

# HOME CANDLE FIRES

**Marty Ahrens**  
**December 2011**



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

# HOME CANDLE FIRES

**Marty Ahrens**  
**December 2011**



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

## **Abstract**

Based on data from the U.S. Fire Administration's (USFA's) National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association's (NFPA's) annual fire department experience survey, NFPA estimates that candles were the heat source in an estimated average of 12,860 reported home fires annually during 2005-2009. These fires caused an average of 136 civilian deaths, 1,041 civilian injuries and \$471 million in direct property damage per year. Roughly one-third (36%) of home candle fires started in the bedroom. More than half (55%) of the fires occurred because the candle was too close to something that could burn. Candles used for light in the absence of electrical power appear to pose a particular risk of fatal fire. Home candle fires climbed through the 1990s but have been falling since the 2001 peak. ASTM F15.45 has developed a number of standards relating to candle fire safety.

Keywords: candle fires; home fires, fire causes, fire statistics

## **Acknowledgements**

The National Fire Protection Association thanks all the fire departments and state fire authorities who participate in the National Fire Incident Reporting System (NFIRS) and the annual NFPA fire experience survey. These firefighters are the original sources of the detailed data that make this analysis possible. Their contributions allow us to estimate the size of the fire problem.

We are also grateful to the U.S. Fire Administration for its work in developing, coordinating, and maintaining NFIRS.

For more information about the National Fire Protection Association, visit [www.nfpa.org](http://www.nfpa.org) or call 617-770-3000. To learn more about the One-Stop Data Shop go to [www.nfpa.org/osds](http://www.nfpa.org/osds) or call 617-984-7443.

Copies of this analysis are available from:

National Fire Protection Association  
One-Stop Data Shop  
1 Batterymarch Park  
Quincy, MA 02169-7471  
[www.nfpa.org](http://www.nfpa.org)  
e-mail: [osds@nfpa.org](mailto:osds@nfpa.org)  
phone: 617-984-7443

NFPA No. PKG34

Copyright © 2011, National Fire Protection Association, Quincy, MA

## Executive Summary

---

During 2005-2009, U.S. fire departments responded to an estimated average of 12,860 home structure fires started by candles per year. These fires caused an annual average of 136 civilian deaths, 1,041 civilian fire injuries, and \$471 million in direct property damage. Candles caused 3% of the reported home fires, 5% of home fire deaths, 8% of home fire injuries, and 7% of direct property damage during this period. On average, 35 home candle fires were reported per day.

### **During the five-year period of 2005-2009:**

- More than one-third (36%) of home candle fires started in bedrooms. These fires caused 43% of the associated deaths and 47% of the associated injuries. The 16% of fires that started in living rooms, family rooms, or dens caused 22% of the deaths. Fourteen percent (14%) of fires started in bathrooms and 11% began in kitchens or cooking areas.
- Candle fires start with a variety of items. Eleven percent began with a mattress or bedding; these fires caused 17% of the home candle fire deaths. An unclassified type of furniture or utensil was also the item first ignited in 11% of these incidents. Nine percent started when a curtain, blind or drapery ignited. Cabinetry was first ignited in 8% of these fires. Upholstered furniture was first ignited in 6% of the fires; these incidents caused 22% of the home candle fire deaths.
- Twelve percent of the home candle fires occurred in December, 1.5 times the monthly average of 8%. December candle fires often involve combustible seasonal decorations that would not have been present at other times of the year. From January to November, decorations were first ignited in only 4% of the home candle fires. This jumped to 11% in December. In other words, the heightened candle fire risk around the winter holidays reflects a combination of increased candle use and more things that can burn in the area around the candles.

The top three days for home candle fires were Christmas, New Year's Day, and Christmas Eve.

- Falling asleep was a factor in 12% percent of the home candle fires and 42% of the associated deaths. Extinguish all candles before going to sleep.

### **Factors contributing to ignition in 2005-2009:**

- More than half (55%) of the home candle fires occurred when some form of combustible material was too close to the candle. Keep candles at least 12 inches from anything that can burn.
- Unattended equipment or abandoned materials or products were contributing factors in one of every five (19%) home candle fires. Never leave a burning candle unattended. Blow out candles when you leave a room.
- Four percent were started by people (usually children) playing with the candle. Keep candles up high out of the reach of children. Never leave a child unattended in a room with a candle. A child should not sleep in a room with a lit candle.

### **Candle fires have been falling since the 2001 peak.**

From 1980, the first year of available data, to 1990, the number of home candle fires had been falling. They then started climbing. Incidents peaked in 2001 and have been falling since then. Even so, the estimate of 9,600 fires reported in 2009 is still 1.4 times the 6,800 reported in 1990, the previous low. From 2008 to 2009, reported home candle fires fell 20%.

The share of home structure fires started by candles jumped from 1% in the early 1980's to 5% in 1999, 2001, and 2002, partly because total home fires had declined so much since 1980 and partly because candle fires had increased. The share fell to 4% from 2004 to 2006, inclusive. In 2007, the share dropped to 3% and has remained there.

### **Using candles for light can be dangerous.**

NFPA reviewed fire service reports and news clips about 117 identified fatal home candle fires in 2005-2010 that resulted in a total of 177 civilian fire deaths. Candles were used for light in the absence of power in 30, or one-quarter (26%), of these fires and 60, or one-third (34%), of the associated deaths. The reason for the lack of power was mentioned in 25 of the fires and 50 of the deaths.

In roughly two-thirds of the no-power fires and deaths where the reason was known, the power had either been shut off or the home lacked utilities. In one-quarter of these fires and 12% of the deaths, the power outage was storm-related. Eleven people were killed in 2005 when they used candles when moving into a Louisiana home before the power had been connected. Participants in focus groups conducted by the Environics Research Group for Health Canada were more likely to leave candles burning in several rooms during power outages than when the power was on.

### **Lacerations were the most common type of candle or candlestick injury.**

According to the U.S. Consumer Product Safety Commission's (CPSC's) National Electronic Injury Surveillance System (NEISS), an estimated 10,900 people were seen at hospital emergency rooms for injuries from candles, candlesticks or related items during 2009. Almost half (47%) of the candle-related injuries that year were lacerations and one-quarter (24%) were thermal burns. Some of the lacerations were caused by sharp or broken candleholders; some occurred while candles were being trimmed or wax was being removed from candleholders. Some of the burns were from the hot wax, others were from fires started by the candle.

### **ASTM's voluntary standards address candles and accessories.**

The ASTM subcommittee F15.45 was created to address candle safety issues in 1997. Since then, it has issued a variety of candle-safety standards, including standards addressing terminology, fire safety labeling, glass candle containers, visible emissions, and fire safety for candles and candle accessories. These standards can be incorporated into law, contracts, codes and procedures.

## Contents

---

Executive Summary	i
Contents	iii
List of Tables and Figures	v
Home Candle Fires Fact Sheet	vii
Candle Safety Tips	viii
Home Candle Fires	1
Detailed Patterns of Reported U.S. Home Candle Fires	5
Who Are the Victims of Home Candle Fires?	6
When Do Candle Fires Occur?	7
Candle Fires by Occupancy	9
Special Studies	9
Candles Used for Light	12
Candle-Related Injuries Seen at Emergency Rooms	14
Preventing Candle Fires	15
Appendix A. How National Estimates Are Calculated	35
Appendix B. Selected Published Incidents	43



## List of Tables and Figures

---

Figure 1. Home Candle Fires by Year	1
Figure 2. Home Candle Fire Deaths by Year	3
Figure 3. Home Candle Fire Injuries by Year	3
Figure 4. Property Damage in Home Candle Fires by Year	4
Figure 5. Home Candle Fires by Month	7
Table A. Top Five Days for Reported Non-Confined Home Candle Fires	8
Figure 6. Leading Areas of Origin in Home Fires: January-November vs. December	8
Figure 7. Candle-Related Injuries Seen at Hospital Emergency Rooms	14
Figure 8. Emergency Room Visit Rates for Candle-Related Injuries by Age Group	15
Table 1. Candle Fires in the Home by Year	19
Table 2. Candle Fires in the Home as a Share of All Home Structure Fires	20
Table 3. Home Candle Structure Fires, by Area of Origin	21
Table 4. Home Candle Structure Fires, by Item First Ignited	22
Table 5. Home Candle Structure Fires, by Cause	24
Table 6. Home Candle Structure Fires, by Factor Contributing to Ignition	25
Table 7. Home Candle Structure Fires, by Human Factor Contributing to Ignition	27
Table 8. Home Candle Structure Fires, by Extent of Flame Damage	28
Table 9. Home Candle Structure Fire Deaths and Injuries by Age	29
Table 10. Home Candle Structure Fires by Day of Week	30
Table 11. Home Candle Structure Fires by Time Period	30
Table 12. Home Candle Fires by Month	31
Table 13. Home Candle Structure Fires by Item First Ignited: January-November and December	32
Table 14. Candle Fires in Non-Home Properties by Occupancy Class	33





## U.S. Home Candle Fires Fact Sheet

In 2005-2009, U.S. fire departments responded to an average of 12,860 home<sup>1</sup> structure fires that were started by candles. These fires caused an annual average of 136 civilian fire deaths; 1,040 civilian fire injuries; and \$471 million in direct property damage.

Overall, candles caused 3% of reported home fires, 5% of the home fire deaths, 8% of the home fire injuries, and 7% of the direct property damage in reported home fires during this period.

### Causes and Circumstances of Home Candle Fires

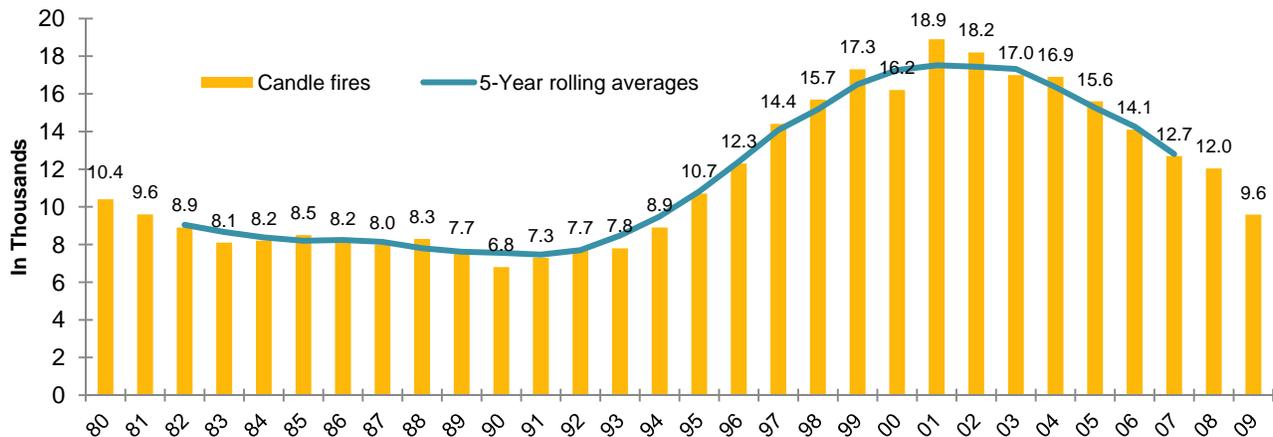
Details from the U.S. Fire Administration’s National Fire Incident Reporting System show that in 2005-2009:

- On average, 35 home candle fires were reported per day.
- More than half (55%) of all candle fires started when something that could burn, such as furniture, mattresses or bedding, curtains, or decorations, was too close to the candle.
- In one-fifth (19%) of the fires, the candles were unattended or abandoned.
- More than one-third of home candle fires begin in the bedroom, although the candle industry found that only 13% of candle users burn candles in the bedroom most often.
- December is the peak time of year for home candle fires. In December, 11% of home candle fires began with decorations compared to 4% the rest of the year.
  - The top three days for home candle fires were Christmas, New Year’s Day, and Christmas Eve.

### Candle Fire Trends

Home candle fires climbed through the 1990s but have been falling since the 2001 peak.

Home Candle Fires (in Thousands) by Year: 1980-2009



<sup>1</sup>Homes include one- or two-family homes, manufactured homes, apartments and other multi-family homes..

# Candle Safety

Candles may be pretty to look at but they are a cause of home fires — and home fire deaths. Remember, a candle is an open flame, which means that it can easily ignite anything that can burn.

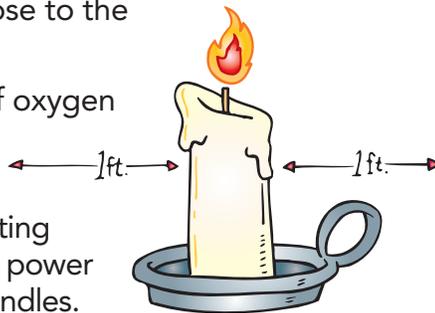
## "CANDLE WITH CARE"

- » Blow out all candles when you leave the room or go to bed. Avoid the use of candles in the bedroom and other areas where people may fall asleep.
- » Keep candles at least 12 inches away from anything that can burn.

Think about using flameless candles in your home. They look and smell like real candles.

## IF YOU DO BURN CANDLES, make sure that you...

- » Use candle holders that are sturdy, and won't tip over easily.
- » Put candle holders on a sturdy, uncluttered surface.
- » Light candles carefully. Keep your hair and any loose clothing away from the flame.
- » Don't burn a candle all the way down — put it out before it gets too close to the holder or container.
- » Never use a candle if oxygen is used in the home.
- » Have flashlights and battery-powered lighting ready to use during a power outage. Never use candles.



## Candles and Kids

Never leave a child alone in a room with a burning candle. Keep matches and lighters up high and out of children's reach, in a locked cabinet.



## FACTS

- ! On average, a candle fire in the home is reported to a U.S. fire department every **40** minutes.
- ! More than **one-third** of home candle fires started in the bedroom.
- ! More than half of all candle fires start when things that can burn are too close to the candle.



Your Source for SAFETY Information

NFPA Public Education Division • 1 Batterymarch Park, Quincy, MA 02169

[www.nfpa.org/education](http://www.nfpa.org/education)

## Home Candle Fires

### **12,860 reported home structure fires, on average, were started by candles annually.**

During the five-year period of 2005-2009, U.S. fire departments responded to an estimated average of 12,860 home structure fires started by candles per year. These fires caused an annual average of 136 civilian deaths, 1,041 civilian fire injuries, and \$471 million in direct property damage. On average, 35 home candle fires were reported per day.

Candles caused 3% of total reported home fires, 5% of home fire deaths, 8% of home fire injuries, and 7% of associated direct property damage during this period. Candles ranked seventh among the leading cause categories in number of fires and in direct property damage, sixth in home fire deaths, and fourth in home fire injuries.

### **Home candle fires climbed through the 1990s but have been falling since the 2001 peak.**

During 2009, an estimated 9,600 home structure fires started by candles were reported to local fire departments. These fires caused 60 civilian deaths, 790 civilian injuries and an estimated direct property loss of \$576 million. Home candle fires fell 20% from 2008 to 2009. As Figure 1 shows, candles started an estimated 10,400 home fires in 1980. Candle fires generally declined through the 1980s, falling to a low of 6,800 in 1990. They started climbing in 1991. Candle fires peaked in 2001 at an estimated 18,900, before beginning a steady decline. Although candle fires have fallen 49% since 2001, the number of candle fires reported in 2009 is still 1.4 times the low of 6,800 reported in 1990. Table 1 shows the candle fire and loss experience from 1980-2009. Rolling five-year averages are shown by the solid line beginning with the 1980-1984 average above the 1982 column.

**Figure 1. Home Candle Fires (in Thousands) by Year: 1980-2009**

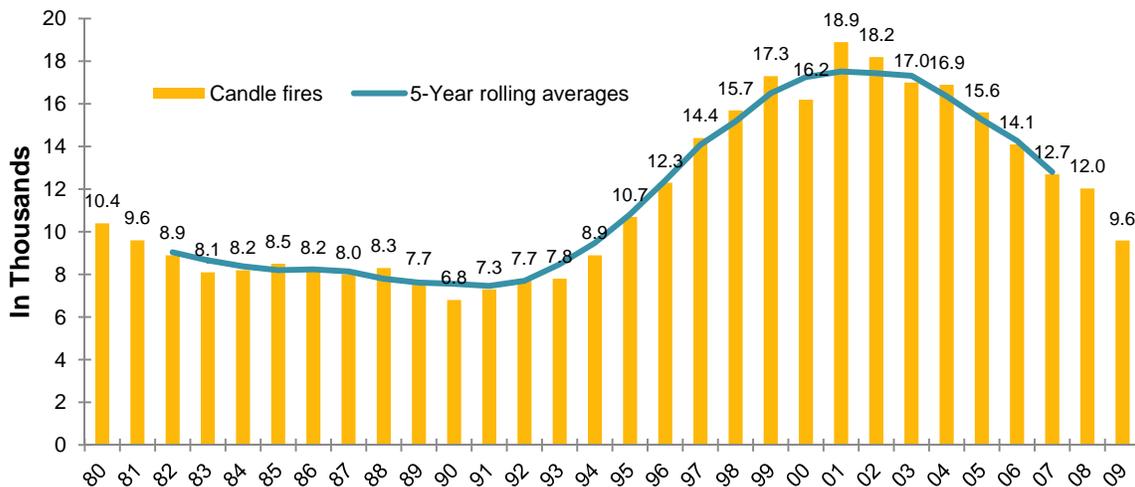


Figure 2 shows that the number of deaths has fluctuated considerably but that these deaths have generally been more frequent in recent years than in the 1980s and early 1990s. However, the 60 deaths in 2009 was the second lowest number of candle fire deaths ever reported.

