the resulting loss of 0.0 fatalities per 1,000 fires reflects only data reported to NFIRS.
2) Average loss for fatalities and injuries is computed per 1,000 fires; average dollar loss is computed ***per fire*** and is rounded to the nearest $10.
3) When calculating the average dollar loss per fire for 2008–2010, the 2008 and 2009 dollar-loss values were adjusted to their equivalent 2010 dollar-loss values to account for inflation.
4) The category "Residential Building Fires (Excluding Heating Fires)" does not include fires of unknown cause.

Property Use

Figure 1 presents the percentage distribution of residential heating fires and losses by property use (i.e., one- and two-family residential buildings, multifamily residential buildings, and other residential buildings).[12] One- and two-family residences were disproportionately represented in residential heating fires. Heating fires in one- and two-family residences accounted for 82 percent of residential heating fires—yet one- and two-family residences represented only 66 percent of residential fires.[13] Multifamily dwellings accounted for an additional 14 percent of residential heating fires.

Consistent with the fact that the majority of residential heating fires took place in one- and two-family residential buildings (82 percent), the percentages of fatalities (90 percent), injuries (79 percent), and dollar loss (85 percent) were also highest in these types of residences. One reason that heating played a larger role in one- and two-family fires than in multifamily and other residential fires is that one- and two-family residential buildings have fireplaces, chimneys, and fire-place-related equipment that most other types of residential properties do not.[14] In addition, multifamily residential buildings 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.[15]

Figure 1. Residential Building Heating Fires and Losses by Property Use (2008–2010)

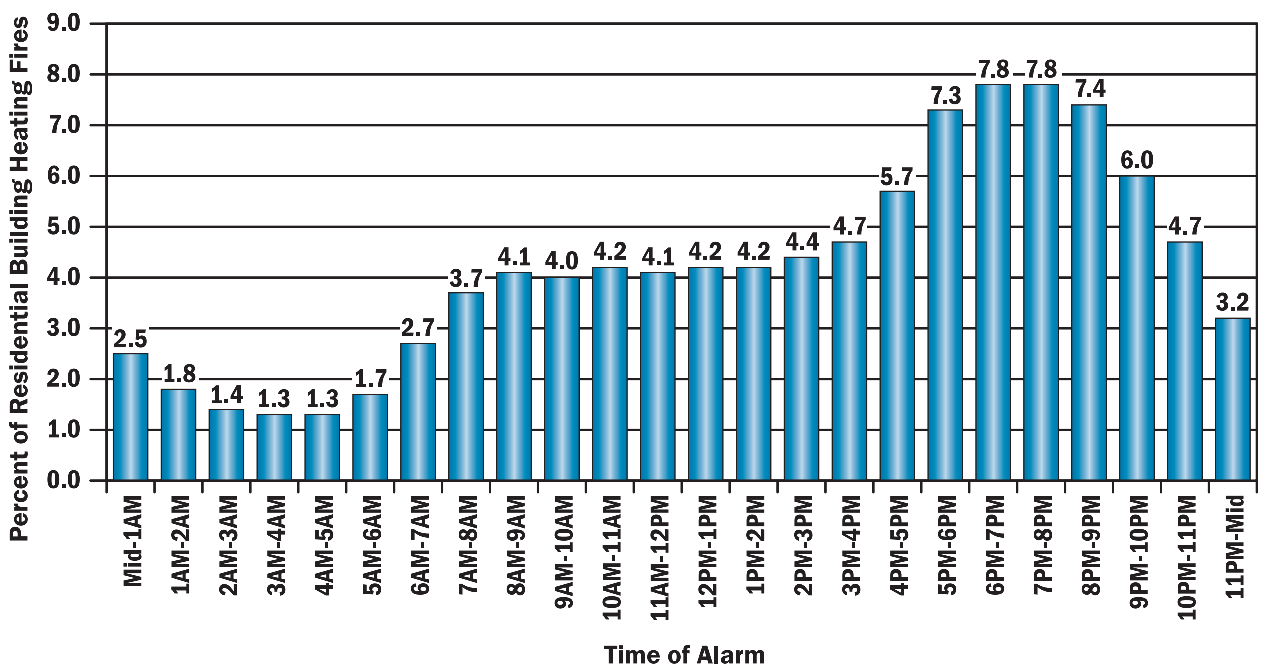


Source: NFIRS 5.0.
Notes: 1) When calculating the dollar losses by property use for 2008–2010, the 2008 and 2009 dollar-loss values were adjusted to their equivalent 2010 dollar-loss values to account for inflation.
2) Totals may not add to 100 percent due to rounding.

