RESEARCH

Home Candle Fires

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Abstract

Candles can enhance décor or be a source of light. However, they can also start fires.

National estimates of reported fires derived from the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS) and NFPA's annual fire department experience survey show that candles were the heat source in an estimated average of 9,300 reported home fires annually during 2009-2013. These fires caused an average of 86 civilian deaths, 827 civilian injuries and $374 million in direct property damage per year.

More than one-third (36%) of home candle fires started in the bedroom. Almost three of every five (58%) fires occurred because the candle was too close to something that could burn. Candle fires are most common around the winter holidays. 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 fallen since the 2001 peak. ASTM F15.45 has developed a number of standards relating to candle fire safety.

Despite the considerable progress made in reducing candle fires, they are still a problem. In 2009-2013, candle fires ranked second among the major causes in injuries per thousand fires and average loss per fire. Efforts to prevent these fires must continue.

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 or call 617-770-3000. To learn more about the One-Stop Data Shop go to www.nfpa.org/osds or call 617-984-7451.

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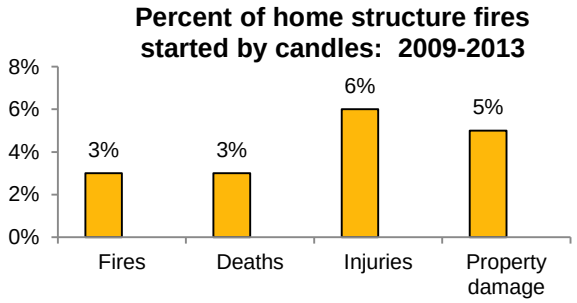
While fires from most causes have declined fairly steadily over the past few decades, candle fires followed a different pattern. Like most fire causes, candle fires were generally decreasing in the 1980s. However, an increase in candle sales in the 1990s was accompanied by an increase in candle fires. These incidents peaked in 2001 and have fallen considerably since. Even with the decline, candles remain one of the major causes of fire. This report provides details about the circumstances, causes, and trends associated with home structure fires started by candles.

Unless otherwise specified, the statistics presented here are estimates derived from the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS) and NFPA's annual fire department experience survey.

The size of the problem in 2009-2013

9,300 reported home structure fires, on average, were started by candles annually. During the five-year period of 2009-2013, U.S. fire departments responded to an estimated average of 9,300 home structure fires started by candles per year. These fires caused an annual average of 86 civilian deaths, 827 civilian fire injuries, and $374 million in direct property damage.

On average, 25 home candle fires were reported per day.



Candles caused 3% of total reported home fires, and home fire deaths, 6% of home fire injuries, and 5% of associated direct property damage during 2009-2013. Candles ranked eighth among the leading cause categories in number of fires, tied for sixth in home fire deaths, also ranked sixth in home fire injuries, and ranked seventh in direct property damage.[1]

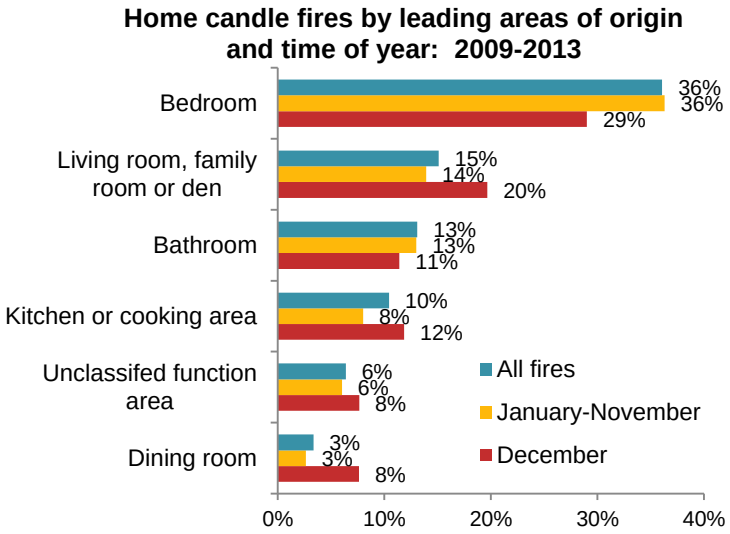
Candle fires ranked second among the major causes in rate of injury per thousand fires and average loss per fire. During this period, home candles caused 9.2 deaths and 88.9 injuries per thousand fires, as well as an average loss of $40,000 per fire. In contrast, home structure fires overall caused 6.9 deaths and 36.1 injuries per thousand reported home fires with an average loss of $19,000 per fire.