## Data Sources, Definitions and Conventions Used in this Report

Unless otherwise specified, the statistics in this analysis are national estimates of home structure fires reported to U.S. municipal fire departments in which candles were the heat source. Estimates exclude fires reported only to Federal or state agencies or industrial fire brigades. These estimates are projections based on the detailed information collected in Version 5.0 of the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS 5.0) and the National Fire Protection Association's (NFPA's) annual fire department experience survey. Except for property use and incident type, *fires with unknown or unreported data were allocated proportionally in calculations of national estimates. Candle fires were identified by NFIRS 5.0 heat source code 66.* These statistics include a proportional share of fires in which the heat source was undetermined or not reported, as well as proportional shares in which the heat source was an unclassified open flame or smoking material (heat source code 60). Homes include one- and two-family homes, manufactured housing, and apartments, tenements, and flats, townhouses, and rowhouses, regardless of ownership.

NFIRS 5.0, first introduced in 1999 and adopted gradually, includes a category of structure fires collectively referred to as "confined fires," identified by incident type. These include confined cooking fires, confined chimney or flue fires, confined trash fires, confined fuel burner or boiler fires, confined commercial compactor fires, and confined incinerator fires (incident type 113-118). Losses are generally minimal in these fires, which by definition, are assumed to have been limited to the object of origin. Although causal data is not required for these fires, it is sometimes present. *Confined and non-confined fires were analyzed separately and summed for most fields studied.* The detailed estimates in this report were based on five-year raw *totals* of

- a) 19,944 non-confined fires with candle reported as the heat source that resulted in 125 civilian deaths, 1,664 civilian injuries, and \$514 million in direct property damage; and
- b) 223 confined fires with no associated deaths, four civilian injuries, and \$100,000 in direct property damage.

Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Property damage has not been adjusted for inflation. In the trend tables, fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest ten, and direct property damage to the nearest million. In non-trend tables, fires are rounded to the nearest ten, deaths and injuries to the nearest one, and property damage is rounded to the nearest million. Additional details on the methodology may be found in Appendix A.

**Figure 2. Home Candle Fire Deaths by Year: 1980-2009**

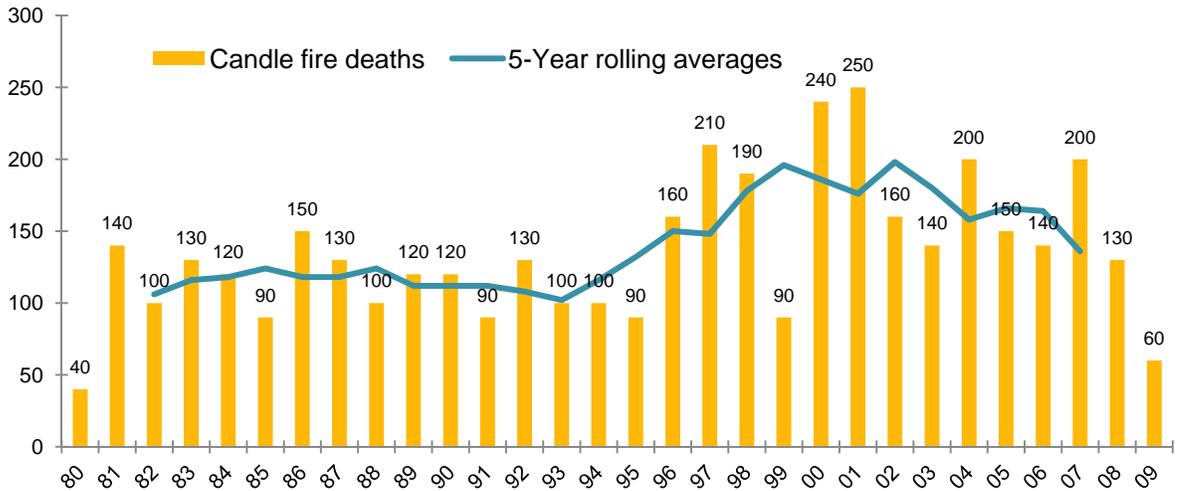
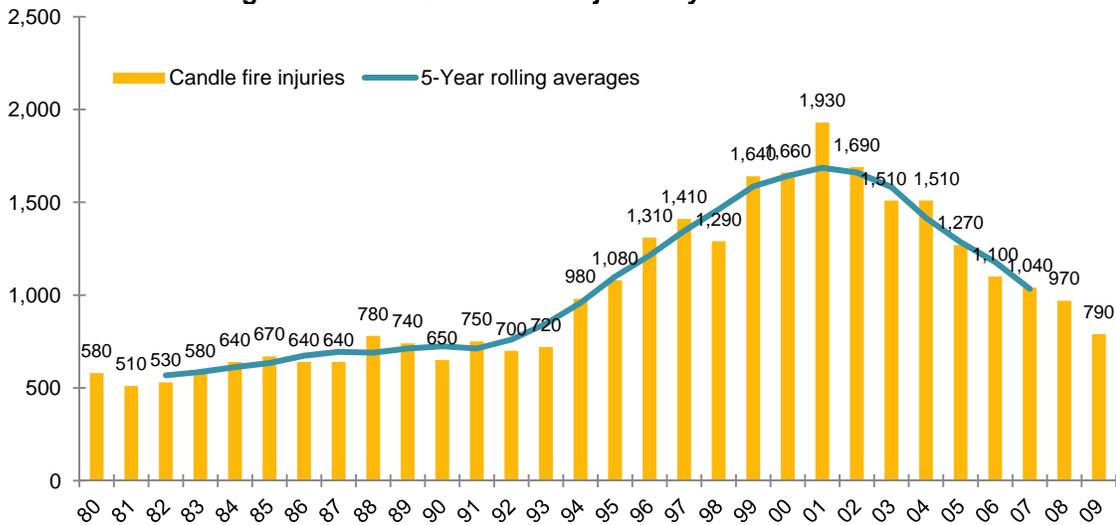


Figure 3 shows that civilian injuries caused by home candle fires have also been falling since 2001 but remain higher than in the 1980s and early 1990s. NFPA’s estimates of candle fire injuries are based only on injuries reported to the fire service. Some injured individuals may be transported from the scene before the fire department arrives or without fire department involvement.

**Figure 3. Home Candle Fire Injuries by Year: 1980-2009**

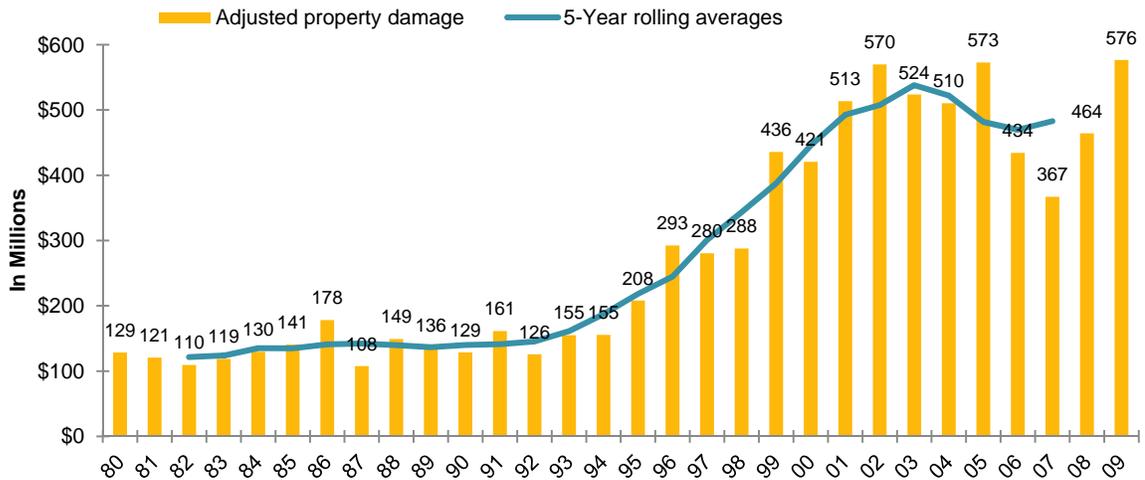


The U.S. Consumer Product Safety Commission (CPSC’s) National Electronic Injury Surveillance System (NEISS) estimated that between July 1, 2002 and June 30, 2003, hospital emergency rooms treated 3,400 patients for fire injuries caused by candles, twice the number reported to the fire service at that time. The CPSC also noted that only one-third of candle fire injuries treated at emergency rooms happened at fires attended by fire departments.<sup>1</sup>

<sup>1</sup> David Miller, *Estimates of Fire Injuries Treated in Hospital Emergency Departments*, Washington, DC., CPSC, January 2005, pp. 8-9, available on-line at <http://www.cpsc.gov/LIBRARY/NEISSFire.pdf>.

Direct property damage from home candle fires, adjusted for inflation, jumped 24% from an estimated \$464 million in 2008 to \$576 million in 2009. Table 1 and Figure 4 show that direct property damage in real dollars was fairly stable through the 1980s and early 1990s. It rose to a new level in 1996-1998. Losses were even higher in 1999-2009.

**Figure 4. Property Damage in Home Candle Fires by Year: 1980-2009**



**The share of home fires started by candles has been falling but is still higher than in the 1980s and early 1990s.**

Partly because total home fires have declined so much since 1980 and partly because candle fires increased so much over the course of the 1990s through the earliest years of this century, the share of home structure fires started by candles climbed from 1% in the early 1980's to 5% in 1999, 2001, and 2002. The share fell to 4% from 2003 to 2006, inclusive. In 2007, the share dropped to 3%, where it remained in 2008 and 2009. (See Table 2.) In 2009, candles caused 2% of the civilian home fire deaths, 6% of the civilian home fire injuries, and 8% of the direct property damage in reported home fires.

**CPSC estimates 465,000 unreported home candle fires occur per year.**

The 2004-2005 CPSC's Residential Fire Survey asked about all fires, including incidents that were not attended by the fire service.<sup>2</sup> They estimated that U.S. households experienced 7.2 million home fires per year that were not attended by the fire service. Candles started 465,000, or 6% of these unreported fires.

<sup>2</sup> Michael A. Greene and Craig Andres. *2004-2005 National Sample Survey of Unreported Residential Fires*. U.S. Consumer Product Safety Commission, July 2009, pp. 142-143.

## Detailed Patterns of Reported U.S. Home Candle Fires

---

### **Where do candle fires start?**

More than one-third (36%) of home candle fires reported to local fire departments in 2005-2009 started in bedrooms. These fires caused 43% of the associated deaths and almost half (47%) of the associated injuries. The 16% of fires that started in living rooms, family rooms, or dens caused 22% of the deaths. Fourteen percent (14%) of these fires started in bathrooms and 11% began in kitchens or cooking areas.

According to the National Candle Association, 42% of the candle users most often burned candles in the living room, 18% used candles most frequently in the kitchen, and 13% most commonly used them in the bedroom. Roughly one of every five women also decorates the yard, patio or other exterior areas with candles.<sup>3</sup>

### **What do candles ignite?**

Candle fires start with a variety of items. Eleven percent of home candle fires began with a mattress or bedding; these fires caused 17% of the home candle fire deaths. An unclassified type of furniture or utensil was also the item first ignited in another 11% of these incidents. Nine percent started when a curtain, blind or drapery ignited.

Cabinetry was first ignited in 8% of these fires. Upholstered furniture was first ignited in 6% of the fires; these incidents caused 22% of the home candle fire deaths. Five percent of the fires began with interior wall coverings, excluding drapes. Decorations were first also ignited in 5% of the fires, as were magazines, newspaper or writing paper. (See Table 4.)

Decoration fires are unusually likely to begin with candles. In 2004-2008, candles were the heat source in almost half (45%) the home structure fires that began with decorations.<sup>4</sup> In addition, candles started 11% of the home structure fires that began with Christmas trees during 2005-2009.<sup>5</sup> Candles were also the heat source in 10% of the home upholstered furniture fires<sup>6</sup> in 2005-2009 and 12% of the home mattress and bedding fires.<sup>7</sup>

### **How do home candle fires start?**

Ninety-four percent (94%) of the home candle fires were unintentional, 3% were intentional, 2% resulted from an unclassified cause, and 1% resulted from the failure of the equipment or heat source. That could refer to a holder or the candle itself. (See Table 5.).

---

<sup>3 3</sup> National Candle Association, "Facts and Figures" [http://www.candles.org/about\\_facts.html](http://www.candles.org/about_facts.html), accessed in November 2011.

<sup>4</sup> Marty Ahrens, *Home Structure Fires that Began with Decorations*, Quincy, MA: NFPA, Fire Analysis and Research Division, 2010, p. 11.

<sup>5</sup> Marty Ahrens, *Home Christmas Tree and Holiday Light Fires*, Quincy, MA: NFPA, Fire Analysis and Research Division, 2011, p. 115.

<sup>6</sup> Marty Ahrens, *Home Structure Fires that Began with Upholstered Furniture*, Quincy, MA: NFPA, Fire Analysis and Research Division, 2011, p. 27

<sup>7</sup> Ben Evarts, *Home Structure Fires that Began with Mattresses and Bedding*, Quincy, MA: NFPA, Fire Analysis and Research Division, 2011, p. 24.

Table 6 shows that in more than half (55%) of the home candle fires reported in 2005-2009, the fire started because the candle was too close to some combustible material. These fires caused 60% of the associated deaths and 61% of the injuries. The candle was unattended or abandoned in one-fifth (19%) of the incidents. Unclassified misuse of the material or product was a factor in 12% of these fires, an unclassified factor contributed in 5%, and 4% of the incidents were caused by people, often children, playing with candles.

Table 7 shows that in 12% of the home candle fires, 42% of the associated civilian deaths, and 28% of the injuries, sleep was a human factor contributing to ignition. In 20% of the fires, an unattended or unsupervised person was a factor.<sup>8</sup> The incident reports noted that no human factors contributed to 62% of the fires, 46% of the civilian deaths, and 51% of the civilian injuries.

**Flame damage was confined to the room of origin in three-quarters of these fires.**

Table 8 shows the extent of flame damage in home candle fires. In more than one-quarter (29%) of these fires, the fire either had a confined fire incident type or the damage was coded as confined to the object of origin. In almost half (46%) of the incidents, flame damage extended beyond the original object but was confined to the room of origin. Flame damage extended beyond the room of origin in only one-quarter (25%) of the fires.

**Incident descriptions provide more details.**

A collection of home candle fire incident descriptions that were included in *NFPA Journal's* "Firewatch" column or in NFPA's studies of catastrophic or large-loss fires since 2005 may be found in Appendix B. These fires tend to be more serious and should not be considered typical. However, they do help draw a clearer picture of how these fires can occur.

***Who Are the Victims of Home Candle Fires?***

**Young children and older adults had highest death risk from candle fires.**

Table 9 shows the age distribution of people killed and injured by reported home candle fires during 2005-2009, the casualty rate per million population, the relative risk of death or injury from home candle fires compared to the risk faced by the general population and other age groups, and the age distribution of the general population. The relative risk was calculated by dividing the death or injury rate for each age group by the rates for the general population. A relative risk of 1.0 means that the risk was equal to the risk faced by the general population.

For most fire causes, children under age five and older adults age 65 or over face a higher risk of fire death than the general population. This was also true for candle fires. Children under five had a risk 2.0 times that of the general population and adults 65 or

---

<sup>8</sup> It is possible that in at least some of these fires, the "unattended" actually refers to the candle.

older faced a risk 1.6 times as high. However, people between 15 and 24 faced the highest risk of injury from these fires.

Males accounted for 56% of home fire fatalities and 53% of injuries from fires of all causes.<sup>9</sup> However, 53% of the people killed by home candle fires were female, as were 57% of those injured. Statistics about deaths and injuries from all fire causes were obtained from NFPA’s report, *Characteristics of Home Fire Victims*, by Jennifer D. Flynn.

### **When Do Candle Fires Occur?**

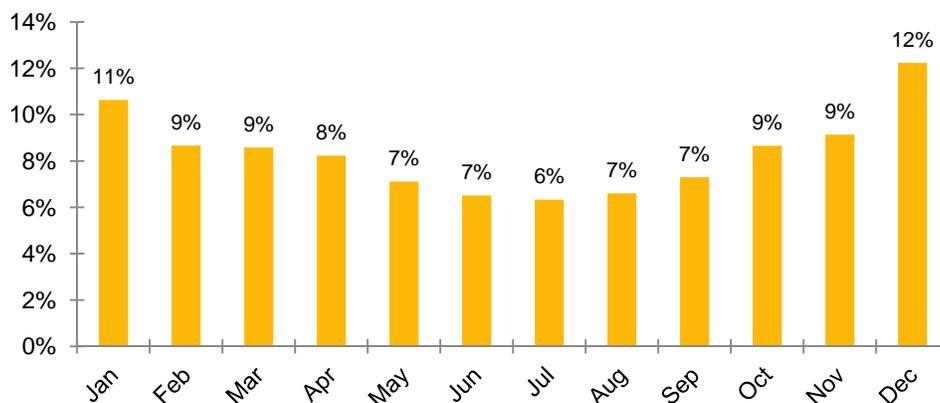
#### **Candle fires are more common on weekends and during the evening.**

Table 10 shows that home candle fires were most common on Saturdays and Sundays. Home candle fires peaked during the period from 6:00 to 9:00 p.m. Table 11 shows that the period from 9:00 p.m. to midnight ranked second and the interval from 3:00 to 6:00 p.m. ranked third. The smallest shares of these fires were reported between 3:00 and 9:00 a.m.