When Residential Building Heating Fires Occur

As shown in Figure 2, residential heating fires occurred mainly in the evening hours, 5 to 9 p.m., peaking from 6 to 8 p.m.[16] They declined throughout the night and early morning and reached their lowest point during the morning hours from 3 to 5 a.m. The 4-hour evening period from 5 to 9 p.m. accounted for 30 percent of residential heating fires and the 2-hour morning period from 3 to 5 a.m. accounted for 3 percent. The small, confined fire incidents dominated the alarm profile and produced the pronounced peaks and valleys; the larger, nonconfined fires, experienced an early morning low and an evening peak as well, but less pronounced.

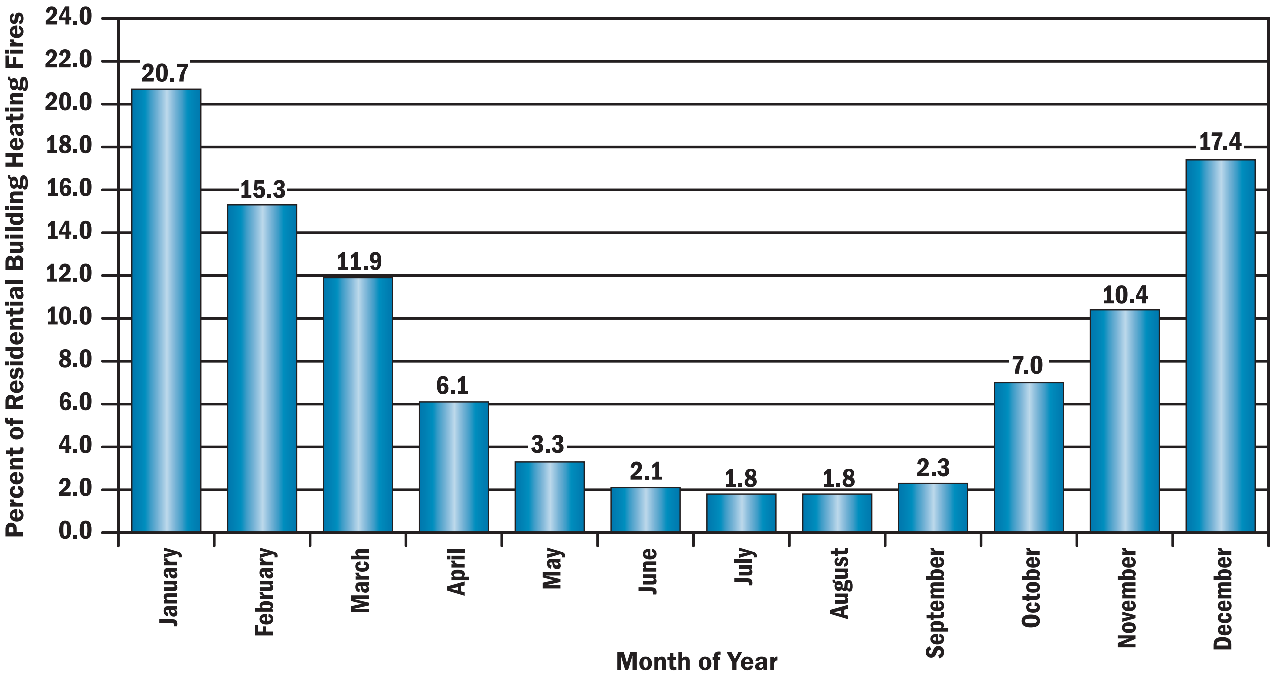
Figure 2. Residential Building Heating Fires by Time of Alarm (2008–2010)



Source: NFIRS 5.0.
Note: Total does not add to 100 percent due to rounding.

As expected, residential heating fires were most prevalent during the winter months from December through February when the use of central heating systems, portable heaters, and fireplaces is most common (Figure 3). The incidence of heating fires peaked in January at 21 percent. From March to August, fires declined from 12 percent to 2 percent. Fire incidence declined to the lowest point during the summer months from June to August, corresponding to reduced heating activities in residential buildings. Both confined and nonconfined residential heating fires followed this overall pattern of winter peaks and summer lows. Residential heating fires during the summer months tended to be confined fuel burner/boiler malfunction fires (62 percent).