Causes and circumstances of home candle fires

Candle fires peak around the winter holidays. Twelve percent of home candle fires occurred in December, 1.4 times the monthly average. January ranked second with 10%. According to the National Candle Association, roughly 35% of the candle business is seasonal around the Christmas holiday. The peak days for candle fires were New Year's, Christmas, New Year's Eve, and Christmas Eve.

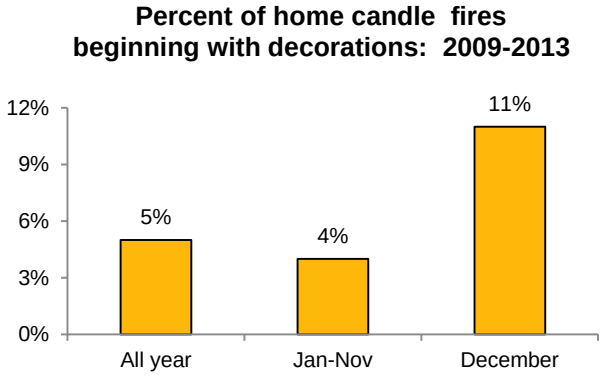
[1] Marty Ahrens. *Home Structure Fires*, Quincy, MA: National Fire Protection Association, 2015, p. 19.

Bedrooms were the leading area of origin. Throughout the year, more than one-third (36%) of home candle fires started in bedrooms. These fires caused one-third (32%) of the associated deaths and almost half (47%) of the associated injuries. The 15% of fires that started in living rooms, family rooms, or dens also caused one-third (32%) of the deaths. Thirteen percent (13%) of the fires started in bathrooms, 10% began in kitchens or cooking areas, and 3% began in the dining room.



The pattern is somewhat different in December when candles become part of holiday decorating and celebrations. One of every five (20%) December candle fires started in the living room, family room or den; 8% started in the dining room. Twelve percent of December candle fires started in the kitchen, compared to 8% the rest of the year.

Candle fires start with a variety of burnable items. Twelve percent began with a mattress or bedding; these fires caused 19% of the home candle fire deaths. An unclassified type of furniture or utensil was the item first ignited in 10% of fires. Nine percent started when a curtain, blind or drapery ignited. Cabinetry was first ignited in 7% of the fires. Upholstered furniture was first ignited in 5% of the fires, resulting in 16% of the home candle fire deaths. Unclassified items, clothing, magazines or papers, interior coverings, and decorations were also first ignited in 5% of the candle fires.



Decorations are the most common item first ignited in December candle fires. During 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 compared to 11% in December. In other words, the heightened candle fire risk around the winter holidays reflects a combination of increased candle use and the presence of more things that can burn in the area around the candles.

Almost three of every five (58%) home candle fires occurred when some form of combustible material was too close to the candle. Unattended equipment or abandoned materials or products were contributing factors in almost one of every five (18%) home candle fires. Four percent were started by people (typically children) playing with the candle. Only 3% were intentional.

Falling asleep was a factor in 11% percent of the home candle fires and 30% of the associated deaths.

Victims of home candle fires

A slight majority of home candle fire victims were female. While males were slightly more likely to be killed or injured in home fires of all causes, 52% of the candle fire fatalities and 54% of those injured were female.