#### **December was the peak month for candle fires.**

Figure 5 and Table 12 show that 12% of home candle fires were reported in December. This was 1.5 times the 8% monthly average. January ranked second. These fires were less common in the warmer months that have longer days, with July having the smallest number reported. According to the National Candle Association, roughly 35% of the candle business is seasonal around the Christmas holiday.<sup>10</sup>

**Figure 5. Home Candle Fires by Month: 2005-2009**



<sup>9</sup> Jennifer D. Flynn. *Characteristics of Home Fire Victims*, Quincy, MA: NFPA, Fire Analysis and Research Division, March 2010, p. 5.

<sup>10</sup> National Candle Association, “Facts and Figures” [http://www.candles.org/about\\_facts.html](http://www.candles.org/about_facts.html), accessed in November 2011.

Christmas was the peak day, with an estimated 90, or 0.7%, of the 12,860 home candle fires in 2005-2009. (If all days had an equal share of the fires, the daily share would be  $1/365.2 = 0.3\%$ .) Table A shows that New Year's Day was the second most common day for these fires, and Christmas Eve ranked third.

**Table A. Top Three Days for Reported Home Candle Structure Fires  
2005-2009 Annual Averages**

Rank	Date	Fires	Percent
1.	December 25	90	0.7%
2.	January 1	80	0.7%
3.	December 24	70	0.6%

Source: NFIRS and NFPA survey.

**December candle fires follow a somewhat different pattern.**

As mentioned previously, candles are associated with Christmas and other December holidays, including Hanukkah, Kwanzaa, and New Year's Eve. Although the bedroom was the leading areas of origin for home candle fires all year, Figure 6 shows that this pattern was not as pronounced in December. From January through November, 37% of the candle fires started in bedrooms. Only 30% of the December candle fires started there. In December, 21% of the home candle fires started in living rooms, family rooms, or dens, compared to 15% during the rest of the year.

**Figure 6. Leading Areas of Origin in Home Candle Fires in 2005-2009  
January-November vs. December**

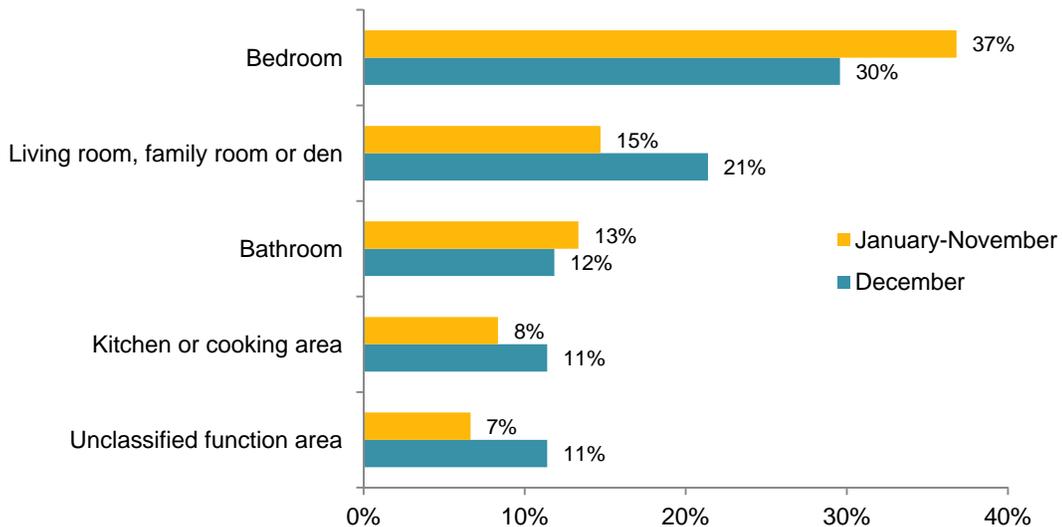


Table 13 shows that from January to November, decorations were first ignited in only 4% of the home candle fires. This jumped to 11% in December. This is consistent with the industry pattern of seasonal business. It also suggests that seasonal candle fires often involve combustible decorations that would not have been present at other times

of the year. In other words, the higher frequency of these fires around the winter holidays reflects a combination of increased candle use and a more combustible environment around those candles.

### ***Candle Fires by Occupancy***

#### **Twelve percent of candle structure fires occurred in non-home properties.**

During 2005-2009, candle fires started an estimated annual average of 14,550 reported structure fires in properties of all types, including homes and non-home properties. These fires caused an average of 151 civilian fire deaths, 1,126 civilian fire injuries, and an estimated \$528 million in direct property damage. Eighty-eight percent (88%) of the reported structure fires started by candles occurred in homes.

Table 14 provides more detail on candle fires in non-home occupancies. Candles started an average of 1,680 reported non-home structure fires per year, resulting in an average of 15 civilian deaths, 85 civilian injuries, and \$57 million in direct property damage. Twenty-two percent of the candle fires in non-home properties occurred in unclassified residential properties; 7% occurred in hotels or motels; 7% occurred in unclassified storage properties; 5% occurred in dormitories, fraternities, sororities, or barracks; 5% occurred in rooming or lodging houses, and another 5% occurred in places of worship or funeral properties.

### ***Special Studies***

Because NFIRS is designed to document all types of fires, it cannot capture all of the details that industry, policy makers and life safety educators need to know about specific fire problems. Nor can NFIRS tell us how people normally use candles. Although two of the following studies were done more than a decade ago, they provide valuable additional information about who was using the candles and how the fire actually occurred.

#### **Massachusetts study found that candle users were teenagers in a disproportionate share of candle fires.**

The Massachusetts Office of the State Fire Marshal and the NFPA worked together on a special study of 1999 Massachusetts candle fires. Information was collected on the age of the individual who was using the candles, what type of candle was involved, and whether the candleholder was a factor. The Massachusetts fire service completed special forms on 220 fires, or more than 70% of the candle fires reported that year.<sup>11</sup> Two-thirds of the people using candles in the Massachusetts fires were between 20 and 64 years old. However, teenagers faced the greatest relative risk of a candle fire. Although they comprised only 9% of the Massachusetts population, they accounted for 21% of the fires, meaning they were more than twice as likely to have a candle fire as the population in

---

<sup>11</sup> Marty Ahrens and Jennifer Mieth, "A Special Study of Massachusetts Candle Fires During 1999," available from the National Fire Protection Association's One-Stop Data Shop. Email [osds@nfpa.org](mailto:osds@nfpa.org).

general. When Massachusetts teenagers were the candle users, three of every four candle fires started in the bedroom.

This study asked first if the candle was unattended, and then asked for the cause separately. Three-quarters of the fires occurred when candles were unattended. Interestingly, there was relatively little difference between the causes seen for unattended and attended candle fires.

Forty percent (40%) of the Massachusetts candle fires were caused by combustibles too close to the candle. In one-third (35%) of the cases, the candle burned down too low. The candle tipped over (on its own) in 10% of the incidents, and was knocked over (by a person, pet or other object) in 7% of the fires. The holder broke in 3% of the cases.

**In CPSC investigations, someone was in the room with the candle in only 15% of the fires.**

The U.S. Consumer Product Safety Commission (CPSC) conducted 79 in-depth investigations of candle fires between August 2000 and March 2001 (inclusive) as part of a pilot study on the topic. The pilot was done to ascertain how much detail could be obtained about these fires. Some of the highlights are summarized here.<sup>12</sup>

- Based on 55 incidents with known causes, 47% were caused by combustibles too close to the candle (without further elaboration), the candle fell over in 9% of the fires, was knocked over by a pet in 9%, and was just said to be knocked over in another 9%. Five percent were caused by a child playing with a candle and 4% started after the candle burned down.
- Filled candles (candles produced and used in the same vessel) accounted for 27% of the 48 known types of candles, 25% were pillar or column candles, dinner or taper candles accounted for 15%, 8% were freestanding, and votive candles accounted for another 8% of the incidents.
- In 37% of the 41 incidents in which the reason for candle use was known, candles were used for fragrance. In 20% of the cases, candles were used for religious purposes. They were used for light in 17% of the fires, for aromatherapy in 7%, for ambience in 5%, and for heat in 5% of the fires.
- In cases in which the surface was known (53 incidents), candles were placed on tables in 19% of the fires, on dressers in 15%, on nightstands in 15%, on bookcases, cabinets or shelves in 9%, on coffee tables or end tables in 9% and held by a child in 6% of the fires.
- In 70% of the fires, someone was home at the time of the fire (based on 63 cases with known data). Someone was in the room with the candle in only 15% of the fires (based on 82 fires with known data).

---

<sup>12</sup> Signe Hiser, *Candle Fires Pilot Study Summary*, Washington, DC, CPSC, September 2001, available online at <http://www.cpsc.gov/LIBRARY/FOIA/FOIA02/os/Candles3.pdf>.

**CPSC has issued recalls of more than 150 candles and candle-related products because of fire danger.**

From 1993 to the present, fire safety issues caused the CPSC to issue more than 150 recalls of candles and accessories. According to a 2006 CPSC Briefing Package which examined the candle industry and the 118 recalls issued between 1993 and May 2006, the leading problems were secondary ignitions (often of items embedded in or decorating a candle), excessively high flames, and candleholders that overheated or ignited.<sup>13</sup> Candles and candle holders are still being recalled in 2011. To report a problem with a candle or find out about recalls of specific products, see [www.cpsc.gov](http://www.cpsc.gov).

**More than 400 companies or organizations manufacture candles.**

According to the National Candle Association (NCA), retail candle sales in the United States are estimated at \$2 billion per year, excluding accessories such as holders. In the United States, more than 400 commercial, religious and institutional organizations manufacture candles. NCA members produce more than 90% of the candles made in the U.S. Women make 90% of all candle purchases. The three most popular consumer candles are votives, container candles, and pillar candles. About three-quarters of candle users burn candles for four hours or less at a time.<sup>14</sup>

**Candle safety rules were often not followed when entertaining, according to Canadian focus groups.**

In 2005, Health Canada commissioned the Environics Research Group to conduct Intensive/Interactive Workshop focus groups with three groups of people between 18 and 30 years old and three groups with people between 31 and 71 years of age. The groups were asked about fire safety awareness, candle usage, and product labeling. A total of 42 people participated.

All said candles were used in their homes at least once a month. Some were deeply interested in candles, some used them as romantic signals, some found candlelight relaxing, and some used them for odor management or to reduce bugs outside. Candles were also used in power outages. Candles in the living room were burned at night for appearance and scent. Decorative candles in the living room were treated like art and rarely burned. Candles were used in the kitchen for odor control and atmosphere. Women were more likely than men to take baths by candlelight.

A few participants used floating candles in the tub. In the bedroom, candles set romantic and/or relaxing moods. A few participants like to read by candlelight before going to sleep. Some admitted to falling asleep while candles were burning; most knew that this was dangerous.

---

<sup>13</sup> U.S. Consumer Product Safety Commission Candle Petition Product Team. *Petition CP 04-1 HP 04-1 Requesting Mandatory Fire Safety Standards for Candles and Candle Accessories* Briefing Package, July 2006, accessed online at <http://www.cpsc.gov/library/foia/foia06/brief/candleballot.pdf> on September 5, 2007.

<sup>14</sup> National Candle Association, "Facts and Figures" [http://www.candles.org/about\\_facts.html](http://www.candles.org/about_facts.html), accessed in November 2011.

Parents of teens and young adult daughters expressed concern about how this group used candles as they sometimes found wax on dressers. Many use candles differently when young children are present. Many feel that they minimize the risk of candle fire by choosing proper candle holders, safer types of candles and a non-flammable surface. However, when they entertain, they often leave candles burning throughout the house. In social situations, candles are burned when children are present even when no one is providing direct supervision of either the children or the candles. Less attention seems to be paid to safety when candles are used outside, with candles placed in a wide variety of locations, at times including steps and paths. Citronella candles are used to keep mosquitoes away. Some use candles when camping.<sup>15</sup>

In March 2006, Health Canada's Consumer Product Safety Commission engaged Decima Research, Inc to conduct an online survey of Canadian's candle usage practices, related fire safety issues and labeling preferences. Roughly 1,100 people completed the survey. Eighty-four percent used candles regularly, most often in either the living room or den or in the dining room. Those who recalled seeing warning labels on candles were more likely to use safe practices. The same survey found that 3% of Canada's candle users had a candle-related fire or injury in the previous year. The most common scenario involved a candle igniting something nearby. One-third of these incidents were reported to the fire department<sup>16</sup>

### ***Candles Used for Light***

#### **When candles are used for light in the absence of electricity, there is additional risk of fatal fire.**

NFPA's Fire Incident Data Organization (FIDO) provides more detail on certain fires. While the collection is not complete or representative, information is available through FIDO that is not available through NFIRS. When fires of note are brought to NFPA's attention, additional information on the causes and circumstances is requested from fire departments. Files on 117 fatal home candle fires between January 1, 2005 and December 31, 2010 were reviewed to determine the role of power problems in candle fire fatalities. These fires caused a total of 177 deaths. Unless power was specifically mentioned, it was assumed to be operational.

According to reports from the fire service, fire investigators, or the newspapers, the home was without power in 30, or one-quarter (26%) of the fatal candle fires studied. These fires resulted in 60, or one-third (34%) of the associated deaths. The reason for the lack of power was mentioned in 25 of the fires and 50 of the deaths. Percentages in the discussion below were based on incidents in which the reason for the lack of power was known.

---

<sup>15</sup> Enviro-nics Research Group Limited. *Canadians' Behaviour Surrounding Candle Use and Fire Safety, a Qualitative Exploration: Final Report*, Toronto, Ontario, Canada. Study prepared for Health Canada, January 2006.

<sup>16</sup> Decima Research. *Canadians' Behaviour Surrounding Candle Use and Fire Safety: A Quantitative Exploration*. Study done for Health Canada, March 2006.

In 17 (68%) fires resulting in 31 deaths (62%), the power had been shut off or the home lacked utilities. In six fires (24%) resulting in six deaths (12%), candles were used during a temporary power outage. In two fires (8%) resulting in 13 deaths (26%), new occupants were moving in and the power had not yet been turned on.

Some of the candle fires from *NFPA Journal's* "Firewatch" series and most of the catastrophic (multiple fire death) candle fires at the back of this report involve candles used for light due to lack of power, due to either a temporary situation or a termination of service.

In a study done for NFPA in the fall of 2004, 24% of the 77% of the respondents who said they use candles, or 18% of the total respondents, reported that they used candles when the power goes out.<sup>17</sup> A review of the candle fires included in NFPA's studies of catastrophic fires found that candles had been used in the absence of electrical power in 10 of the 13 (three-quarters) catastrophic home candle fires from 1992 to 2010. These fires killed at least five people each. Two examples are shown below. Details about these and other catastrophic home candle fires are found in Appendix B.

- In December 2006, a candle used for light burned down to and ignited the living room coffee table in a two-story Ohio single-family dwelling. Power had been shut off before the fire occurred. Five people died in this fire.<sup>18</sup>
- In March 2005, a family that had just moved into a Louisiana townhouse was using candles for light because the electricity had not yet been turned on. One of the candles ignited bedding. Attempts to move the burning mattress were unsuccessful. Eleven people died in this fire.<sup>19</sup>

### **Health Canada focus groups found candles were used differently in power outages.**

The focus groups in the study done for Health Canada were asked about their use of candles in power outages. Many had a stash of candle stubs, often from tapers, or ugly candles that they would use in blackouts. Most would light candles in several rooms to make movement easier and to reduce the danger of falls. If the candles were placed in "safe and stable" holders, they felt that the candles were safe. Most avoided walking around with lit candles but some had special candle holders that they considered safe to use for this purpose. People with large numbers of decorative candles reported that power outages were a good time to use candles they no longer wanted and would light candles all over the house without moving the candle.<sup>20</sup> Because many decorative candles are placed as art objects, their location may be less than safe for actual use.

---

<sup>17</sup> Harris Interactive, *Fire Prevention Week Survey*, conducted for National Fire Protection Association (Public Affairs Division), Fall 2004, Pp. 22-23, available at <http://www.nfpa.org/assets/images/Public%20Education/FPWsurvey.pdf>.

<sup>18</sup> Badger, Stephen G. "U.S. Multiple-Death Fires for 2006," *NFPA Journal*, 101, no. 5 (2006), pp. 59-60.

<sup>19</sup> Badger, Stephen G. "U.S. Multiple-Death Fires for 2005," *NFPA Journal*, 100, no. 5 (2006), p. 60.

<sup>20</sup> Environics Research Group Limited. *Canadians' Behaviour Surrounding Candle Use and Fire Safety, A qualitative Exploration: Final Report*, Toronto, Ontario, Canada. Study prepared for Health Canada, January 2006, pp. 25-27.