Figure 3. Residential Building Heating Fires by Month (2008–2010)

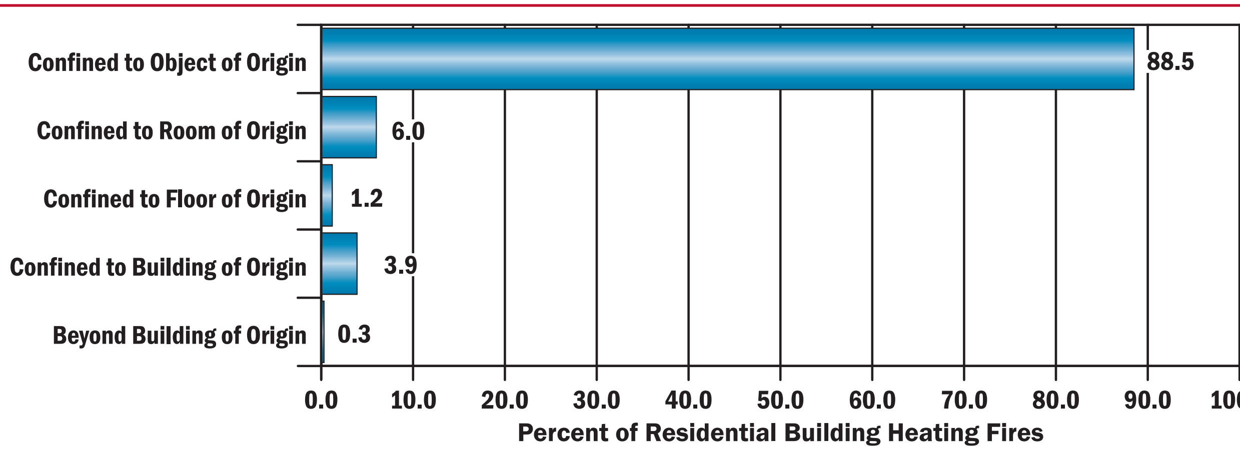


Source: NFIRS 5.0.
Note: Total does not add to 100 percent due to rounding.

Fire Spread in Residential Building Heating Fires

Eighty-nine percent of residential heating fires were confined to the object of origin (Figure 4). These fires were primarily coded as confined fires in NFIRS—96 percent of residential heating fires confined to the object of origin were coded as confined fires. Few fires, 5 percent, extended beyond the room of origin.

Figure 4. Extent of Fire Spread in Residential Building Heating Fires (2008–2010)



Source: NFIRS 5.0.
Note: Total does not add to 100 percent due to rounding.

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).[17] Confined residential heating fires accounted for the majority (87 percent) of residential heating fire incidents and dominated the time of alarm profile. The numbers of confined residential heating fires were greatest during the hours from 5 to 9 p.m. when they accounted for 91 percent of fires that occurred during this period. Confined residential heating fires peaked in January, declined through May, and were lowest during the months of June through August.

Nonconfined Fires

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

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

Five areas in the home—heating rooms/areas or water heater areas (14 percent); cooking areas and kitchens (11 percent); bedrooms (10 percent); common rooms or lounge areas (10 percent); and walls or concealed wall spaces (7 percent)—accounted for over half of nonconfined residential heating fires (Table 4).

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

Area of Origin	**Percent of Nonconfined** Residential Building Heating Fires (Unknowns Apportioned)
Heating room or area, water heater area	14.0
Cooking area, kitchen	11.2
Bedrooms	10.0
Common room, den, family room, living room, lounge	9.9
Wall assembly, concealed wall space	6.8