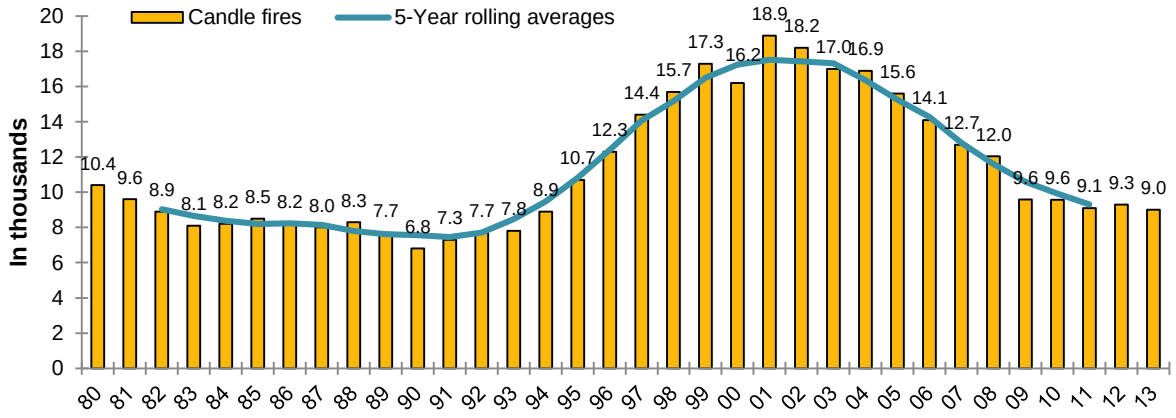
People 75 years of age or older faced the highest risk of death from candle fires. Children age five through nine faced a risk 1.8 times that of the general population. Interestingly, children under five were slightly less at risk than the older children with a risk 1.4 times that of the entire population.

Individuals in the 35-49 age group faced the highest risk of non-fatal candle fire injury, 1.4 times that of the general population. Much less variability was seen in risk of injury than of death.

Trends in reported home candle fires

Candle fires have been falling since the 2001 peak. From 1980 (the first year of available data) to 1990, home candle fires had been on a slight downward trend. As candle sales increased sharply in the 1990s, so, too, did candle fires. Incidents peaked in 2001 and have since fallen 53%. Even so, the estimate of 9,000 fires reported in 2013 is still 1.3 times the 6,800 reported in 1990, the previous low.

Home candle fires (in thousands) by year
1980-2013



The share of home structure fires started by candles rose from 1% in the early 1980's to 5% in 1999, 2001, and 2002, partly because total home fires had declined so much and partly because candle fires had increased. The share fell to 4% from 2004 to 2006. In 2007, the share dropped to 3%. In 2013, the percent of homes fires started by candles fell to 2% .

Using candles for light can be dangerous.

When candles are used for light in the absence of electricity, there is additional risk of fatal fire. 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 while moving into a Louisiana home before the power had been connected.

Participants in focus groups conducted by the Environics Research Group for Health Canada reported they were more likely to leave candles burning in several rooms during power outages than when the power was on.

Candle-Related Injuries Seen at Emergency Rooms

Fire is not the only cause of candle-related injuries. According to the U.S. Consumer Product Safety Commission's (CPSC's) National Electronic Injury Surveillance System (NEISS), an estimated 9,500 people were seen at hospital emergency rooms for injuries from candles, candlesticks or related items during 2014. Forty percent of the candle-related injuries that year were lacerations and more than one in five (22%) were thermal burns. Some of the lacerations were caused by falling, 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 or from the candle flame itself.

Safety Information

NFPA has a variety of resources. The Educational Messages Advisory Committee (EMAC) to NFPA's Public Education Division developed a collection of safety tips for a wide variety of activities, including the use of candles. New tips have been added for candle use in home worship. Fire and life safety educators can download the Educational Messages Desk Reference - 2015 to find consistent safety messaging.

NFPA also has safety resources to help consumers protect themselves from candle fires and other dangers.

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.

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U.S. Home Candle Fires Fact Sheet

In 2009-2013, U.S. fire departments responded to an average of 9,300 home[1] structure fires that were started by candles per year. These fires caused an annual average of 86 civilian fire deaths, 827 civilian fire injuries, and $374 million in direct property damage.