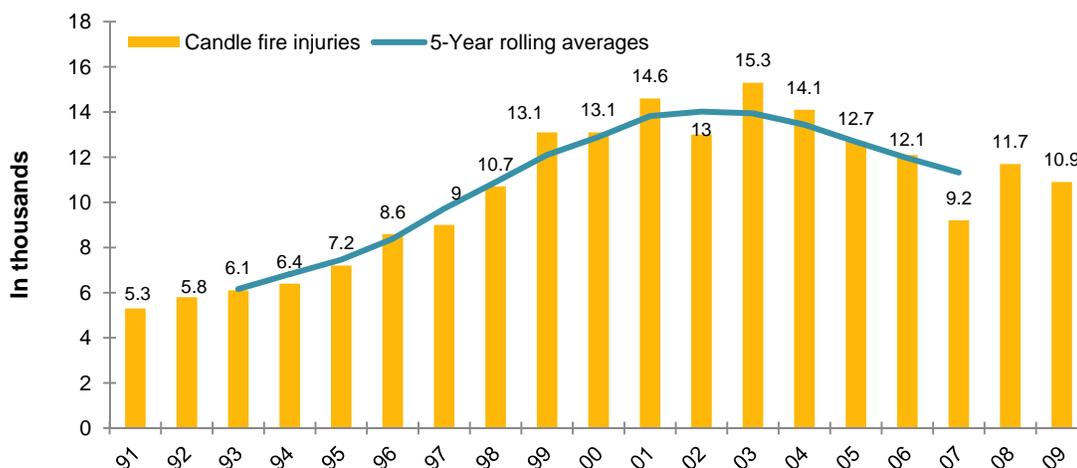
Advice for using candles safely and special additional advice for situations in which candles must be used as emergency light sources are found on page 19. However, people who cannot afford to pay their electric bills may also have difficulty affording flashlights and batteries. Prolonged power outages may exhaust battery supplies. Developing strategies to address this problem is a challenge for all life safety educators, and a particular challenge for fire safety groups such as NFPA.

### ***Candle-Related Injuries Seen at Emergency Rooms***

#### **Fire is not the only cause of candle-related injuries.**

According to estimates from the CPSC’s National Electronic Injury Surveillance System (NEISS), candles, candlesticks and other candleholders were involved in an estimated 10,900 injuries seen at emergency rooms in 2009, 29% less than the peak of 15,300 in 2003 but still more than twice the 5,300 in 1991. Figure 7 shows the injuries seen by year and five-year rolling averages. The 2009 estimates are projections made based on 287 cases seen in sample emergency rooms that year.

**Figure 7. Candle-Related Injuries Seen at Hospital Emergency Rooms 1980-2009**



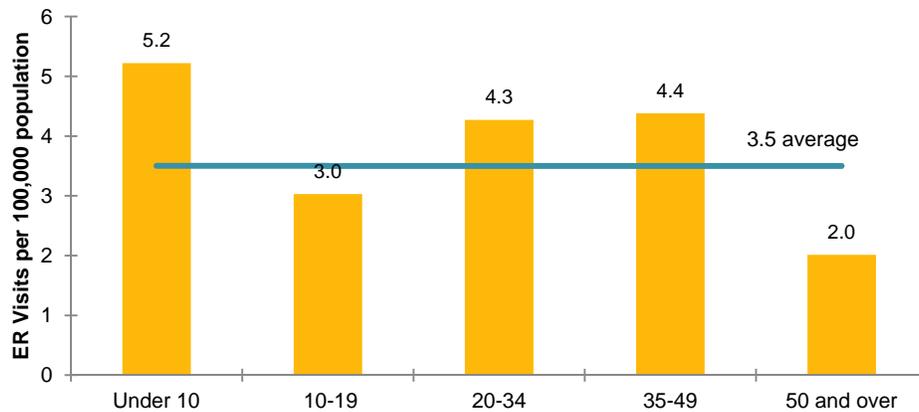
Source: NEISS estimates as reported in *Candle Fires Pilot Study Summary*, by Signe Hiser, CPSC, September 2001 for 1991-2000, NEISS estimates obtained for product code 463 (candles, candlesticks and other candleholders from <http://www.cpsc.gov/library/neiss.html>).

Males accounted for more than one-third (37%) of the candle-related injuries seen at emergency rooms in 2009; 63% were female. Almost half (47%) of the candle-related injuries that year were lacerations and one-quarter (24%) were thermal burns. Some of the lacerations were caused by sharp or broken candleholders; others occurred while candles were being trimmed or wax was being removed from candleholders or containers. Some of the burns were from the hot wax; others were from fires started by the candle.

A study of fires and burns involving home medical oxygen found that candles were involved 9% of the estimated 1,190 thermal burns associated with medical oxygen annually during 2003-2006.<sup>21</sup> Candles, including birthday candles, should never be used around medical oxygen.

One of every five (20%) emergency room patients seen for candle-related injuries was under 10 years old. Overall, there were 3.5 candle-related emergency room visits per 100,000 population in 2009. Figure 8 shows that the injury rate for individuals under ten was 1.5 times that of the general population. Adults between 35 and 49 had the second highest rate of these injuries, with those 20-34 having a rate that was only slightly lower. The rate was lowest for those 50 and older.

**Figure 8. Emergency Room Visit Rates for Candle-Related Injuries in 2009 by Age Group**



Source: NEISS estimates obtained for product code 463 (candles, candlesticks and other candleholders from <http://www.cpsc.gov/library/neiss.html> in November 2011 and U.S. Census Resident Population data.

## ***Preventing Candle Fires***

### **ASTM issued standards relating to candles**

ASTM International (formerly the American Society for Testing and Materials) develops consensus standards for “materials, products, systems and services.” As candle fires (and candle sales) increased during the 1990s, it became clear that standards were needed for candles and associated products. As of 1997, no uniform standards existed for candle manufacturers to test or label their products. ASTM subcommittee F15.45 was created to address candle safety issues. Its first meeting was held in August 1997. James Becker described the committee’s history and provided

---

<sup>21</sup> Marty Ahrens. *Fires and Burns Involving Home Medical Oxygen*. Quincy, MA: NFPA, Fire Analysis and Research Division, 2008, pp. 13-14.

background on candle-related standards in his March 2003 article in *Standardization News*.<sup>22</sup> To date, ASTM standards on candles include:

*F1972-05, Standard Guide for Terminology Relating to Candles and Associated Accessory Items* establishes standard terms and definitions for common types of candles and associated products.

*F2058-07, Standard Specification for Candle Fire Safety Labeling* describes labeling requirements, including minimum size, formatting specifications, and the minimum words of “Burn within sight. Keep away from things that burn. Keep away from children.” A warning label must be placed on the top or side of packaged candles, unless a message referring to a label at the bottom is included on the top or side.

*F2179-02 (2007), Standard Specification for Annealed Soda-Lime Silicate Glass Containers That Are Produced for Use as Candle Containers* provides for minimum requirements and testing options for containers of this type when they are expected to be used for candles. Containers should be able to withstand a change in temperature without cracking or breaking.

*F2326-04 (2009), Standard Test Method for Collection and Analysis of Visible Emissions from Candles as They Burn* addresses smoke and burn behavior of most types of indoor candles.

*F2417-09, Standard Specification for Fire Safety for Candles* addresses issues of candle stability, flame height, end of useful life and secondary ignition. Tealight cup flammability is addressed. The appendix has flashpoint guidelines for gel candles.

*F2601-09, Standard Specification for Fire Safety for Candle Accessories* has flammability requirements for rings and candle holders, as well as requirements for candle burners. The relationship of candle height to candle holder and stability is also addressed.<sup>23</sup>

Like NFPA standards, the ASTM standards are not mandated by ASTM, but can be referenced or incorporated into contracts, regulation, laws, codes and procedures.

### **Educational Message Advisory Committee developed basic candle messages.**

The Educational Messages Advisory Committee, a group of fire safety experts who help NFPA’s public education division develop and review educational messages, endorsed the following basic messages for candle safety:

- Keep candles at least 12 inches from anything that can burn.
- Use sturdy, safe candleholders.

---

<sup>22</sup> Jim Becker. “Candles: Answering your Burning Questions,” *Standardization News*, March 2003, online at [http://www.astm.org/SNEWS/MARCH\\_2003/becker\\_mar03.html](http://www.astm.org/SNEWS/MARCH_2003/becker_mar03.html).

<sup>23</sup> ASTM International. For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For Annual Book of ASTM Standards volume information, refer to the standard's Document Summary page on the ASTM website.

- Never leave a burning candle unattended. Blow out candles when you leave a room.
- NFPA discourages the use of candles in bedrooms and sleeping areas.
- Use a flashlight, not a candle for emergency lighting.
- Be careful not to splatter wax when extinguishing a candle.

These messages are short and simple. When additional information is required, some or all of the following expanded points may be useful.

**Remember: A candle is an open flame. It can easily ignite any combustibles nearby. *Keep a careful eye on candles.***

- Extinguish all candles when leaving the room or when going to sleep.
- Keep candles away from items that can catch fire such as clothing, books, paper, curtains, Christmas trees, flammable decorations or anything else that may burn.
- Make sure candles are placed on a stable piece of furniture in sturdy holders that won't tip over. Candles should fit in the holders securely and holders should be made from material that can't burn.
- Make sure the candle holder is big enough to collect dripping wax.
- Don't place lit candles in windows, where blinds or curtains can close over or come in contact with them.
- Place candles away from spots where they could be knocked over by children or pets.
- Keep candles and all open flames away from flammable liquids.
- When purchasing or using candles, consider what would happen if the candle burned low. Could it burn the candle holder or decorative material nearby? Extinguish taper and pillar candles when they get within two inches of the holder or decorative material. Votives and filled candles should be extinguished before the last ½ inch of wax starts to melt.
- Fire experts discourage the use of candles in bedrooms, where almost half of all home candle fires start. If you must burn candles in the bedroom, keep them away from bedding, curtains and blinds, wallpaper, upholstered furniture, piles of clothing, and newspapers and magazines, and monitor them carefully.
- Avoid candles with combustible items embedded in them.

**Where young children are present:**

- Keep candles up high out of the reach of children.
- Never leave a child unattended in a room with a candle. A child should not sleep in a room with a lit candle.
- Keep all matches and lighters up high in a locked cabinet and out of the sight and reach of children.

**The National Candle Association has additional candle safety tips.**

The National Candle Association provides information about candle labels and specific tips for safe use and extinguishment of candles at <http://www.candles.org/index.html>.

The site also has information about the science of candles.

**Power outages are special situations.**

Flashlights and other lights generated by batteries are much safer light sources than candles. Keep working flashlights on hand. If you do use candles during power outages,

- Avoid carrying a lit candle. When you carry a candle, you are carrying something that could start a fire. If you need to look for something in a closet or confined area, use a flashlight or wait.
- Never use a candle for light when checking pilot lights or fueling equipment such as a kerosene heater or lantern. The flame may ignite the fumes.
- Extinguish all candles when leaving the home or when going to sleep.
- Don't allow children to use candles for light without supervision.

**NFPA brochure – “Candle with Care” -- provides safety information.**

NFPA developed “Candle with Care,” a brochure focusing on candle safety in response to the candle fire problem. This brochure may be ordered by calling NFPA’s catalog at 1-800-344-3555 or on-line at <http://www.nfpacatalog.org/>. A candle safety tips sheet for consumers can be downloaded at no cost from the Safety Information section of NFPA’s web site at <http://www.nfpa.org/>.

**Table 1.  
Candle Fires in the Home by Year: 1980-2009**

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property As Reported	Damage (in Millions) In 2009 Dollars
1980	10,400	40	580	\$51	\$129
1981	9,600	140	510	\$53	\$121
1982	8,900	100	530	\$51	\$110
1983	8,100	130	580	\$57	\$119
1984	8,200	120	640	\$65	\$130
1985	8,500	90	670	\$73	\$141
1986	8,200	150	640	\$94	\$178
1987	8,000	130	640	\$59	\$108
1988	8,300	100	780	\$85	\$149
1989	7,700	120	740	\$81	\$136
1990	6,800	120	650	\$81	\$129
1991	7,300	90	750	\$106	\$161
1992	7,700	130	700	\$85	\$126
1993	7,800	100	720	\$108	\$155
1994	8,900	100	980	\$111	\$155
1995	10,700	90	1,080	\$153	\$208
1996	12,300	160	1,310	\$221	\$293
1997	14,400	210	1,410	\$217	\$280
1998	15,700	190	1,290	\$226	\$288
1999	17,300 (16,800)	90 (90)	1,640 (1,640)	\$350 (\$348)	\$436
2000	16,200 (15,800)	240 (240)	1,660 (1,660)	\$349 (\$349)	\$421
2001	18,900 (18,000)	250 (250)	1,930 (1,900)	\$438 (\$437)	\$513
2002	18,200 (17,600)	160 (160)	1,690 (1,690)	\$494 (\$494)	\$570
2003	17,000 (15,700)	140 (140)	1,510 (1,510)	\$464 (\$462)	\$524
2004	16,900 (15,600)	200 (200)	1,510 (1,490)	\$464 (\$462)	\$510
2005	15,600 (14,900)	150 (150)	1,270 (1,270)	\$539 (\$538)	\$573
2006	14,200 (13,000)	140 (140)	1,100 (1,090)	\$422 (\$422)	\$434
2007	12,700 (11,900)	200 (200)	1,040 (1,020)	\$367 (\$367)	\$367
2008	12,000 (10,900)	130 (130)	970 (960)	\$465 (\$465)	\$464
2009	9,600 (8,900)	60 (60)	790 (790)	\$576 (\$576)	\$576

Note: Numbers in parentheses exclude fires with incident types indicating specific confined fires, including confined cooking fires, chimney or flue fires, fuel burner or boiler fires, incinerator, compactor, or trash fires that did not spread to other contents or the structure itself. *Because of low participation in NFIRS Version 5.0 during 1999-2001, estimates for those years are highly uncertain and must be used with caution.* Inflation adjustments were based on the consumer price index

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2009) and from NFPA survey found in the U.S. Census Bureau's *Statistical Abstract of the United States: 2010*, "Table 708, Purchasing Power of the Dollar: 1950 to 2009."

**Table 2.**  
**Candle Fires in the Home as a Share of All Home Structure Fires, 1980-2009**

<b>Year</b>	<b>Home Fires</b>	<b>Home Candle Fires</b>	<b>Percent of Home Fires Started by Candles</b>
1980	734,000	10,400	1%
1981	711,000	9,600	1%
1982	654,500	8,900	1%
1983	625,500	8,100	1%
1984	605,500	8,200	1%
1985	606,000	8,500	1%
1986	565,500	8,200	1%
1987	536,500	8,000	1%
1988	538,500	8,300	2%
1989	498,500	7,700	2%
1990	454,500	6,800	1%
1991	464,500	7,300	2%
1992	459,000	7,700	2%
1993	458,000	7,800	2%
1994	438,000	8,900	2%
1995	414,000	10,700	3%
1996	417,000	12,300	3%
1997	395,500	14,400	4%
1998	369,500	15,700	4%
1999	371,000	17,300	5%
2000	368,000	16,200	4%
2001	383,500	18,900	5%
2002	389,000	18,200	5%
2003	388,500	17,000	4%
2004	395,500	16,900	4%
2005	381,000	15,600	4%
2006	396,000	14,100	4%
2007	399,000	12,700	3%
2008	386,500	12,000	3%
2009	362,500	9,600	3%

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Home fires are rounded to the nearest five hundred while home candle fires are rounded to the nearest hundred.

Source: Total home fires are based on the NFPA survey. Candle fire estimates are derived from NFIRS and the NFPA survey. See Appendix A for information on the methodology used.

**Table 3.  
Home Candle Structure Fires, by Area of Origin  
2005-2009 Annual Averages**

<b>Area of Origin</b>	<b>Fires</b>		<b>Civilian Deaths</b>		<b>Civilian Injuries</b>		<b>Direct Property Damage (in Millions)</b>	
<b>Bedroom</b>	4,650	(36%)	59	(43%)	486	(47%)	\$198	(42%)
Non-confined fire	4,530	(35%)	59	(43%)	482	(46%)	\$198	(42%)
Confined fire	120	(1%)	0	(0%)	4	(0%)	\$0	(0%)
<b>Living room, family room or den</b>	2,000	(16%)	30	(22%)	205	(20%)	\$103	(22%)
Non-confined fire	1,920	(15%)	30	(22%)	202	(19%)	\$103	(22%)
Confined fire	70	(1%)	0	(0%)	2	(0%)	\$0	(0%)
<b>Bathroom or lavatory</b>	1,770	(14%)	6	(5%)	87	(8%)	\$27	(6%)
Non-confined fire	1,690	(13%)	6	(5%)	87	(8%)	\$27	(6%)
Confined fire	80	(1%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Kitchen or cooking area</b>	1,420	(11%)	7	(5%)	58	(6%)	\$23	(5%)
Non-confined fire	1,080	(8%)	7	(5%)	56	(5%)	\$23	(5%)
Confined fire	340	(3%)	0	(0%)	2	(0%)	\$0	(0%)
<b>Unclassified function area</b>	930	(7%)	12	(9%)	83	(8%)	\$39	(8%)
Non-confined fire	890	(7%)	12	(9%)	83	(8%)	\$39	(8%)
Confined fire	40	(0%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Unclassified structural area</b>	250	(2%)	5	(4%)	15	(1%)	\$12	(3%)
Non-confined fire	230	(2%)	5	(4%)	15	(1%)	\$12	(3%)
Confined fire	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Other known area</b>	1,850	(14%)	17	(12%)	108	(10%)	\$70	(15%)
Non-confined fire	1,620	(13%)	17	(12%)	108	(10%)	\$70	(15%)
Confined fire	230	(2%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Total</b>	12,860	(100%)	136	(100%)	1,041	(100%)	\$471	(100%)
Non-confined fire	11,960	(93%)	136	(100%)	1,033	(99%)	\$471	(100%)
Confined fire	910	(7%)	0	(0%)	8	(1%)	\$0	(0%)

Note: Sums may not equal totals due to rounding errors. Confined structure fires other than chimney or flue fires (NFIRS incident type 113, and 115-118) were analyzed separately from non-confined structure fires (incident type 110-129, except 113-118). See Appendix A for details.