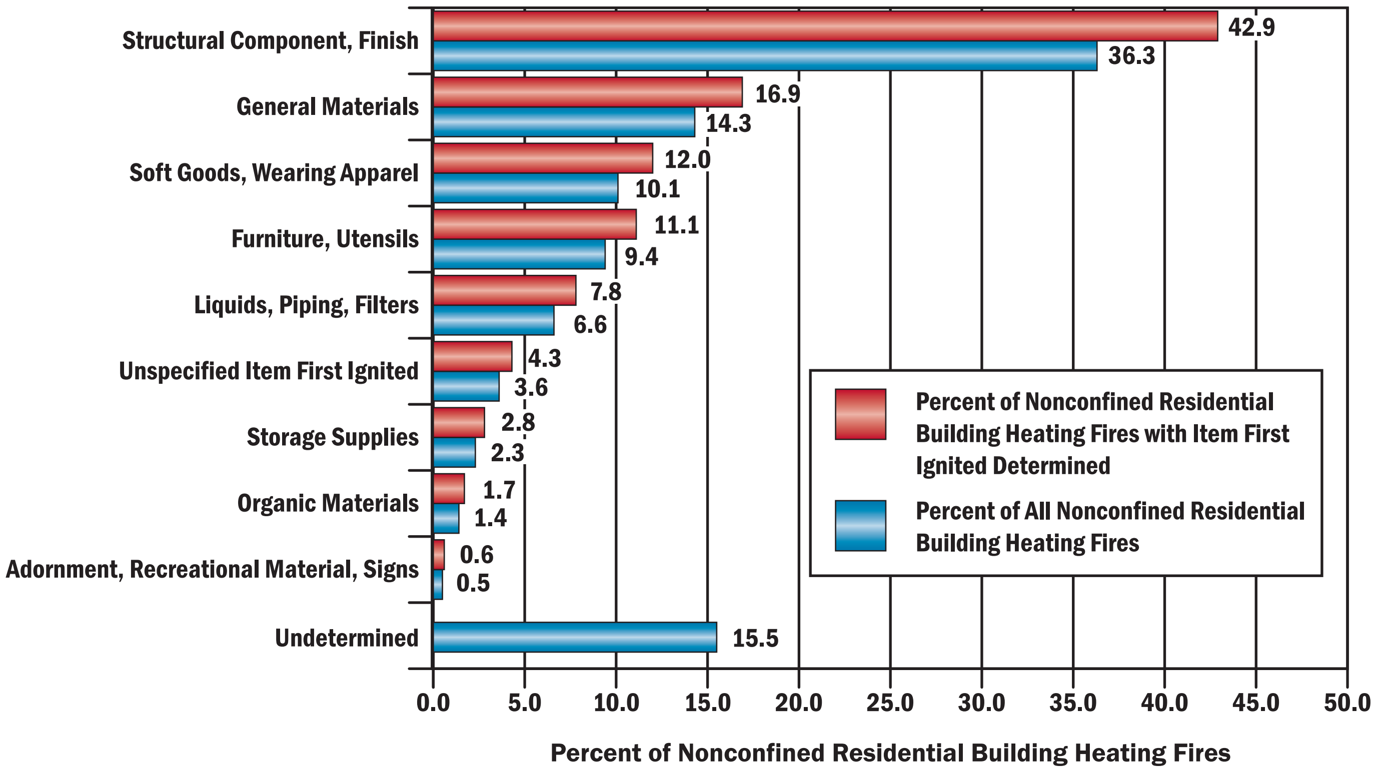
Source: NFIRS 5.0.

What Ignites First in Nonconfined Residential Building Heating Fires

Forty-three percent of the items first ignited in nonconfined residential heating fires fell under the "structural component, finish" category (Figure 5). This category includes structural members or framing, exterior trim and finishes, interior wall coverings, insulation within the walls, partitions, and floor/ceiling surfaces. The second leading category was "general materials," a catch-all category that includes items such as electrical wire insulation, trash/rubbish, and residues (such as chimney residue). General materials accounted for 17 percent of nonconfined residential heating fires. At 12 percent, "soft goods, wearing apparel" was the third leading category of items first ignited.

Structural members or framing (19 percent) and electrical wire and cable insulation (11 percent) were the specific items most often first ignited in nonconfined residential heating fires.

Figure 5. Item First Ignited in Nonconfined Residential Building Heating Fires by Major Category (2008–2010)



Source: NFIRS 5.0.
Note: Total of nonconfined residential building heating fires with item first ignited determined does not add to 100 percent due to rounding.

Equipment Involved in Ignition of Nonconfined Residential Building Heating Fires

Three types of equipment played a leading role in the ignition of 47 percent of nonconfined residential heating fires. These leading types of equipment involved in ignition of nonconfined residential heating fires, as shown in Table 5, were water heaters (16 percent), heaters (16 percent), and heating stoves (15 percent). "Water heaters" include sink-mounted instant hot water heaters and waterbed heaters. "Heaters" include floor furnaces, wall heaters, and baseboard heaters.[18]

Table 5. Leading Equipment Involved in Ignition of Nonconfined Residential Building Heating Fires (2008–2010)