Overall, candles caused 3% of reported home fires, 3% of the home fire deaths, 6% of the home fire injuries, and 5% of the direct property damage in reported home fires during this period.

On average, 25 home candle fires were reported per day.

Candle fires are more common around the winter holidays

- Candle fires peak in December (12%). January ranked second with 10% of home candle fires.
- The top four days for home candle fires were New Year's Day, Christmas, New Year's Eve and Christmas Eve.

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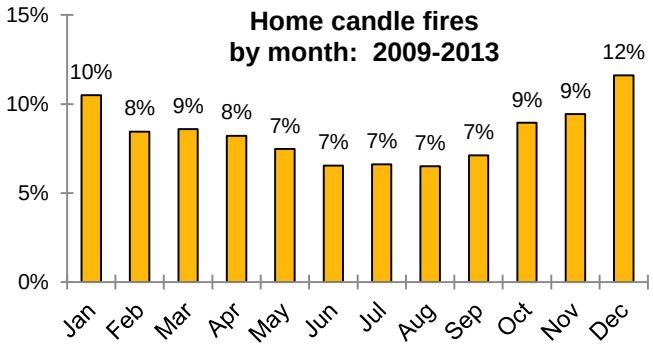


Causes and Circumstances of Home Candle Fires

Almost three of every five (58%) candle fires started when something that could burn, such as furniture, mattresses or bedding, curtains, or decorations, was too close to the candle.

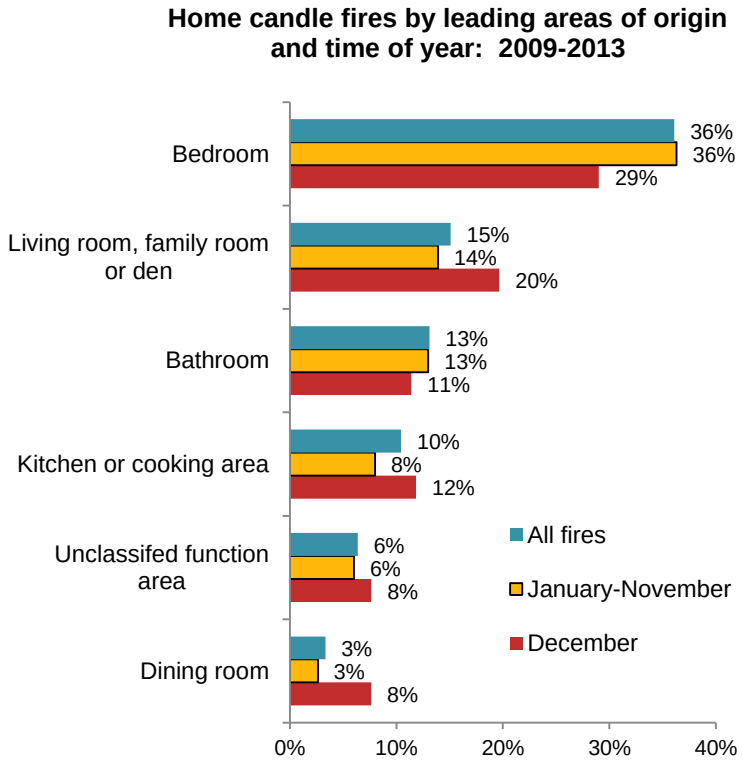
In almost one-fifth (18%) of the fires, the candles were unattended or abandoned.

Sleep was a factor in 11% of the fires and 30% of the candle fire deaths.

More than one-third (36%) of home candle fires began in the bedroom, although the National Candle Association found that only 13% of candle users burn candles in the bedroom most often.

Although bedrooms are still the most common area of origin in December, the pattern is somewhat different when candles become part of holiday decorating and celebrations.

- One of every five (20%) December candle fires started in the living room, family room or den; 8% started in the dining room.
- Twelve percent of December candle fires started in the kitchen, compared to 8% the rest of the year.