Source: NFIRS 5.0 and NFPA survey.

**Table 4.**  
**Home Candle Structure Fires, by Item First Ignited**  
**2005-2009 Annual Averages**

<b>Item First Ignited</b>	<b>Fires</b>		<b>Civilian Deaths</b>		<b>Civilian Injuries</b>		<b>Direct Property Damage (in Millions)</b>	
<b>Mattress or bedding</b>	1,440	(11%)	24	(17%)	200	(19%)	\$72	(15%)
Non-confined fire	1,430	(11%)	24	(17%)	200	(19%)	\$72	(15%)
Confined fire	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Unclassified furniture or utensil</b>	1,420	(11%)	15	(11%)	101	(10%)	\$69	(15%)
Non-confined fire	1,360	(11%)	15	(11%)	96	(9%)	\$69	(15%)
Confined fire	60	(0%)	0	(0%)	4	(0%)	\$0	(0%)
<b>Curtain, blind, drapery or tapestry</b>	1,160	(9%)	3	(2%)	101	(10%)	\$40	(8%)
Non-confined fire	1,140	(9%)	3	(2%)	101	(10%)	\$40	(8%)
Confined fire	20	(0%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Cabinetry</b>	1,000	(8%)	10	(7%)	66	(6%)	\$34	(7%)
Non-confined fire	940	(7%)	10	(7%)	66	(6%)	\$34	(7%)
Confined fire	60	(0%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Upholstered furniture</b>	740	(6%)	30	(22%)	106	(10%)	\$51	(11%)
Non-confined fire	720	(6%)	30	(22%)	106	(10%)	\$51	(11%)
Confined fire	20	(0%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Unclassified item first ignited</b>	710	(6%)	3	(2%)	34	(3%)	\$17	(4%)
Non-confined fire	580	(4%)	3	(2%)	34	(3%)	\$17	(4%)
Confined fire	130	(1%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Interior wall covering, excluding drapes</b>	660	(5%)	3	(2%)	28	(3%)	\$18	(4%)
Non-confined fire	650	(5%)	3	(2%)	28	(3%)	\$18	(4%)
Confined fire	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Decoration</b>	610	(5%)	2	(1%)	43	(4%)	\$12	(3%)
Non-confined fire	540	(4%)	2	(1%)	41	(4%)	\$12	(3%)
Confined fire	70	(1%)	0	(0%)	2	(0%)	\$0	(0%)
<b>Magazine, newspaper or writing paper</b>	590	(5%)	6	(4%)	52	(5%)	\$21	(4%)
Non-confined fire	530	(4%)	6	(4%)	52	(5%)	\$21	(4%)
Confined fire	60	(0%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Clothing</b>	550	(4%)	8	(6%)	51	(5%)	\$21	(5%)
Non-confined fire	540	(4%)	8	(6%)	51	(5%)	\$21	(5%)
Confined fire	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Linen other than bedding</b>	510	(4%)	3	(2%)	28	(3%)	\$9	(2%)
Non-confined fire	490	(4%)	3	(2%)	28	(3%)	\$9	(2%)
Confined fire	20	(0%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Floor covering rug, carpet, or mat</b>	440	(3%)	5	(4%)	29	(3%)	\$17	(4%)
Non-confined fire	440	(3%)	5	(4%)	29	(3%)	\$17	(4%)
Confined fire	0	(0%)	0	(0%)	0	(0%)	\$0	(0%)

**Table 4.**  
**Home Candle Structure Fires, by Item First Ignited**  
**2005-2009 Annual Averages**  
**(Continued)**

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified soft goods or wearing apparel	350	(3%)	3	(2%)	32	(3%)	\$12	(3%)
Non-confined fire	320	(3%)	3	(2%)	32	(3%)	\$12	(3%)
Confined fire	30	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Multiple items first ignited	330	(3%)	6	(5%)	27	(3%)	\$14	(3%)
Non-confined fire	310	(2%)	6	(5%)	27	(3%)	\$14	(3%)
Confined fire	20	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Rubbish, trash, or waste	320	(2%)	1	(1%)	10	(1%)	\$3	(1%)
Non-confined fire	150	(1%)	1	(1%)	10	(1%)	\$3	(1%)
Confined fire	170	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Appliance housing or casing	320	(2%)	1	(1%)	23	(2%)	\$4	(1%)
Non-confined fire	270	(2%)	1	(1%)	23	(2%)	\$4	(1%)
Confined fire	50	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Box, carton, bag, basket or barrel	210	(2%)	0	(0%)	13	(1%)	\$6	(1%)
Non-confined fire	190	(1%)	0	(0%)	13	(1%)	\$6	(1%)
Confined fire	20	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Other known item first ignited	1,510	(12%)	15	(11%)	97	(9%)	\$50	(11%)
Non-confined fire	1,370	(11%)	15	(11%)	95	(9%)	\$50	(11%)
Confined fire	140	(1%)	0	(0%)	2	(0%)	\$0	(0%)
<b>Total</b>	<b>12,860</b>	<b>(100%)</b>	<b>136</b>	<b>(100%)</b>	<b>1,041</b>	<b>(100%)</b>	<b>\$471</b>	<b>(100%)</b>
Non-confined fire	11,960	(93%)	136	(100%)	1,033	(99%)	\$471	(100%)
Confined fire	910	(7%)	0	(0%)	8	(1%)	\$0	(0%)

Note: Sums may not equal totals due to rounding errors. Confined structure fires other than chimney or flue fires (NFIRS incident type 113, and 115-118) were analyzed separately from non-confined structure fires (incident type 110-129, except 113-118). See Appendix A for details.

Source: NFIRS 5.0 and NFPA survey.

**Table 5.**  
**Home Candle Structure Fires, by Cause**  
**2005-2009 Annual Averages**

Cause	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unintentional	12,100	(94%)	133	(97%)	995	(96%)	\$453	(96%)
Non-confined fire	11,320	(88%)	133	(97%)	986	(96%)	\$452	(96%)
Confined fire	780	(6%)	0	(0%)	8	(100%)	\$0	(96%)
Intentional	380	(3%)	1	(1%)	30	(3%)	\$11	(2%)
Non-confined fire	320	(2%)	1	(1%)	30	(3%)	\$11	(2%)
Confined fire	70	(1%)	0	(0%)	0	(0%)	\$0	(1%)
Unclassified cause of ignition	190	(2%)	0	(0%)	7	(1%)	\$6	(1%)
Non-confined fire	180	(1%)	0	(0%)	7	(1%)	\$6	(1%)
Confined fire	20	(0%)	0	(0%)	0	(0%)	\$0	(1%)
Failure of equipment or heat source	170	(1%)	2	(2%)	8	(1%)	\$3	(1%)
Non-confined fire	140	(1%)	2	(2%)	8	(1%)	\$3	(1%)
Confined fire	40	(0%)	0	(0%)	0	(0%)	\$0	(1%)
Act of nature	10	(0%)	0	(0%)	1	(0%)	\$0	(0%)
Non-confined fire	10	(0%)	0	(0%)	1	(0%)	\$0	(0%)
Confined fire	0	(0%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Total</b>	<b>12,860</b>	<b>(100%)</b>	<b>136</b>	<b>(100%)</b>	<b>1,041</b>	<b>(100%)</b>	<b>\$471</b>	<b>(100%)</b>
Non-confined fire	11,960	(93%)	136	(100%)	1,033	(99%)	\$471	(100%)
Confined fire	910	(7%)	0	(0%)	8	(1%)	\$0	(0%)

Note: Sums may not equal totals due to rounding errors. Confined structure fires other than chimney or flue fires (NFIRS incident type 113, and 115-118) were analyzed separately from non-confined structure fires (incident type 110-129, except 113-118). See Appendix A for details.

Source: NFIRS 5.0 and NFPA survey.

**Table 6.**  
**Home Candle Structure Fires, by Factor Contributing to Ignition**  
**2005-2009 Annual Averages**

<b>Factor</b>	<b>Fires</b>		<b>Civilian Deaths</b>		<b>Civilian Injuries</b>		<b>Direct Property Damage (in Millions)</b>	
Heat source too close to combustible	7,130	(55%)	82	(60%)	634	(61%)	\$264	(56%)
Non-confined fire	6,720	(52%)	82	(60%)	628	(60%)	\$263	(56%)
Confined fire	410	(3%)	0	(0%)	6	(1%)	\$0	(0%)
Abandoned or discarded material or product	1,700	(13%)	13	(10%)	102	(10%)	\$73	(15%)
Non-confined fire	1,580	(12%)	13	(10%)	102	(10%)	\$73	(15%)
Confined fire	110	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified misuse of material or product	1,580	(12%)	10	(7%)	138	(13%)	\$53	(11%)
Non-confined fire	1,400	(11%)	10	(7%)	138	(13%)	\$53	(11%)
Confined fire	170	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Equipment unattended	780	(6%)	7	(5%)	43	(4%)	\$22	(5%)
Non-confined fire	740	(6%)	7	(5%)	43	(4%)	\$22	(5%)
Confined fire	40	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified factor contributed to ignition	690	(5%)	23	(17%)	34	(3%)	\$25	(5%)
Non-confined fire	630	(5%)	23	(17%)	34	(3%)	\$25	(5%)
Confined fire	70	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Playing with heat source	530	(4%)	3	(2%)	66	(6%)	\$24	(5%)
Non-confined fire	480	(4%)	3	(2%)	66	(6%)	\$24	(5%)
Confined fire	50	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Collision, knock down or overturn	220	(2%)	3	(2%)	18	(2%)	\$8	(2%)
Non-confined fire	210	(2%)	3	(2%)	18	(2%)	\$8	(2%)
Confined fire	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Improper container or storage	200	(2%)	0	(0%)	12	(1%)	\$6	(1%)
Non-confined fire	180	(1%)	0	(0%)	12	(1%)	\$6	(1%)
Confined fire	20	(0%)	0	(0%)	0	(0%)	\$0	(0%)

**Table 6.**  
**Home Candle Structure Fires, by Factor Contributing to Ignition**  
**2003-2007 Annual Averages**  
**(Continued)**

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Other known factor	830	(6%)	10	(7%)	49	(5%)	\$33	(7%)
Non-confined fire	740	(6%)	10	(7%)	47	(5%)	\$33	(7%)
Confined fire	90	(1%)	0	(0%)	2	(0%)	\$0	(0%)
<b>Total fires*</b>	<b>12,860</b>	<b>(100%)</b>	<b>136</b>	<b>(5%)</b>	<b>1,041</b>	<b>(8%)</b>	<b>\$471</b>	<b>(7%)</b>
Non-confined fire	11,960	(93%)	136	(5%)	1,033	(8%)	\$471	(7%)
Confined fire	910	(7%)	0	(0%)	8	(0%)	\$0	(0%)
<b>Total entries*</b>	<b>13,650</b>	<b>(106%)</b>	<b>151</b>	<b>(111%)</b>	<b>1,097</b>	<b>(105%)</b>	<b>\$509</b>	<b>(108%)</b>
Non-confined fire	12,680	(99%)	151	(111%)	1,089	(105%)	\$508	(108%)
Confined fire	970	(8%)	0	(0%)	8	(1%)	\$0	(0%)

\* Multiple entries are allowed which can result in sums higher than totals.

Note: Sums may not equal totals due to rounding errors. Fires in which the factor contributing to ignition was coded as “none,” unknown, or not reported have been allocated proportionally among fires with known factor contributing to ignition. Confined structure fires (NFIRS incident type 113-118) were analyzed separately from non-confined structure fires (incident type 110-129, except 113-118). See Appendix A for details.

Source: NFIRS 5.0 and NFPA survey.

**Table 7.**  
**Home Candle Structure Fires, by Human Factor Contributing to Ignition**  
**2005-2009 Annual Averages**

<b>Human Factor</b>	<b>Fires</b>		<b>Civilian Deaths</b>		<b>Civilian Injuries</b>		<b>Direct Property Damage (in Millions)</b>	
Unattended or unsupervised person	2,550	(20%)	11	(8%)	142	(14%)	\$84	(18%)
Non-confined fire	2,370	(18%)	11	(8%)	142	(14%)	\$84	(18%)
Confined fire	180	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Asleep	1,520	(12%)	57	(42%)	289	(28%)	\$70	(15%)
Non-confined fire	1,450	(11%)	57	(42%)	287	(28%)	\$70	(15%)
Confined fire	70	(1%)	0	(0%)	2	(0%)	\$0	(0%)
Age was a factor	590	(5%)	6	(5%)	74	(7%)	\$26	(6%)
Non-confined fire	530	(4%)	6	(5%)	74	(7%)	\$26	(6%)
Confined fire	60	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Possibly impaired by alcohol or drugs	240	(2%)	11	(8%)	39	(4%)	\$12	(3%)
Non-confined fire	230	(2%)	11	(8%)	39	(4%)	\$12	(3%)
Confined fire	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Other known factor	280	(2%)	8	(6%)	38	(4%)	\$11	(2%)
Non-confined fire	250	(2%)	8	(6%)	38	(4%)	\$11	(2%)
Confined fire	30	(0%)	0	(0%)	0	(0%)	\$0	(0%)
No human factor	8,030	(62%)	57	(42%)	527	(51%)	\$289	(61%)
Non-confined fire	7,430	(58%)	57	(42%)	520	(50%)	\$289	(61%)
Confined fire	600	(5%)	0	(0%)	6	(1%)	\$0	(0%)
<b>Total fires*</b>	<b>12,860</b>	<b>(100%)</b>	<b>136</b>	<b>(100%)</b>	<b>1,041</b>	<b>(100%)</b>	<b>\$471</b>	<b>(100%)</b>
Non-confined fire	11,960	(93%)	136	(100%)	1,033	(99%)	\$471	(100%)
Confined fire	910	(7%)	0	(0%)	8	(1%)	\$0	(0%)
<b>Total entries*</b>	<b>13,210</b>	<b>(103%)</b>	<b>150</b>	<b>(110%)</b>	<b>1,108</b>	<b>(106%)</b>	<b>\$493</b>	<b>(105%)</b>
Non-confined fire	12,270	(95%)	150	(110%)	1,100	(106%)	\$493	(105%)
Confined fire	950	(7%)	0	(0%)	8	(1%)	\$0	(0%)

\* Multiple entries are allowed which can result in sums higher than totals.

Note: Sums may not equal totals due to rounding errors. Confined structure fires other than chimney or flue fires (NFIRS incident type 113, and 115-118) were analyzed separately from non-confined structure fires (incident type 110-129, except 113-118). See Appendix A for details.

Source: NFIRS 5.0 and NFPA survey.

**Table 8.**  
**Home Candle Structure Fires, by Extent of Flame Damage**  
**2005-2009 Annual Averages**

Extent of Flame Damage	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined fire identified by incident type	910	(7%)	0	(0%)	8	(1%)	\$0	(0%)
Confined to object of origin	2,860	(22%)	6	(5%)	146	(14%)	\$22	(5%)
Confined to room of origin	5,870	(46%)	30	(22%)	449	(43%)	\$94	(20%)
Confined to floor of origin	1,010	(8%)	20	(15%)	127	(12%)	\$68	(14%)
Confined to building of origin	2,020	(16%)	66	(49%)	272	(26%)	\$251	(53%)
Extended beyond building of origin	200	(2%)	13	(9%)	39	(4%)	\$36	(8%)
<b>Total</b>	<b>12,860</b>	<b>(100%)</b>	<b>136</b>	<b>(100%)</b>	<b>1,041</b>	<b>(100%)</b>	<b>\$471</b>	<b>(100%)</b>

Note: Sums may not equal totals due to rounding errors.

Source: NFIRS 5.0 and NFPA survey.