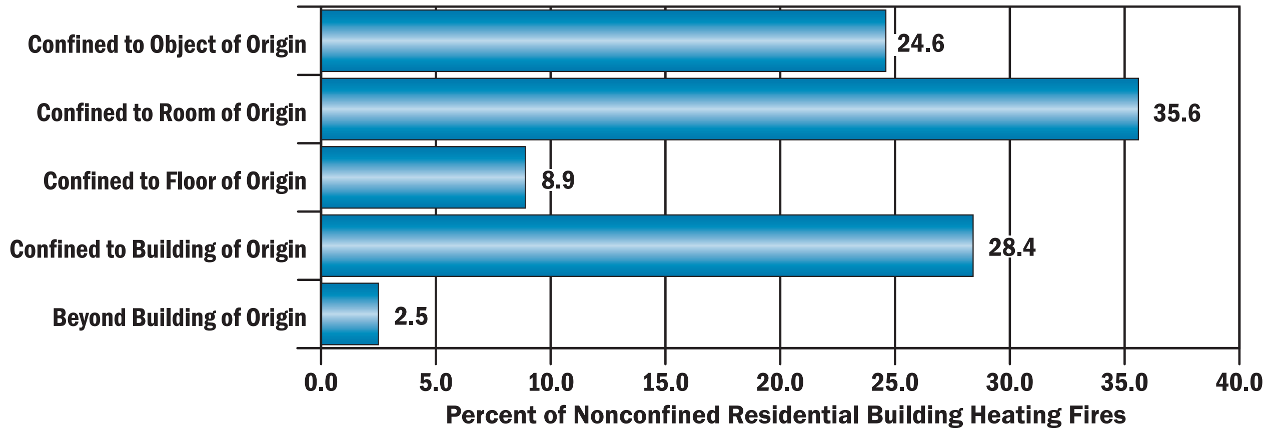
Equipment Involved in Ignition	Percent of Nonconfined Residential Building Heating Fires
Water heater	16.2
Heater	16.0
Heating stove	15.2

Source: NFIRS 5.0.

Fire Spread in Nonconfined Residential Building Heating Fires

The majority of nonconfined residential heating fires, 60 percent, were limited to the object or room of fire origin (Figure 6). The fire spread profile for nonconfined residential heating fires was similar to the fire spread profile for all nonconfined residential fires with slightly more nonconfined heating fires being confined to the room or object of origin.[19]

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



Source: NFIRS 5.0.

Factors Contributing to Ignition in Nonconfined Residential Building Heating Fires

Table 6 shows the categories of factors contributing to ignition for nonconfined residential heating fires. "Misuse of material or product" was the leading category contributing to the ignition of nonconfined residential heating fires (38 percent). "Mechanical failure or malfunction" was the second leading category in 22 percent of residential heating fires, and "operational deficiency" was the third leading category in 19 percent of the fires. These three categories played a role in 79 percent of nonconfined residential heating fires.

Heat source too close to combustibles (30 percent) was, by far, the leading specific factor contributing to ignition. This specific factor was more than twice the second leading factor contributing to ignition, miscellaneous mechanical failure/malfunction (12 percent).

Table 6. Factors Contributing to Ignition for Nonconfined Residential Building Heating Fires by Major Category (Where Factor Contributing to Ignition Specified, 2008–2010)

Factor Contributing to Ignition Category	Percent of Nonconfined Residential Building Heating Fires (Unknowns Apportioned)
Misuse of material or product	37.9
Mechanical failure or malfunction	22.1
Operational deficiency	18.5
Electrical failure, malfunction	18.1
Design, manufacture, installation deficiency	9.8
Other factors contributing to ignition	2.9
Fire spread or control	0.8
Natural condition	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; total will exceed 100 percent.

Suppression/Alerting Systems in Residential Building Heating Fires

Technologies to detect and extinguish fires have been major contributors in the drop in fire fatalities and injuries over the past 30 years. Smoke alarms are now present in the majority of residential buildings. In addition, the use of residential sprinklers is widely supported by the fire service and is gaining support within residential communities.

Smoke alarm data are available for both confined and nonconfined 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 7 to 9 are the raw counts from the NFIRS data set and are not scaled to national estimates of smoke alarms in residential heating fires. In addition, NFIRS does not allow for the determination of the type of smoke alarm (i.e., photoelectric or ionization) or the location of the smoke alarm with respect to the area of fire origin.

Smoke Alarms in Nonconfined Residential Building Heating Fires

Smoke alarms were present in 53 percent of nonconfined residential heating fires (Table 7). In 23 percent of nonconfined residential heating fires, there were no smoke alarms present. In another 24 percent of these fires, firefighters were unable to determine if a smoke alarm was present. Thus, smoke alarms were potentially missing in between 23 and 47 percent of these fires with the ability to spread and possibly result in fatalities.

Table 7. Presence of Smoke Alarms in Nonconfined Residential Building Heating Fires (2008–2010)

Presence of Smoke Alarms	Percent
Present	53.2
None present	22.7
Undetermined	24.1
Total	100.0

Source: NFIRS 5.0.