Home Candle Fires

Overview

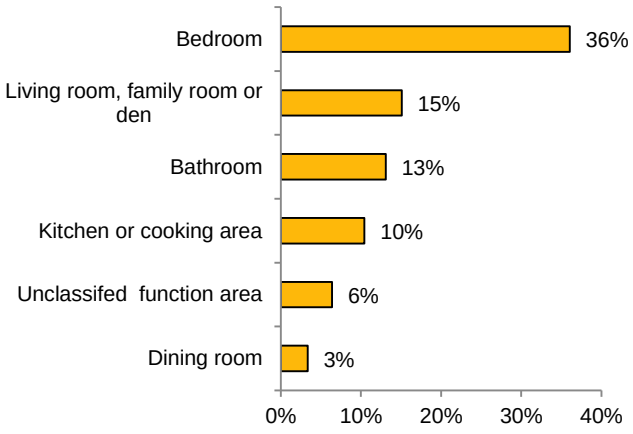
9,300 reported home structure fires, on average, were started by candles annually. During the five-year period of 2009-2013, U.S. fire departments responded to an estimated average of 9,300 home structure fires started by candles per year. These fires caused an annual average of 86 civilian deaths, 827 civilian fire injuries, and $374 million in direct property damage. On average, 25 home candle fires were reported per day.

Candles caused 3% of total reported home fires, 3% of home fire deaths, 6% of home fire injuries, and 5% of associated direct property damage during this period. Candles ranked eighth among the leading cause categories in number of fires, tied for sixth in home fire deaths, also ranked sixth in home fire injuries, and ranked seventh in direct property damage.[2] During 2009-2013, candles caused 9.2 deaths and 88.9 injuries per thousand fires, and an average loss of $40,000 per fire. In contrast, home structure fires overall caused 6.9 deaths and 36.1 injuries per thousand reported home fires with an average loss of $19,000 per fire. Candle fires ranked second among the major causes in injuries per thousand fires and average loss per fire.

Detailed Patterns of Reported U.S. Home Candle Fires

Where do candle fires start? The bedroom was the leading area of origin for home candle fires, even though candle are used more often in the living room. Figure 1 shows that more than one-third (36%) of home candle fires reported to local fire departments in 2009-2013 started in bedrooms. These fires caused one-third (32%) of the associated deaths and almost half (47%) of the associated injuries. The 15% of fires that started in living rooms, family rooms, or dens caused one-third (32%) of the deaths and one of every five (20%) injuries. Thirteen percent of the candle fires started in bathrooms and 10% began in kitchens or cooking areas. (See Table 1.)

Figure 1. Home Candle Fires by Leading Areas of Origin: 2009-2013



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 surveyed also decorates the yard, patio or other exterior areas with candles.[3]

[2] Marty Ahrens. *Home Structure Fires*, Quincy, MA: National Fire Protection Association, 2015, p. 19.
[3] National Candle Association. "Facts and Figures about Candles" accessed in November 2015.

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 or other multi-family housing regardless of ownership.

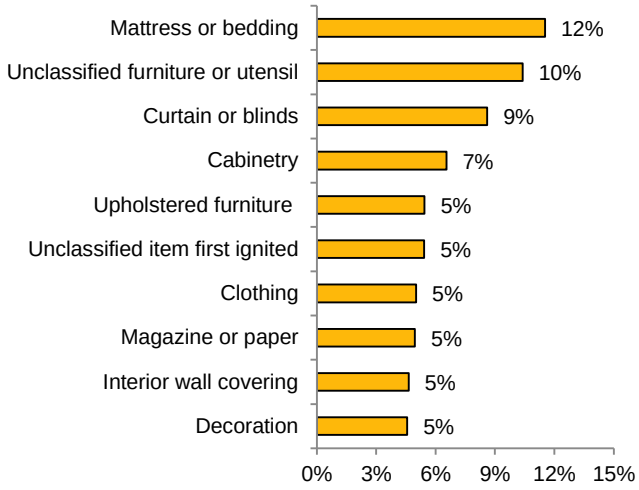
NFIRS 5.0, first introduced in 1999 and adopted gradually, includes a category of structure fires collectively referred to as "confined fires," identified by incident type. These include confined cooking fires, confined chimney or flue fires, confined trash fires, confined fuel burner or boiler fires, 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) 14,690 non-confined fires with candle reported as the heat source that resulted in 78 civilian deaths, 1,287 civilian injuries, and $571 million in direct property damage; and
b) 245 confined fires with no associated deaths, six civilian injuries, and $110,000 in direct property damage.

Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Except for the trend table, 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 hundred thousand dollars. Additional details on the methodology may be found in Appendix A.

What do candle fires ignite? Figure 2 shows that 12% of home candle fires began with a mattress or bedding; these fires caused 19% of the home candle fire deaths. An unclassified type of furniture or utensil was the item first ignited in 10% of these fires. Nine percent started when a curtain, blind or drapery ignited. Cabinetry was first ignited in 7% of these fires. Upholstered furniture was first ignited in 5% of the fires; these incidents caused 16% of the home candle fire deaths. Five percent of the fires began with unclassified items. Clothing was also first ignited in 5% of the fires, as were magazines, newspaper or writing paper; interior wall coverings; and decorations. (See Table 2.)

Figure 2. Home Candle Fires by Leading Items First Ignited: 2009-2013



Decoration fires are unusually likely to begin with candles. During the same five-year period, candles were the heat source in two of every five (38%) home structure fires that began with decorations.[4] In addition, candles started 8% of the home structure fires that began with Christmas trees during 2009-2013.[5] In 2005-2009, candles were also the heat source in 10% of the home upholstered furniture fires[6] and 12% of the home mattress and bedding fires.[7]

How do home candle fires start? Ninety-five percent of the home candle fires were unintentional; 3% were intentional. (See Table 3.)

Table 4 shows that in three out of five (58%) home candle fires reported in 2009-2013, the fire started because the candle was too close to something that can burn. These fires caused three-quarters (73%) of the associated deaths and two-thirds (66%) of the injuries. The candle was unattended or abandoned in almost one-fifth (18%) of the incidents. Unclassified misuse of the material or product was a factor in 11% of these fires, an unclassified factor contributed in 5%, and 4% of the incidents were caused by people (typically children) playing with candles.

Table 5 shows that sleep was a human factor contributing to ignition in 11% of the home candle fires, almost one-third (30%) of the associated civilian deaths, and one-quarter (24%) of the injuries. In 19% of the fires, an unattended or unsupervised person was a factor. It is possible that in at least some of these fires, the "unattended" actually refers to the candle. The incident reports noted that no human factors contributed to 65% of the fires, 45% of the civilian deaths, and 54% of the civilian injuries.

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[4] Marty Ahrens. *Home Structure Fires that Began with Decorations*, Quincy, MA: NFPA, Fire Analysis and Research Division, 2015, p. 8.
[5] Marty Ahrens. *Home Christmas Tree and Holiday Light Fires*, Quincy, MA: NFPA, Fire Analysis and Research Division, 2015, p. 8.
[6] Marty Ahrens. *Home Structure Fires that Began with Upholstered Furniture*, Quincy, MA: NFPA, Fire Analysis and Research Division, 2011, p. 27
[7] Ben Evarts. *Home Structure Fires that Began with Mattresses and Bedding*, Quincy, MA: NFPA, Fire Analysis and Research Division, 2011, p. 24.

Flame damage was confined to the room of origin in three-quarters of these fires. Table 6 shows the extent of flame damage in home candle fires. In almost one-quarter (23%) fires, the fire either had a confined fire incident type or the damage was coded as confined to the object of origin. In half (51%) 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 (26%) 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 2009 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?

Adults 75 and older had highest death risk from candle fires. Table 7 shows the age distribution of the general population in 2011, the age distribution of people killed and injured by reported home candle fires during 2009-2013, the casualty rate per million population, and the relative risk of death or injury from home candle fires compared to the risk faced by the general population and other age groups. 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.