**Table 9.**  
**Home Candle Structure Fire Deaths and Injuries by Age**  
**2005-2009 Annual Averages**

Age Group	Civilian Death		Deaths per Million Population	Relative Death Risk	Civilian Injuries		Injuries Per Million Population	Relative Injury Risk	Population (in Millions)	
0-4	18	(14%)	0.88	2.0	46	(4%)	2.22	0.6	20.9	(7%)
5-9	11	(8%)	0.53	1.2	36	(3%)	1.77	0.5	20.1	(7%)
10-14	7	(5%)	0.33	0.7	53	(5%)	2.59	0.8	20.4	(7%)
15-19	2	(1%)	0.09	0.2	93	(9%)	4.33	1.3	21.4	(7%)
20-34	23	(17%)	0.37	0.8	283	(27%)	4.57	1.3	61.8	(20%)
35-49	28	(20%)	0.42	0.9	262	(25%)	4.01	1.2	65.4	(22%)
50-64	21	(15%)	0.39	0.9	172	(16%)	3.21	0.9	53.5	(18%)
65-74	13	(10%)	0.67	1.5	48	(5%)	2.46	0.7	19.6	(6%)
75-84	10	(7%)	0.73	1.6	42	(4%)	3.19	0.9	13.2	(4%)
85 and over	4	(3%)	0.81	1.8	7	(1%)	1.33	0.4	5.3	(2%)
<b>Total</b>	<b>136</b>	<b>(100%)</b>	<b>0.45</b>	<b>1.0</b>	<b>1,041</b>	<b>(100%)</b>	<b>3.45</b>	<b>1.0</b>	<b>301.5</b>	<b>(100%)</b>
65 and over	27	(20%)	0.71	1.6	97	(9%)	2.55	0.7	38.0	(13%)

Note: Civilian deaths and injuries are rounded to the nearest one. Sums may not equal totals due to rounding errors. See Appendix A. for methodology

Source: NFIRS and NFPA survey. Population estimates were obtained from Table 11, "Resident Population by Age and Sex: 1980 to 2005" from the U.S. Census Bureau's *Statistical Abstract of the United States: 2007*.

**Table 10.**  
**Home Candle Structure Fires, by Day of Week**  
**2005-2009 Annual Averages**  
(Includes both non-confined and confined fires)

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	2,020	(16%)	13	(10%)	162	(16%)	\$68	(14%)
Monday	1,780	(14%)	23	(17%)	145	(14%)	\$66	(14%)
Tuesday	1,710	(13%)	17	(13%)	141	(14%)	\$60	(13%)
Wednesday	1,690	(13%)	16	(11%)	132	(13%)	\$58	(12%)
Thursday	1,770	(14%)	16	(12%)	150	(14%)	\$58	(12%)
Friday	1,800	(14%)	14	(10%)	139	(13%)	\$92	(20%)
Saturday	2,090	(16%)	38	(28%)	171	(16%)	\$68	(14%)
<b>Total</b>	<b>12,860</b>	<b>(100%)</b>	<b>136</b>	<b>(100%)</b>	<b>1,041</b>	<b>(100%)</b>	<b>\$471</b>	<b>(100%)</b>
Daily average (total)	1,840	(14%)	19	(14%)	149	(14%)	\$67	(14%)

**Table 11.**  
**Home Candle Structure Fires, by Time Period**  
**2005-2009 Annual Averages**  
(Includes both non-confined and confined fires)

Time Period	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Midnight – 3:00 a.m.	1,440	(11%)	33	(24%)	163	(16%)	\$98	(21%)
3:00 – 6:00 a.m.	1,050	(8%)	36	(27%)	151	(15%)	\$50	(11%)
6:00 – 9:00 a.m.	990	(8%)	16	(12%)	114	(11%)	\$38	(8%)
9:00 a.m. – Noon	1,340	(10%)	3	(2%)	106	(10%)	\$44	(9%)
Noon – 3:00 p.m.	1,690	(13%)	10	(7%)	92	(9%)	\$46	(10%)
3:00 – 6:00 p.m.	1,970	(15%)	7	(5%)	116	(11%)	\$53	(11%)
6:00 – 9:00 p.m.	2,340	(18%)	12	(9%)	155	(15%)	\$75	(16%)
9:00 p.m. – Midnight	2,040	(16%)	19	(14%)	144	(14%)	\$68	(14%)
<b>Total</b>	<b>12,860</b>	<b>(100%)</b>	<b>136</b>	<b>(100%)</b>	<b>1,041</b>	<b>(100%)</b>	<b>\$471</b>	<b>(100%)</b>
Average by time period	1,610	(13%)	17	(13%)	130	(13%)	\$59	(13%)

Note: Sums may not equal totals due to rounding errors.

Source: NFIRS 5.0 and NFPA survey.

**Table 12.**  
**Home Candle Structure Fires, by Month**  
**2005-2009 Annual Averages**  
**(Includes both non-confined and confined fires)**

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	1,370	(11%)	16	(11%)	130	(13%)	\$49	(10%)
February	1,110	(9%)	15	(11%)	120	(12%)	\$42	(9%)
March	1,100	(9%)	12	(9%)	105	(10%)	\$68	(14%)
April	1,060	(8%)	9	(7%)	83	(8%)	\$38	(8%)
May	910	(7%)	14	(11%)	84	(8%)	\$26	(5%)
June	840	(7%)	8	(6%)	49	(5%)	\$33	(7%)
July	810	(6%)	6	(4%)	60	(6%)	\$24	(5%)
August	850	(7%)	13	(9%)	43	(4%)	\$33	(7%)
September	940	(7%)	9	(6%)	75	(7%)	\$28	(6%)
October	1,110	(9%)	11	(8%)	81	(8%)	\$36	(8%)
November	1,180	(9%)	9	(6%)	80	(8%)	\$36	(8%)
December	1,570	(12%)	15	(11%)	129	(12%)	\$60	(13%)
<b>Total</b>	<b>12,860</b>	<b>(100%)</b>	<b>136</b>	<b>(100%)</b>	<b>1,041</b>	<b>(100%)</b>	<b>\$471</b>	<b>(100%)</b>
Monthly average (total)	1,070	(8%)	11	(8%)	87	(8%)	\$39	(8%)

Note: Sums may not equal totals due to rounding errors.

Source: NFIRS 5.0 and NFPA survey.

**Table 13.**  
**Home Candle Structure Fires, by Item First Ignited:**  
**January-November and December**  
**2005-2009 Annual Averages**  
**(Includes both non-confined and confined fires)**

January-November	Fires		December	Fires	
Mattress or bedding	1,300	(12%)	Decoration	170	(11%)
Unclassified furniture or utensil	1,250	(11%)	Unclassified furniture or utensil	170	(11%)
Curtain, blind, drapery or tapestry	1,060	(9%)	Mattress or bedding	140	(9%)
Cabinetry	870	(8%)	Cabinetry	130	(8%)
Upholstered furniture	660	(6%)	Curtain, blind, drapery or tapestry	110	(7%)
Unclassified item first ignited	630	(6%)	Upholstered furniture	80	(5%)
Interior wall covering	580	(5%)	Unclassified item first ignited	80	(5%)
Clothing	490	(4%)	Interior wall covering	80	(5%)
Magazine, newspaper or writing paper	520	(5%)	Linen other than bedding	70	(5%)
Linen other than bedding	440	(4%)	Magazine, newspaper or writing paper	70	(4%)
Decoration	430	(4%)	Floor covering, rug, carpet, or mat	50	(3%)
Floor covering, rug, carpet, or mat	380	(3%)	Clothing	50	(3%)
Unclassified soft goods or wearing apparel	310	(3%)	Unclassified soft goods or wearing apparel	40	(3%)
Appliance housing or casing	300	(3%)	Multiple items first ignited	40	(2%)
Multiple items first ignited	290	(3%)	Rubbish, trash, or waste	40	(2%)
Rubbish, trash, or waste	280	(3%)	Appliance housing or casing	30	(2%)
Box, carton, bag, basket or barrel	190	(2%)	Other known item	220	(14%)
Other known item	1,320	(12%)			
<b>Total</b>	<b>11,290</b>	<b>(100%)</b>	<b>Total</b>	<b>1,570</b>	<b>(100%)</b>

Note: Sums may not equal totals due to rounding errors.

Source: NFIRS 5.0 and NFPA survey.

**Table 14.**  
**Candle Fires in Non-Home Properties by Occupancy Class**  
**2005-2009 Annual Averages**  
**(Includes both non-confined and confined fires)**

Occupancy	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
<b>Non-home residential</b>	<b>670</b>	<b>(40%)</b>	<b>13</b>	<b>(85%)</b>	<b>45</b>	<b>(53%)</b>	<b>\$25</b>	<b>(43%)</b>
Unclassified residential type occupancy	370	(22%)	6	(43%)	30	(35%)	\$12	(21%)
Hotel or motel	120	(7%)	2	(16%)	6	(7%)	\$4	(7%)
Rooming or lodging house	80	(5%)	3	(18%)	5	(6%)	\$4	(7%)
Dormitory, fraternity, sorority or barracks	80	(5%)	1	(9%)	5	(5%)	\$5	(8%)
Residential board and care or assisted living	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Mercantile or office</b>	<b>310</b>	<b>(19%)</b>	<b>0</b>	<b>(0%)</b>	<b>13</b>	<b>(15%)</b>	<b>\$12</b>	<b>(21%)</b>
Specialty shop	70	(4%)	0	(0%)	6	(7%)	\$3	(5%)
Office, bank or mail facility	70	(4%)	0	(0%)	0	(0%)	\$3	(6%)
Personal service, recreational or home repair	60	(3%)	0	(0%)	1	(1%)	\$2	(4%)
Unclassified or unknown-type mercantile or business	50	(3%)	0	(0%)	4	(5%)	\$1	(2%)
Grocery or convenience store	20	(1%)	0	(0%)	0	(0%)	\$1	(2%)
Department store or unclassified general retail	10	(1%)	0	(0%)	1	(1%)	\$1	(2%)
Textile or apparel sales	10	(1%)	0	(0%)	1	(1%)	\$0	(0%)
Service station or vehicle sales, service or repair	10	(1%)	0	(0%)	1	(1%)	\$0	(0%)
Laundry, dry cleaning or professional supplies or services	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Storage</b>	<b>190</b>	<b>(11%)</b>	<b>0</b>	<b>(0%)</b>	<b>8</b>	<b>(9%)</b>	<b>\$4</b>	<b>(7%)</b>
Unclassified storage	120	(7%)	0	(0%)	4	(5%)	\$1	(2%)
Vehicle storage, garage or fire station*	60	(3%)	0	(0%)	2	(3%)	\$1	(1%)
Warehouse or residential or self-storage	20	(1%)	0	(0%)	2	(2%)	\$2	(4%)
<b>Public Assembly</b>	<b>180</b>	<b>(10%)</b>	<b>0</b>	<b>(0%)</b>	<b>4</b>	<b>(4%)</b>	<b>\$11</b>	<b>(20%)</b>
Place of worship or funeral property	80	(5%)	0	(0%)	2	(2%)	\$10	(17%)
Eating or drinking place	50	(3%)	0	(0%)	1	(2%)	\$1	(2%)
Club	20	(1%)	0	(0%)	0	(0%)	\$0	(1%)

\* Does not include fires in which an attached residential garage is coded as a dwelling with the garage as the area of origin.

**Table 14.**  
**Candle Fires in Non-Home Properties by Occupancy Class**  
**2005-2009 Annual Averages**  
**(Includes both non-confined and confined fires)**  
**(Continued)**

Occupancy	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
<b>Outside or special property</b>	120	(7%)	1	(6%)	7	(8%)	\$1	(2%)
Highway, street, or parking area	60	(3%)	0	(0%)	5	(2%)	\$0	(17%)
Open land, beach, or campsite	20	(1%)	0	(0%)	1	(2%)	\$0	(2%)
Bridge, tunnel, or outbuilding	20	(1%)	1	(0%)	1	(0%)	\$0	(1%)
<b>Health care, detention or correction</b>	60	(3%)	1	(9%)	5	(6%)	\$1	(2%)
Nursing home	20	(1%)	1	(9%)	3	(4%)	\$1	(1%)
Clinic or doctor's office	20	(1%)	0	(0%)	0	(0%)	\$1	(1%)
<b>Educational</b>	50	(3%)	0	(0%)	1	(1%)	\$1	(1%)
Preschool through grade 12	30	(2%)	0	(0%)	1	(1%)	\$1	(1%)
Adult education or college classroom	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Industrial, utility defense, agriculture, mining or manufacturing</b>	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Unclassified or unknown property use</b>	80	(5%)	0	(0%)	3	(4%)	\$2	(3%)
<b>Total</b>	<b>1,680</b>	<b>(100%)</b>	<b>15</b>	<b>(100%)</b>	<b>85</b>	<b>(100%)</b>	<b>\$57</b>	<b>(100%)</b>

Note: Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest million dollars. Sums may not equal totals due to rounding errors. See Appendix A. for methodology

Source: NFIRS and NFPA survey.

## Appendix A. How National Estimates Statistics Are Calculated

---

The statistics in this analysis are estimates derived from the U.S. Fire Administration's (USFA's) National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association's (NFPA's) annual survey of U.S. fire departments. NFIRS is a voluntary system by which participating fire departments report detailed factors about the fires to which they respond. Roughly two-thirds of U.S. fire departments participate, although not all of these departments provide data every year. Fires reported to federal or state fire departments or industrial fire brigades are not included in these estimates.

NFIRS provides the most detailed incident information of any national database not limited to large fires. NFIRS is the only database capable of addressing national patterns for fires of all sizes by specific property use and specific fire cause. NFIRS also captures information on the extent of flame spread, and automatic detection and suppression equipment. For more information about NFIRS visit <http://www.nfirs.fema.gov/>. Copies of the paper forms may be downloaded from [http://www.nfirs.fema.gov/documentation/design/NFIRS\\_Paper\\_Forms\\_2008.pdf](http://www.nfirs.fema.gov/documentation/design/NFIRS_Paper_Forms_2008.pdf).

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

### **Methodology may change slightly from year to year.**

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

### **NFPA's fire department experience survey provides estimates of the big picture.**

Each year, NFPA conducts an annual survey of fire departments which enables us to capture a summary of fire department experience on a larger scale. Surveys are sent to all municipal departments protecting populations of 50,000 or more and a random sample, stratified by community size, of the smaller departments. Typically, a total of roughly 3,000 surveys are returned, representing about one of every ten U.S. municipal fire departments and about one third of the U.S. population.

The survey is stratified by size of population protected to reduce the uncertainty of the final estimate. Small rural communities have fewer people protected per department and are less likely to respond to the survey. A larger number must be surveyed to obtain an adequate sample of those departments. (NFPA also makes follow-up calls to a sample of the smaller fire departments that do not respond, to confirm that those that did respond are truly representative of fire departments their size.) On the other hand, large city

departments are so few in number and protect such a large proportion of the total U.S. population that it makes sense to survey all of them. Most respond, resulting in excellent precision for their part of the final estimate.

The survey includes the following information: (1) the total number of fire incidents, civilian deaths, and civilian injuries, and the total estimated property damage (in dollars), for each of the major property use classes defined in NFIRS; (2) the number of on-duty firefighter injuries, by type of duty and nature of illness; 3) the number and nature of non-fire incidents; and (4) information on the type of community protected (e.g., county versus township versus city) and the size of the population protected, which is used in the statistical formula for projecting national totals from sample results. The results of the survey are published in the annual report *Fire Loss in the United States*. To download a free copy of the report, visit <http://www.nfpa.org/assets/files/PDF/OS.fireloss.pdf>.

### **Projecting NFIRS to National Estimates**

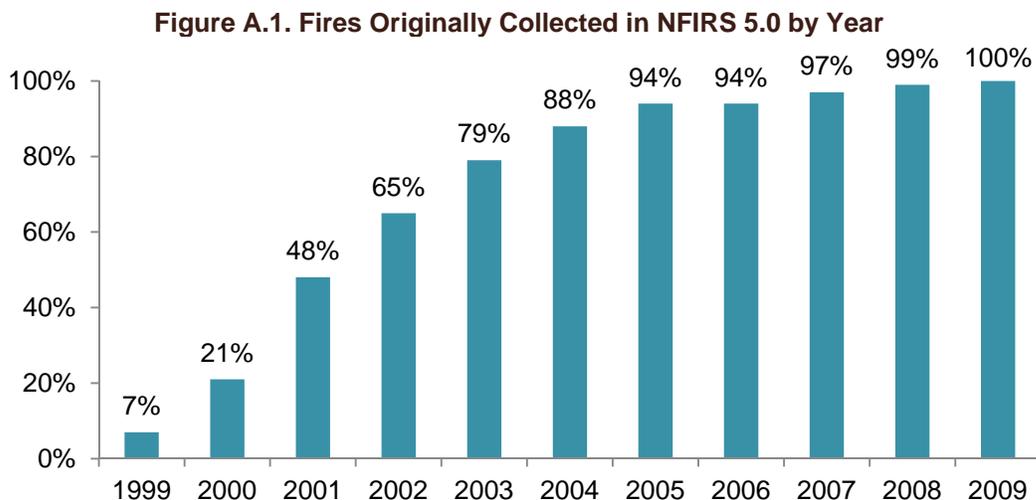
As noted, NFIRS is a voluntary system. Different states and jurisdictions have different reporting requirements and practices. Participation rates in NFIRS are not necessarily uniform across regions and community sizes, both factors correlated with frequency and severity of fires. This means NFIRS may be susceptible to systematic biases. No one at present can quantify the size of these deviations from the ideal, representative sample, so no one can say with confidence that they are or are not serious problems. But there is enough reason for concern so that a second database -- the NFPA survey -- is needed to project NFIRS to national estimates and to project different parts of NFIRS separately. This multiple calibration approach makes use of the annual NFPA survey where its statistical design advantages are strongest.

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

Analysts at the NFPA, the USFA and the Consumer Product Safety Commission developed the specific basic analytical rules used for this procedure. "The National Estimates Approach to U.S. Fire Statistics," by John R. Hall, Jr. and Beatrice Harwood, provides a more detailed explanation of national estimates. A copy of the article is available online at <http://www.nfpa.org/osds> or through NFPA's One-Stop Data Shop.