While only 5 percent of all nonconfined residential heating fires occurred in residential buildings that are **not** currently or routinely occupied, these occupancies—buildings under construction, undergoing major renovation, vacant, and the like—are unlikely to have alerting and suppression systems that are in place and, if in place, that operate. In fact, only 16 percent of all nonconfined heating fires in unoccupied residential buildings were reported as having smoke alarms that operated. As a result, the detailed smoke alarm analyses in the next section focus on nonconfined heating fires in occupied residential buildings only.

Smoke Alarms in Nonconfined Heating Fires in Occupied Residential Buildings

Smoke alarms were reported as present in 55 percent of nonconfined heating fires in occupied residential buildings (Table 8). In 22 percent of nonconfined heating fires in occupied residential buildings, there were no smoke alarms present. In another 24 percent of these fires, firefighters were unable to determine if a smoke alarm was present; unfortunately, in 37 percent of the fires where the presence of a smoke alarm was undetermined, either the flames involved the building of origin or spread beyond it. The fires were so large and destructive that it is unlikely the presence of a smoke alarm could be determined.

When smoke alarms were present (55 percent) and the alarm operational status is considered, the percentage of smoke alarms reported as present consisted of:

- smoke alarms present and operated—32 percent;
- present but did not operate—15 percent (alarm failed to operate, 8 percent; fire too small, 7 percent); and
- present, but operational status unknown—8 percent.

When the subset of incidents where smoke alarms were reported as present are analyzed separately and as a whole, smoke alarms were reported to have operated in 58 percent of the incidents. Smoke alarms failed to operate in 15 percent of the incidents, and in another 13 percent, the fire was too small to activate the alarm. The operational status of the alarm was undetermined in 14 percent of these incidents.

Table 8. NFIRS Smoke Alarm Data for Nonconfined Heating Fires in Occupied Residential Buildings (2008–2010)

Presence of Smoke Alarms	Smoke Alarm Operational Status	Smoke Alarm Effectiveness	Count	Percent
Present	Fire too small to activate smoke alarm		760	7.1
	Smoke alarm operated	Smoke alarm alerted occupants, occupants responded	2,604	24.2
		Smoke alarm alerted occupants, occupants failed to respond	112	1.0
		No occupants	326	3.0
		Smoke alarm failed to alert occupants	105	1.0
		Undetermined	260	2.4
	Smoke alarm failed to operate		897	8.3
	Undetermined		814	7.6
None present			2,329	21.6
Undetermined			2,571	23.9
Total incidents			10,778	100.0

Source: NFIRS 5.0.
Notes: 1) 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 residential building heating fires. They are presented for informational purposes.
2) Total does not add to 100 percent due to rounding.

Smoke Alarms in Confined Residential Building Heating Fires

Less information about smoke alarm status is collected for confined fires, but the data still give important insights about the effectiveness of alerting occupants in these types of fires. It is especially important to look at the limited information provided for these fires since the majority (87 percent) of residential heating fires were confined fires. The analyses presented here do not differentiate between occupied and unoccupied residential buildings, as this data detail is not required when reporting confined fires in NFIRS. However, an assumption may be made that confined fires are fires in occupied housing as these types of fires are unlikely to be reported in residential buildings that are not occupied.

Smoke alarms alerted occupants in 20 percent of confined residential heating fires (Table 9). Occupants were not alerted by the smoke alarm in 25 percent of the confined fires.[20] In 55 percent of these confined fires, the smoke alarm effectiveness was unknown.

Table 9. NFIRS Smoke Alarm Data for Confined Residential Building Heating Fires (2008–2010)

Smoke Alarm Effectiveness	Count	Percent
Smoke alarm alerted occupants	15,051	19.9
Smoke alarm did not alert occupants	19,107	25.3
Unknown	41,295	54.7
Null/Blank	1	0.0
Total incidents	75,454	100.0

Source: NFIRS 5.0.
Notes: 1) 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 residential building heating fires. They are presented for informational purposes.
2) Total does not add to 100 percent due to rounding.

Automatic Extinguishment Systems in Nonconfined Residential Building Heating Fires

Automatic extinguishing system (AES) data are available for both confined and nonconfined fires, although for confined fires, the data are also very limited in scope. In confined residential building fires, an AES was present in less than 1 percent of reported incidents.[21, 22] In addition, the analyses presented here do not differentiate between occupied and unoccupied housing, as extremely few reported fires in unoccupied housing have AESs present (occupied housing accounted for 96 percent of reported nonconfined residential heating incidents with full AESs).

Full or partial AESs were present in only 3 percent of nonconfined residential heating fires (Table 10). While the use of residential sprinklers is widely supported by the fire service and is gaining support within residential communities, the lack of AESs is not unexpected as they are not yet widely installed. In fact, only 3 percent of **all** nonconfined residential building fires had AESs present.[23]

Table 10. NFIRS Automatic Extinguishing System (AES) Data for Nonconfined Residential Building Heating Fires (2008–2010)

AES Presence	Count	Percent
AES present	327	2.9
Partial system present	7	0.1
AES not present	10,638	93.1
Unknown	455	4.0
Total incidents	11,427	100.0

Source: NFIRS 5.0.

Notes: 1) 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 residential building heating fires. They are presented for informational purposes.

2) Total does not add to 100 percent due to rounding.

Examples

The following are recent examples of residential heating fires reported by the media:

- February 2012: A 67-year-old woman died in an early morning Columbia, SC, house fire from smoke inhalation and carbon monoxide poisoning. Columbia-Richland Fire Marshal Office officials announced that the fire was caused by a space heater located too close to an upholstered chair. The radiant heat from the space heater ignited the combustible fibers of the chair and nearby contents of the main living room where the victim was found. Damages to the home were estimated at $26,000.[24]
- February 2012: Fire crews believe a two-story house in Austin, TX, went up in flames due to an unclean chimney. A neighbor initially noticed an unusual amount of smoke billowing from the home's chimney consuming the attic and roof, alerted the homeowner, and called 9-1-1. The homeowners recently moved in to the home and did not know whether the fireplace and chimney had been cleaned out or not. The family, along with their pets, got out safely and was not injured. It was estimated, however, that 30 percent of the house was damaged.[25]
- January 2012: Grand Junction, CO, fire officials said a fire that caused moderate structural damage to a home was accidental and caused by a malfunctioning furnace. Officials said that the furnace shot flames through the ducts, which broke out in the master bedroom. A mother and her two children were home when the fire broke out, but no injuries were reported.[26]
- January 2012: Fire and Rescue Department units in Fairfax County, VA, responded to an early morning single-family house fire and, upon arrival, encountered heavy smoke and fire coming from the garage. The fire rapidly spread into the attic along the roof line of the two-story home. Firefighters conducted an aggressive interior fire attack and brought the fire under control in approximately 20 minutes. According to fire investigators, the fire was accidental and caused by a broken seam in the chimney of the zero-clearance fireplace. The family of four escaped without injuries but was displaced. Damage was estimated at $100,000.[27]

NFIRS Data Specifications for Residential Building Heating 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.

Residential building heating fires are defined by the following criteria:

- Aid Types 3 (mutual aid given) and 4 (automatic aid given) are excluded to avoid double counting of incidents.
- Incident Types 111, 114, 116, 120–123:[28]

Incident Type	Description
111	Building fire
114	Chimney or flue fire, confined to chimney or flue
116	Fuel burner/boiler malfunction, fire confined
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) Note that Incident Types 114 and 116 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 400 to 464:

Property Use	Description
400	Residential, other
419	One- or two-family dwelling
429	Multifamily dwelling
439	Boarding/Rooming house, residential hotels
449	Hotel/Motel, commercial
459	Residential board and care
460	Dormitory-type residence, other
462	Sorority house, fraternity house
464	Barracks, dormitory

- Structure Type:
  - For Incident Types 114 and 116:
    - 1—Enclosed building,
    - 2—Fixed portable or mobile structure, and
    - Structure Type not specified (null entry).
  - For Incident Types 111 and 120–123:
    - 1—Enclosed building, and
    - 2—Fixed portable or mobile structure.

- The U.S. Fire Administration (USFA) Structure Fire Cause Methodology was used to determine residential building heating fire incidents.[29]

- Heating fire incidents involving heating stoves and food were believed to be cooking fires. As a result, fires with equipment involved in ignition code 124 (stove, heating) and item first ignited code 76 (cooking materials; includes edible materials for man or animal; excludes cooking utensils) were removed from the query.

The analyses contained in this report reflect the current methodologies used by the USFA. The USFA is committed to providing the best and most current 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.

To request additional information or to comment on this report, visit http://apps.usfa.fema.gov/feedback/

Notes:

[1] National estimates are based on 2008–2010 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 (NFPA's) annual surveys of fire loss, and the U.S. Fire Administration's (USFA's) residential buildings 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 million dollars.

[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] The term "residential buildings" includes what are commonly referred to as "homes," whether they are one- or two-family dwellings or multifamily buildings. It also includes manufactured housing, hotels and motels, residential hotels, dormitories, assisted living facilities, and halfway houses—residences for formerly institutionalized individuals (patients with mental disabilities, drug addicts, or those formerly incarcerated) that are designed to facilitate their readjustment to private life. The term "residential buildings" does not include institutions such as prisons, nursing homes, juvenile care facilities, or hospitals, even though people may reside in these facilities for short or long periods of time.