Version 5.0 of NFIRS, first introduced in 1999, used a different coding structure for many data elements, added some property use codes, and dropped others. The essentials of the approach described by Hall and Harwood are still used, but some modifications have been necessary to accommodate the changes in NFIRS 5.0.

Figure A.1 shows the percentage of fires originally collected in the NFIRS 5.0 system. Each year's release version of NFIRS data also includes data collected in older versions of NFIRS that were converted to NFIRS 5.0 codes.



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

$$\frac{\text{NFPA survey projections}}{\text{NFIRS totals (Version 5.0)}}$$

For 1999 to 2001, the same rules may be applied, but estimates for these years in this form will be less reliable due to the smaller amount of data originally collected in NFIRS 5.0; they should be viewed with extreme caution.

NFIRS 5.0 introduced six categories of confined structure fires, including:

- cooking fires confined to the cooking vessel,
- confined chimney or flue fires,
- confined incinerator fire,
- confined fuel burner or boiler fire or delayed ignition,
- confined commercial compactor fire, and
- trash or rubbish fires in a structure with no flame damage to the structure or its contents.

Although causal and other detailed information is typically not required for these incidents, it is provided in some cases. Some analyses, particularly those that examine cooking equipment, heating equipment, fires caused by smoking materials, and fires started by playing with fire, may examine the confined fires in greater detail. Because the confined fire incident types describe certain scenarios, the distribution of unknown data differs from that of all fires. Consequently, allocation of unknowns must be done separately.

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

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

For most fields other than Property Use and Incident Type, NFPA allocates unknown data proportionally among known data. This approach assumes that if the missing data were known, it would be distributed in the same manner as the known data. NFPA makes additional adjustments to several fields. *Casualty and loss projections can be heavily influenced by the inclusion or exclusion of unusually serious fire.*

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

**Heat Source.** In NFIRS 5.0, candle fires are identified by heat source code 66. These estimates include a proportional share of fires in which the heat source was unknown or not reported, and a proportional share of fires coded as “Heat from open flame or smoking material, other.”

In NFIRS 5.0, one grouping of codes encompasses various types of open flames and smoking materials. In the past, these had been two separate groupings. A new code was added to NFIRS 5.0, which is code 60: “Heat from open flame or smoking material, other.” NFPA treats this code as a partial unknown and allocates it proportionally across the codes in the 61-69 range, shown below.

61. Cigarette;
62. Pipe or cigar;
63. Heat from undetermined smoking material;
64. Match;
65. Lighter: cigarette lighter, cigar lighter;
66. Candle;
67. Warning or road flare, fuse;
68. Backfire from internal combustion engine. Excludes flames and sparks from an exhaust system, (11); and
69. Flame/torch used for lighting. Includes gas light and gas-/liquid-fueled lantern.

In addition to the conventional allocation of missing and undetermined fires, NFPA multiplies fires with codes in the 61-69 range by

$$\frac{\text{All fires in range 60-69}}{\text{All fires in range 61-69}}$$

The downside of this approach is that heat sources that are truly a different type of open flame or smoking material are erroneously assigned to other categories. The grouping “smoking materials” includes codes 61-63 (cigarettes, pipes or cigars, and heat from undetermined smoking material, with a proportional share of the code 60s and true unknown data.

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

**Factor Contributing to Ignition:** In this field, the code “none” is treated as an unknown and allocated proportionally. For Human Factor Contributing to Ignition, NFPA enters a code for “not reported” when no factors are recorded. “Not reported” is treated as an unknown, but the code “none” is treated as a known code and not allocated. Multiple entries are allowed in both of these fields. Percentages are calculated on the total number of fires, not entries, resulting in sums greater than 100%. Although Factor Contributing to Ignition is only required when the cause of ignition was coded as: 2) unintentional, 3) failure of equipment or heat source; or 4) act of nature, data is often present when not required. Consequently, any fire in which no factor contributing to ignition was entered was treated as unknown.

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

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

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

31. Water-caused short circuit arc;
32. Short-circuit arc from mechanical damage;
33. Short-circuit arc from defective or worn insulation;
34. Unspecified short circuit arc;
35. Arc from faulty contact or broken connector, including broken power lines and loose connections;
36. Arc or spark from operating equipment, switch, or electric fence;

- 37. Fluorescent light ballast; and
- 30. Electrical failure or malfunction, other.

**Equipment Involved in Ignition (EII).** NFIRS 5.0 originally defined EII as the piece of equipment that provided the principal heat source to cause ignition if the equipment malfunctioned or was used improperly. In 2006, the definition was modified to “the piece of equipment that provided the principal heat source to cause ignition.” However, much of the data predates the change. Individuals who have already been trained with the older definition may not change their practices. To compensate, NFPA treats fires in which EII = NNN and heat source is not in the range of 40-99 as an additional unknown.

To allocate unknown data for EII, the known data is multiplied by

All fires

---

(All fires – blank – undetermined – [fires in which EII =NNN and heat source <>40-99])

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

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

<b>Code Grouping</b>	<b>EII Code</b>	<b>NFIRS definitions</b>
Central heat	132	Furnace or central heating unit
	133	Boiler (power, process or heating)
Fixed or portable space heater	131	Furnace, local heating unit, built-in
	123	Fireplace with insert or stove
	124	Heating stove
	141	Heater, excluding catalytic and oil-filled
	142	Catalytic heater
	143	Oil-filled heater
Fireplace or chimney	120	Fireplace or chimney
	121	Fireplace, masonry
	122	Fireplace, factory-built
	125	Chimney connector or vent connector
	126	Chimney – brick, stone or masonry
	127	Chimney-metal, including stovepipe or

		flue
Fixed wiring and related equipment	210	Unclassified electrical wiring
	211	Electrical power or utility line
	212	Electrical service supply wires from utility
	213	Electric meter or meter box
	214	Wiring from meter box to circuit breaker
	215	Panel board, switch board or circuit breaker board
	216	Electrical branch circuit
	217	Outlet or receptacle
	218	Wall switch
	219	Ground fault interrupter
Transformers and power supplies	221	Distribution-type transformer
	222	Overcurrent, disconnect equipment
	223	Low-voltage transformer
	224	Generator
	225	Inverter
	226	Uninterrupted power supply (UPS)
	227	Surge protector
	228	Battery charger or rectifier
	229	Battery (all types)
Lamp, bulb or lighting	230	Unclassified lamp or lighting
	231	Lamp-tabletop, floor or desk
	232	Lantern or flashlight
	233	Incandescent lighting fixture
	234	Fluorescent light fixture or ballast
	235	Halogen light fixture or lamp
	236	Sodium or mercury vapor light fixture or lamp
	237	Work or trouble light
	238	Light bulb
	241	Nightlight
	242	Decorative lights – line voltage
	243	Decorative or landscape lighting – low voltage
	244	Sign
Cord or plug	260	Unclassified cord or plug
	261	Power cord or plug, detachable from appliance
	262	Power cord or plug- permanently attached
	263	Extension cord

Torch, burner or soldering iron	331	Welding torch
	332	Cutting torch
	333	Burner, including Bunsen burners
	334	Soldering equipment
Portable cooking or warming equipment	631	Coffee maker or teapot
	632	Food warmer or hot plate
	633	Kettle
	634	Popcorn popper
	635	Pressure cooker or canner
	636	Slow cooker
	637	Toaster, toaster oven, counter-top broiler
	638	Waffle iron, griddle
	639	Wok, frying pan, skillet
641	Breadmaking machine	

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

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

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

**Rounding and percentages.** The data shown are estimates and generally rounded. An entry of zero may be a true zero or it may mean that the value rounds to zero. Percentages are calculated from unrounded values. It is quite possible to have a percentage entry of up to 100% even if the rounded number entry is zero. The same rounded value may account for a slightly different percentage share. Because percentages are expressed in integers and not carried out to several decimal places, percentages that appear identical may be associated with slightly different values.

## Appendix B. Selected Published Incidents

---

The following are selected published incidents involving home candles. Included are short articles from the “Firewatch” columns in *NFPA Journal* and incidents from either the large-loss fires report or catastrophic fires report. It is important to remember that this is anecdotal information. Anecdotes show what can happen; they are not a source to learn about what typically occurs.

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

### **Homeless person dies in abandoned house fire, Alabama**

A 37-year-old man died in a fire in an abandoned single-family home in which he was living without utilities.

The single-story, wood-frame house, which was 33 feet (10 meters) long and 12 ½ feet (4 meters) wide, was dilapidated and had no smoke alarms or sprinklers.

A police officer on patrol reported the fire at 7:30 a.m., and arriving firefighters found the entire front of the house engulfed in flames. They first tried to fight the blaze from the rear, but couldn’t gain access through the boarded-up rear door, so they moved back to the front. Once they had knocked the fire down, firefighters found the victim on the floor between the living room and the bedroom.

Investigators found candles in the living room, along with lawn mowing equipment and stored gasoline, which contributed to the blaze. The victim was seen some four hours before the fire in an impaired state, which may have contributed to his death. He was related to the property owners, who told officials that they were aware he was living there.

The home had no real value, and its contents, valued at less than \$1,000, were destroyed.

Kenneth J. Tremblay, 2010, "Firewatch," *NFPA Journal*, November/December, 21-22.

### **Unattended candle ignites contents of bedroom, Texas**

A 4-year-old boy was fatally injured in a fire started by a candle left burning on a dresser in the master bedroom of his family’s apartment. The apartment building had no sprinklers, and investigators could find no smoke alarms in the apartment.

After the candle ignited the dresser, flames spread to a mattress, then to the entire contents of the room. The body of the little boy was found in an adjacent bedroom.

Neighbors called 911 at 9:12 a.m., and firefighters arrived to extinguish the blaze, which did \$10,000 in damage to the building and \$8,000 in damage to the apartment's contents.

Ken Tremblay, 2010, "Firewatch", *NFPA Journal*, September/October, 34.

### **Alcohol Contributes to Fire Death, Arizona**

A 22-year-old man died in a fire investigators believe started when an unattended candle ignited combustibles on the coffee table in his apartment living room.

The 312-unit, two-story, wood-frame apartment building, which was 100 feet (30 meters) long and 50 feet (15 meters) wide, was unsprinklered. A battery-operated smoke alarm in the living room of the unit of origin provided local coverage.

A neighbor called 911 at 5:56 a.m. to report smoke coming from an adjacent apartment, and firefighters arrived 4 minutes later to find smoke coming from the second floor. When crews entered the apartment of origin, they found the victim near the front door with first-, second-, and third-degree burns to his body. Despite their attempts to resuscitate him, he died of burns and smoke inhalation.

Investigators determined that the fire smoldered for some time before it burst into flames, filling the apartment with smoke that activated the fire alarm, possibly waking the victim. Witnesses reported hearing a beeping sound but said they were unsure whether it was a smoke alarm or an alarm clock. Marks along the walls showed that the victim moved from the bedroom to the hall before collapsing by the front door. His blood alcohol level was 0.189, which contributed to his inability to respond to the emergency.

The building, valued at \$500,000, sustained damages estimated at \$30,000; its contents, valued at \$7,200, sustained \$1,500 in damage.

Ken Tremblay, 2010, "Firewatch", *NFPA Journal*, May/June, 40.

### **Candle Fire Kills Man with Cognitive Disabilities, Vermont**

A man with obsessive-compulsive disorder died of smoke inhalation in a fire that began when unsecured wall sconces holding lit candles fell onto his living room couch, igniting the upholstery, bedding, and a sleeping bag.

The single-family, one-story house had five single-station smoke alarms. There were no sprinklers.

A passerby called the fire department at 10:35 a.m., and responding firefighters heard the smoke alarms sounding inside the house. Crews extinguished the fire, but not before it nearly destroyed the house and its contents, valued at \$225,000.

Investigators determined that the fire spread from the couch to other combustibles in the living room and eventually became starved of oxygen. Once a window broke, however, fresh air flowed into the room, and the fire re-ignited with intensity.

Kenneth J. Tremblay, 2010, "Firewatch", *NFPA Journal*, March/April 24-25.

### **Sprinkler Controls Fire in Home, Arizona**

A sprinkler held a fire in a bedroom of a single-family home in check until firefighters arrived, preventing a significant fire loss. Investigators believe that the fire began when an unattended candle ignited furniture in the bedroom. No one was home at the time of the fire.

The one-story, wood-frame house, which covered an area of 2,000 square feet (186 square meters), was built on a concrete slab and had a tile roof. It was protected by smoke alarms, which were operating when firefighters responded to a neighbor's 911 call at 12:48 p.m.

The house, valued at \$500,000, and its contents, valued at \$50,000, sustained damages estimated at \$20,000 and \$5,000, respectively. There were no injuries.

Kenneth J. Tremblay, 2010, "Firewatch", *NFPA Journal*, January/February, 23.

### **Lack of Working Smoke Alarms Contributes to Death, Florida**

A 62-year-old man died when an unattended candle started a fire in his manufactured home.

The home was 40 feet (12 meters) long and 20 feet (6 meters) wide. Two single-station, battery-operated smoke alarms had no batteries.

The candle, which the man had left burning when he went to bed, fell to the floor at some point and ignited nearby combustibles. When the light fixtures began falling to the floor, the man awoke to find his home on fire.

Rather than trying to escape, he tried to extinguish the blaze until he was overcome by the smoke and heat. At about this time, a passerby called 911, then grabbed a garden hose in an attempt to knock the fire down and rescue the trapped man.

Arriving firefighters extinguished the blaze and found the victim's body. The fire marshal stated that the "occupant would have survived had he exited the structure without attempting to extinguish the fire." He also noted that the man would have "had earlier warning had he not removed the batteries from the smoke alarms."

Ken Tremblay, 2009, Firewatch, *NFPA Journal*, November/December, 22-23.

### **Burglar Bars Block Escape, Texas**

A 76-year-old woman died of smoke inhalation in her single-family home when a fire started by an unattended candle left burning in the living room overnight blocked her path to the door. Burglar bars on her bedroom window also blocked her escape.

The single-story, wood-frame house had battery-operated smoke alarms in the kitchen and bedroom, but investigators could not determine whether they operated during the fire. The utility company had cut off the home's electricity due to nonpayment, and the occupants were using candles for light.

A passerby saw the house on fire and called 911 at 5:18 p.m. Neighbors also alerted one of the woman's sons, who lived in a small building at the rear of the house, and he helped his mentally challenged brother out a rear window. However, he was unable to save his mother, whose body was found in a bathtub.

Investigators determined that the unattended candle ignited nearby combustibles, and the fire spread undetected, blocking access to the door from the hallway.

The house, which was valued at \$34,000, sustained damage estimated at \$20,000. Its contents, valued at \$7,000 were destroyed.

Kenneth J. Tremblay, 2009, Firewatch, *NFPA Journal*, March/April, pg. 24.

### **Fire Safety Education Credited With Saving Child, Ohio**

A 12-year-old boy died in a fire that investigators believe began when a candle burning in a glass container on top of a television fell to the floor of his three-family home. His sister used training from a fire department safety house demonstration to save herself.

The two-story, wood-frame dwelling was 43 feet (13 meters) long and 18 feet (5 meters) wide. One smoke alarm had been installed in a first-floor bedroom, two had been installed in a second-floor hallway, and three had been installed in the second-floor bedrooms. The house was unsprinklered.

Investigators believe that the candle, which had been left burning unattended, fell from the television and continued to burn after the glass container broke, spilling wax and igniting combustibles.

The children, whose mother had left the apartment at about 5:40 a.m., heard the smoke alarms sounding around 6:00 a.m. They tried to go downstairs together, but the heat and smoke drove them back, and they retreated to their own bedrooms.

The girl, whose age was not reported, told investigators that she closed her bedroom door and climbed out a window onto the porch roof to escape. Her brother left his bedroom door partially open. As firefighters were about to enter his bedroom from outside, the contents of his room reached its ignition temperature and flashed over, killing the 12-year-old.

The home, which was valued at \$80,000, and its contents, which were valued at \$20,000, sustained losses estimated at \$70,000. No firefighters were injured.

Kenneth J. Tremblay, 2009, "Firewatch", *NFPA Journal*, January/February, 22-23.

### **Candle Ignites Fire, Killing One, Georgia**

A candle used to illuminate a first-floor closet in a two-story house ignited its contents, starting a fire that spread to the second floor, where it trapped and killed a 12-year-old boy.

The first floor of the wood-frame, single-family house covered an area of 2,200 square feet (204 square meters). Smoke alarms had been installed near the bedrooms, but investigators could not determine whether they had operated. There were no sprinklers.

The fire started around 5:00 p.m. when the victim's sister checked on a litter of puppies that had recently been born in the closet of the first-floor master bedroom. Unable to see the puppies, the girl lit a candle and inadvertently ignited the clothing inside. She left the room to find a fire extinguisher, and by the time she returned, she was unable to extinguish it. The girl ran next door to call the fire department. She did not realize her brother was home at the time.

The fire department received the call at 5:11 p.m., and firefighters arrived about seven minutes later to find heavy smoke and fire showing. Firefighters who entered the structure encountered fire spreading from the master bedroom.

As additional companies arrived to support the first-due engine company, the firefighters stretched hose lines to the upper floor, where they found the boy in a second-floor bedroom. They brought him outside but he died of smoke inhalation.

The house, valued at \$170,000, sustained losses estimated at \$50,000. Damage to its contents is estimated at \$45,000. The status of the puppies was not reported.