[4] For purposes of this analysis, residential building heating fires are defined as those residential buildings (defined above) for which the cause of the fire was determined to be heating. However, for the confined fire portion of residential building fires, only those with Incident Types 114 and 116 were included; all other confined fire types were excluded.

[5] "Residential Building Fires (2008–2010)," USFA, April 2012, Volume 13, Issue 2, http://www.usfa.fema.gov/downloads/pdf/statistics/v13i2.pdf.

[6] *Fire in the United States 1983–1990*, Eighth Edition, U.S. Fire Administration, Federal Emergency Management Agency, October 1993.

[7] "2010 Residential Building Heating Fire Trends," USFA Fire Estimate Summary Series, http://www.usfa.fema.gov/downloads/pdf/statistics/res_bldg_heating_fire_trends.pdf (released December 2011).

[8] In NFIRS, confined fires are defined by Incident Type codes 113–118.

[9] 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, 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.

[10] "Residential Building Fires (2008–2010)," USFA, April 2012, Volume 13, Issue 2, http://www.usfa.fema.gov/downloads/pdf/statistics/v13i2.pdf.

[11] The average fire death and fire injury loss rates computed from the national estimates above 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*(150/50,100)) = 3.0 deaths per 1,000 residential building heating fires and the fire injury rate is (1,000*(575/50,100)) =11.5 injuries per 1,000 residential building heating fires.

[12] "One- and two-family residential buildings" include detached dwellings, manufactured homes, mobile homes not in transit, and duplexes. "Multifamily residential buildings" include apartments, townhouses, rowhouses, condominiums, and other tenement properties. "Other residential buildings" include boarding/rooming houses, hotels/motels, residential board and care facilities, dormitory-type residences, sorority/fraternity houses, and barracks.

[13] "Residential Building Fires (2008–2010)," USFA, April 2012, Volume 13, Issue 2, http://www.usfa.fema.gov/downloads/pdf/statistics/v13i2.pdf.

[14] "One- and Two-Family Residential Building Fires (2008–2010)," USFA, May 2012, Volume 13, Issue 4, http://www.usfa.fema.gov/downloads/pdf/statistics/v13i4.pdf.

[15] "Multifamily Residential Building Fires (2008–2010)," USFA, May 2012, Volume 13, Issue 5, http://www.usfa.fema.gov/downloads/pdf/statistics/v13i5.pdf.

[16] 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.

[17] 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 113–118.

[18] "Heaters" exclude catalytic heaters, oil filled heaters, and hot water heaters.

[19] "Residential Building Fires (2008–2010)," USFA, April 2012, Volume 13, Issue 2, http://www.usfa.fema.gov/downloads/pdf/statistics/v13i2.pdf.

[20] 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.

[21] "Residential Building Fires (2008–2010)," USFA, April 2012, Volume 13, Issue 2, http://www.usfa.fema.gov/downloads/pdf/statistics/v13i2.pdf.

[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 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.

[23] "Residential Building Fires (2008–2010)," USFA, April 2012, Volume 13, Issue 2, http://www.usfa.fema.gov/downloads/pdf/statistics/v13i2.pdf.

[24] Kara Durrette, "Fire Chief: Space Heater Caused Fatal House Fire," www.midlandsconnect.com, February 9, 2012, http://www.midlandsconnect.com/news/story.aspx?id=717763 (accessed April 26, 2012).

[25] Jacqueline Ingles, "Dirty Chimney Causes House Fire," www.kxan.com, February 21, 2012, http://www.kxan.com/dpp/news/local/austin/austin-assists-in-shady-hollow-fire (accessed April 26, 2012).

[26] "Authorities: Furnace Caused House Fire," www.krextv.com, January 9, 2012, http://www.krextv.com/news/around-the-region/Authorities-Know-Cause-of-House-Fire-136990513.html (accessed April 26, 2012).

[27] "Accidental Fireplace House Fire," www.fairfaxcounty.gov, January 3, 2012, http://www.fairfaxcounty.gov/fr/news/2012archive/2012_001.htm (accessed April 26, 2012).

[28] Heating is defined by the equipment used to heat a residential building. Incident Types 113, 115, 117, and 118 were excluded because, by definition, these Incident Types were not heating fires.

[29] The USFA Structure Fire Cause Methodology is designed for structure fires of which buildings are a subset. The cause definitions can be found at http://www.usfa.fema.gov/fireservice/nfirs/tools/fire_cause_category_matrix.shtm.