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

### **Candle Starts Deadly Fire during Power Outage, Kansas**

Candles used during a power failure started a fire that killed a mentally challenged nine-year-old girl, despite sounding smoke alarms.

The fire occurred in a wood-frame, eight-unit apartment building that covered approximately 13,300 square feet (1,236 square meters). The apartments were each two stories high with interconnected smoke alarms in each bedroom, the hallway, the living room, and the kitchen. The alarms had battery backup and operated as designed. The building had no sprinklers.

A thunderstorm passing through the area caused the power outage, and the apartment's occupants lit candles in some rooms, including the master bedroom. The candle in the master bedroom fell from the bookshelf it was on and ignited combustibles in the room.

A bystander heard the apartment fire alarm sounding and called the fire department at 11:57 p.m. The first-arriving engine found smoke coming from the apartment, and witnesses reported that a child was trapped on the upper floor.

Crews advanced a 1 3/4-inch hose line to the second floor and extinguished the fire, which was confined to the master bedroom. The girl was found unconscious under a baby mattress in another bedroom.

Investigators determined that the fire, which was unintentional, began in the master bedroom between the bookshelf and television stand.

The apartment sustained \$25,000 in property damage and \$5,000 in damage to its contents. Heavy heat and smoke damaged the second floor. The cause of the girl's death was high levels of carbon monoxide.

Kenneth J. Tremblay, 2008, "Firewatch," *NFPA Journal*, September/October, 23-24.

### **Candle is Cause of Fatal Fire, Illinois**

A 47-year old woman died when an unattended bedroom candle sparked a fire that spread to other areas of the home before being detected.

The fire occurred in a single-story ranch constructed of wood framing with an asphalt shingle roof. A battery-operated smoke alarm was installed in the hallway by the bedroom and operated during the fire. There were no sprinklers. A passerby called 911 at 12:33 a.m. to report the fire. Firefighters arrived a minute later and found the home well involved. Investigators determined that a candle left burning on a nightstand fell over and ignited bedding. A fan may have spread the fire from the bedroom to the hallway and living rooms where the victim was located.

The victim was medicated and sleeping in a sitting position just outside the room of origin. The victim died of smoke inhalation. The building valued at \$30,000 was a total loss and \$10,000 worth of contents suffered \$8,000 in loss. There were no other injuries.

Kenneth J. Tremblay, 2007, "Firewatch", *NFPA Journal*, May/June, 26.

### **Apartments Housing Mostly Senior Adults Suffered Fatal Fire, Oklahoma**

An unattended candle started a fire fatally injured one occupant and injured four others within a two building apartment complex housing 150 senior adults. Firefighters arrived to find heavy smoke and fire coming from the second floor of one of the buildings and needed additional resources to assist in the evacuation of the high-risk occupants. The fire occurred within a two-story apartment building covering approximately 1,600 square feet. Combination smoke and heat detectors in each unit failed to operate for reason undetermined. There were no sprinklers and building construction was not reported.

The fire was reported at 8:10 a.m. and arriving fire crews were divided into fire attack, and evacuation, search and rescue. A hose line was advanced to the second floor where the flames were quickly controlled. Smoke, heat and water damage was prevalent throughout the building.

During the fire five residents who evacuated suffered smoke inhalation. A 70-year old female developed pneumonia from the exposure to smoke and later died from her injuries. Four other females ages 18, 67, 73 and 82 years of age also suffered smoke inhalation injuries. The

building valued at \$2,300,000 had losses estimated at \$300,000. Contents of \$755,000 had losses of \$115,000.

Kenneth J. Tremblay, 2007, "Firewatch", *NFPA Journal*, January/February, 19.

### **Candles Used for Light Cause Fire that Killed Five, Ohio**

At 6:12 a.m. on a morning in December 2006, the fire department was notified of a fire in a two-story single-family home of unprotected wood-frame construction. This fire broke out in the first-story living room. Power to the house had been shut off prior to the fire and the occupants were using candles throughout the house for light. A candle on a coffee table burned down to the table and ignited it. The smoke and fire spread, blocking egress from the stairs. The fire department had found smoke alarms in the home on a previous inspection, but firefighters found no evidence of any at the time of the fire.

Investigators learned that a guest fell asleep in the living room, and the candle burned unattended. The guest and four occupants upstairs were killed.

Adapted from Stephen G. Badger's 2007 article, "U.S. Multiple-Death Fires for 2006", *NFPA Journal*, September/October, 60.

### **Lack of Battery in Smoke Alarm Leads to Fire Death, Oregon**

An occupant of an apartment suffered fatal smoke inhalation injuries when a candle left unattended ignited nearby combustibles and filled the unit with fire and smoke. A passerby observing fire coming from a window of the apartment drove to a fire station a block away to report the fire. Firefighters arrived and forced the door to the apartment, advanced a hose line, and performed a search quickly finding the victim who sadly already succumbed.

The single-story, wood framed apartment building was one of many located within a complex that contained from three to four units each. A battery operated smoke alarm was located within the hallway of the unit, but was found without batteries. There were no sprinklers. Firefighters found a small amount of fire coming from the front window as smoke puffed from one side of the building. Upon entering the apartment fire was seen along the wall inside the living room along with a heavy smoke condition. Finding a closed bedroom door firefighters attempted to open it but found some resistance. Forcing the door open, they found the victim lying face down towards the bedroom door. A 46-year old male victim was taken outside and emergency medical treatment performed by other crews.

Investigators determined that the fire started against a wall in the living room, near a plant stand with a marble base was located. Speaking with an occupant of the apartment, who was traveling at the time of the fire, stated that both occupants from that location routinely burned candles. An unattended candle is believed to have ignited the fire that spread to other combustibles. The building valued at \$200,000 with \$30,000 in contents suffered structural losses of \$40,000 with contents suffering \$20,000.

Kenneth J. Tremblay, 2006, "Firewatch", *NFPA Journal*, November/December, 21-22.

### **Candle Fire Leads to Four Deaths, Pennsylvania**

Lack of smoke detectors failed to adequately alert the occupants to a fire started by an unattended candle left in a first floor bathroom. Four of the six occupants died as a result of the fire and two others were injured from smoke inhalation and while trying to escape. Firefighters arrived and attempted to search the interior of the home, just as flashover occurred igniting all first floor contents and rapidly spreading the fire to upper the upper floor and attic.

The two-story, single-family home was constructed of wood framing and measured 25-feet by 25-feet with a pitched roof covered by shingles. Conflicting reports from survivors stated smoke alarms were present, however investigators did not find any within the debris. There were no sprinklers.

A neighbor detected the fire at 1:56 a.m. and called 911 to report it to the fire department that responded and arrived within five minutes. On arrival the incident commander observed heavy, black and dark brown smoke pushing from two sides of the building and reports of at least multiple people still inside the building. One surviving occupant had taken refuge on the roof and needed immediate rescue, only to fall to the ground before firefighters could reach him.

Command initially ordered a water supply to be established and a hose line stretched to the dwelling for all hands to search for trapped occupants. The sudden ignition of the first floor contents from flashover forced firefighters from the home, as a deck gun was used in blitz attack to knockdown the heavy fire. In addition, heat from the fire was also affecting a nearby exposure as firefighters rushed to protect that home. Once the heavy fire was knockdown crews reentered the dwelling and found three of the victims and removed them from the upper floor. Partial collapse of the roof forced firefighters from the building a second time, as the fire was fought defensively. Later a team of firefighters found a fourth victim in the debris.

Investigators determined that an unattended candle ignited unknown combustibles in the first floor bathroom and spread undetected within the residence. The building lacked electricity and the candles were used for illumination purposes. Surviving the fire was a 57-year old male victim who fell from the roof and also a 14-year old female who suffered smoke inhalation. The dead included two 15-year old females, a 3-year old male, and a 49-year old female. The home and contents valued at \$35,000 were a total loss.

Kenneth J. Tremblay, 2006, "Firewatch", *NFPA Journal*, May/June, 36.

### **Unattended Candle Ignites Fire Killing Three Children, Texas**

Electrical power shut off to an apartment due to non-payment of the utility bill, led to the use of candles for illumination and to a fire that killed three. Contributing to the deaths and delay in detection was the removal of electrical power to the units hardwired smoke detectors. Although the units had a battery backup, the low battery alarm caused the tenants to remove the batteries rendering the alarms useless. Investigators suggested that the hardwired smoke detectors should have been connected to the uninterrupted building supply rather than the individual apartment circuit.

The two-story, townhouse-style apartment building was constructed of wood framing with an asphalt shingled roof and the unit measured 35-feet by 35-feet. The first floor included a living

room, dining area, kitchen and master bedroom with bathroom. Unenclosed stairs led to a second bedroom, study, bathroom and a loft overlooking the first floor living space. Hardwired smoke detectors were installed and located on the first floor near the master bedroom and on the second floor loft area near the stairs. There were no sprinklers. The apartment was located in a building with eight other units and in a complex with 17 similar buildings totaling 250 units.

A candle placed on a paper food container for several hours burned down and ignited the container in the first floor master bedroom. Flames spread to the plastic housing of a fan and a nearby mattress and box spring stored upright against a wall. A neighbor passing by the apartment smelled smoke and discovered the fire at 9:58 p.m. Yelling for others to help, the neighbor broke an exterior window and tried to use an available 2-1/2 pound fire extinguisher on the flames without success. Fire was drawn to the open window and filled the apartment with smoke and heat. During the fire extinguishment three girls were found by firefighters in the second floor bedroom. Killed in the fire were a 6-year-old, 5-year-old, and a 2-year-old girl all succumbed to smoke inhalation. The report states that the children were abandoned, however it does not specify if it was before or during the fire event. Combined damages to the building and contents were estimated at \$60,000.

Kenneth J. Tremblay, 2006, "Firewatch", *NFPA Journal*, March/April, 28-30.

### **Candle Ignites Fire in Basement Apartment, Nebraska**

A fire that burned a sofa, coffee table and some other combustibles eventually burned itself out, but not before fatally injuring the occupant of a basement bedroom. The fire occurred in a duplex, where basement bedrooms were rented out to single occupants. Lack of egress windows and smoke alarms contributed to the victim's death.

The single-story, wood framed constructed home-contained two living units on the first floor and each had a bedroom located in the basement occupied by other renters. The 50-foot by 20-foot dwelling had only a smoke alarm located on the first floor hallway near sleeping areas. There were no sprinklers and all units of the building were occupied.

One of the basement renters smelled smoke and alerted other occupants and the fire department at 6:08 a.m. The occupant did not know if the other basement renter was home at the time, but relayed information to emergency responders that he may be home. Fire crews arriving six minutes later found light smoke coming from the building with similar smoke conditions inside the structure but no fire. Searching the lower level they forced a door to one of the bedrooms and found the interior was involved in fire but it had nearly extinguished itself. Searching further the victim, a 28-year old male, was found leaning against a dryer unit in the rented space.

Investigators determined that a candle left burning on the floor ignited the upholstered sofa and spread to a wooden table and other combustibles. Producing heavy smoke, the victim suffered severe smoke inhalation and was not able to be revived. A coroner's report stated he died of severe carbon monoxide poisoning and had levels of an illegal substance and alcohol in his blood at the time of his death. All other occupants, who were sleeping at the time, escaped unharmed. Damage to the structure having a combined value of \$200,000 had approximately \$6,000 in loss.

Kenneth J. Tremblay, 2006, "Firewatch", *NFPA Journal*, January/February, 18.

### **Candle Fire Causes \$8.5 Million in Damage to Home, Florida**

At 6:47 a.m. on an October 2005, morning, the fire department was notified of a fire in an 11,000 square feet (1,021 square meters), one-story, single-family house of unprotected ordinary construction. The house was occupied by one adult and six juveniles sleeping. There was a complete coverage of smoke alarms. However due to a power loss caused by a recent hurricane the back-up batteries were removed and used elsewhere. There was no fire suppression equipment present.

Winds of 30 to 45 miles per hour (48 to 72 kilometers per hour) blew a window covering into an unattended candle left burning in a first-story room. Other combustibles were soon involved and by the time, the occupants detected the fire the room was well involved and spreading to the attic and hallway area. Firefighters initially made an interior attack until they noticed the roof was sagging. Fire fighters evacuated the building just as the roof collapsed.

Water supply was a problem for firefighters. There were no fire hydrants on the street. Drafting operations were begun to supplement water flow. One civilian was injured. The loss was \$7,000,000 to the house and \$1,500,000 to the contents.

Adapted from Stephen G. Badger's 2006 article, "Large-Loss Fires in the United States-2005," *NFPA Journal*, November/December, 71.

### **Four Die in Candle Fire, Illinois**

A candle left burning on top of a stereo speaker by a sleeping occupant ignited an adjacent couch, starting a fire that killed a couple and their two children.

The two-story, brick apartment building in which the fire occurred had concrete floors and a wooden mansard roof covered in asphalt shingles and slate tile.

Fire detection equipment in the 12- unit structure, which was 150 feet (46 meters) long and 50 feet (15 meters) wide, was limited to single-station, battery- operated smoke alarms. There were no sprinklers.

The 911 call reporting the fire came from a neighbor across the street at 5 a.m. and was followed by many more reports from cell phones. Firefighters arriving within five minutes of the alarm found fire coming from a balcony door.

Using a 2 1/2-inch hose line with a straight stream nozzle, the first-in fire crew knocked down the heavy fire coming from the second-floor unit. Several crews found and removed three victims-a woman, a toddler, and an infant-and took them outside for transport to the hospital. One fire crew completed extinguishment using a 1-3/4-inch line advanced up a ladder. Other firefighters and police officers removed more residents from balconies without incident.

Upon arrival, fire companies were also directed to a fourth victim found outside the building, a 25-year-old man. He lived long enough to tell investigators he was awakened by the sound of a baby crying. Finding the apartment filling with smoke, he picked up the baby but had to set her

back down to call 911. The descending smoke layer caused him to abandon the call, and he lost sight of the infant. He left the building alone.

Firefighters later found the infant in the kitchen and the man's 24-year-old partner and 2-year-old son on a bedroom floor. They had all died of smoke inhalation.

The injured man told hospital staff before he died that his family had lit candles in the living room earlier in the evening. Investigators found the remains of several small, tea-type candles near the point of fire origin.

They also found the smoke alarm had no battery.

The value of the building and its contents was not reported, but damage to the building was estimated at \$150,000, and damage to the contents was estimated at \$2,500.

Kenneth J. Tremblay, 2005, "Firewatch", *NFPA Journal*, September/October, 27-28.

### **Candle Fire Kills Three, Virginia**

Three people died of smoke inhalation and a fourth was hospitalized when an early-morning fire started by an unattended candle on a first-floor balcony spread through a 24-unit condominium complex.

The unsprinklered complex consisted of four semi-attached, wood-framed buildings 100 feet (30 meters) wide and 200 feet (61 meters) long. The exterior walls were covered with vinyl siding, and the roof decks were covered with asphalt shingles.

The structures, each containing six units, had smoke alarms in the occupied spaces, but activation was delayed because the fire started outside and spread indoors through concealed spaces.

A passing police officer reported the fire at 5:20 a.m. Arriving firefighters noted heavy fire in a portion of the building and worked together with civilians to evacuate several occupants still inside the burning structure. A second and a third alarm were ordered as fire spread on all floors to the attic and roof.

Investigators determined that a candle left burning unattended on a balcony ignited a table, and the fire spread to the exterior siding and other combustibles. It then spread to the upper floors and the attic through concealed spaces, including a fireplace flue, and an exterior stairwell.

Firefighters found a 69-year-old woman, a 36-year-old woman, and a 16-year-old boy dead of carbon monoxide inhalation. Another resident was hospitalized with smoke inhalation, and two others were treated at the scene.

The value of the building was estimated at \$6 million. Structural damage was estimated at \$3 million, and damage to the building's contents was estimated at \$875,000. Eighteen of the 24 units were so badly damaged that residents could not return to them.

A fire department spokesman told reporters that "[We] will be stepping up [our] efforts to educate the community about the hazards associated with leaving candles unattended... [Fires

involving candles are] no longer a seasonal fire safety issue". The department also reported that 20 fires have been attributed to unattended candles in the community in 2003.

Kenneth J. Tremblay, 2005, *NFPA Journal*, July/August, 18-19.

### **Candle Fire in their New Home Kills 11 People, Louisiana**

At 5:05 a.m. on a March 2005 morning, the fire department was notified of a fire in a two-story single-family townhouse of unprotected wood-frame construction. Because of the destruction, smoke alarm presence was unknown.

A candle ignited bedding in a second-story bedroom. Two occupants attempted to remove the mattress from the house. Having difficulties with the front door, they placed the mattress on some cardboard boxes while they worked on the lock, until the mattress began flaming. At this point, these two family members escaped out the rear door. Two others jumped out a second-story window. Some then went to the front door and kicked it open but by then the front room was fully engulfed with fire, and fire was spreading up the stairs to the second story.

The family was using candles for light, since they just moved into the house and the electricity had not yet been turned on. Instead of evacuating, occupants attempted to move the mattress out of the dwelling. The occupants were not familiar with the dead bolt lock on the front door. Escaping occupants left the rear door open, allowing the wind to spread the fire. Eleven people died in the fire, including three children under six years of age. The victims were found in second-story bedrooms and a bathroom.

Adapted from Stephen G. Badger's 2007 article, "U.S. Multiple-Death Fires for 2005," *NFPA Journal*, September/October, 60.