Children under five had a death risk 1.4 times that of the general population, while children ages five through nine had a rate that 1.8 times as high. Adults 75 to 84 faced a risk 2.1 times as high. The risk of death from a candle fire was 2.7 times as high for those 85 and older than it was for the general population.

People in the 35-49 age group faced the highest risk of non-fatal *injury* from these fires. However, the difference between age groups was less pronounced for injuries than for deaths. Children and older adults actually had a lower risk of candle fire injury than did the general population.

Males accounted for 56% of 2007-2011 home fire fatalities and 53% of injuries from fires of all causes.[8] However, 52% of the people killed and 54% of those injured by home candle fires in 2009-2013 were female.

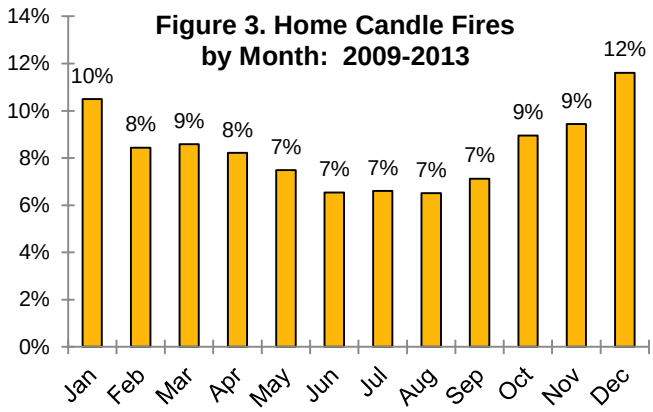
When Do Candle Fires Occur?

Candle fires are more common on weekends and during the evening. Table 8 shows that home candle fires were most common on Saturdays (16%) and Sundays (15%). The peak time interval was from 6:00 to 9:00 p.m. (19%) Table 9 shows that the period from 9:00 p.m. to midnight ranked second and the interval from 3:00 to 6:00 p.m. very closely behind, with both

[8] Marty Ahrens. *Characteristics of Home Fire Victims*, Quincy, MA: NFPA, 2014, p. 6.

periods having 16% of the fires. The smallest shares of these fires were reported between 6:00 and 9:00 a.m. (7%) and between 3:00 and 6:00 a.m. (8%).

Winter holidays are the peak time for candle fires. Figure 3 and Table 10 show that 12% of home candle fires were reported in December. This was 1.4 times the 8.3% monthly average. January ranked second with 10%. According to the National Candle Association, roughly 35% of the candle business is seasonal around the Christmas holiday.[9] These fires were less common in the warmer months that have longer days, with June, July and August having the smallest numbers reported.



New Year's Day was the peak day for candle fires, with an estimated 60, or 0.7%, of the 9,300 home candle fires in 2009-2013. This was 2.5 times the daily average of 25, or 0.3%, of the fires. Table A shows that Christmas was the second most common day for these fires, New Year's Eve ranked third and Christmas Eve ranked fourth.

Table A. Top Five Days for Reported Home Candle Structure Fires 2009-2013 Annual Averages

Rank	Date	Fires	Percent	Ratio to Average
1.	January 1	60	(0.7%)	2.5
2.	December 25	60	(0.6%)	2.2
3.	December 31	50	(0.5%)	2.0
4.	December 24	50	(0.5%)	1.9
5.	January 3	40	(0.5%)	1.8

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 4 shows that this pattern was not as pronounced in December. From January through November, 36% of the candle fires started in bedrooms. Only 29% of the December candle fires started there. In December, 20% of the home candle fires started in living rooms, family rooms, or dens, compared to 14% during the rest of the year. Dining room and kitchen fires also accounted for a larger percentage of fires in December than in the rest of the year.

[9] National Candle Association. "Facts and Figures about Candles" accessed in November 2015.

Figure 4. Leading Areas of Origin in Home Candle Fires in 2009-2013 January-November vs. December

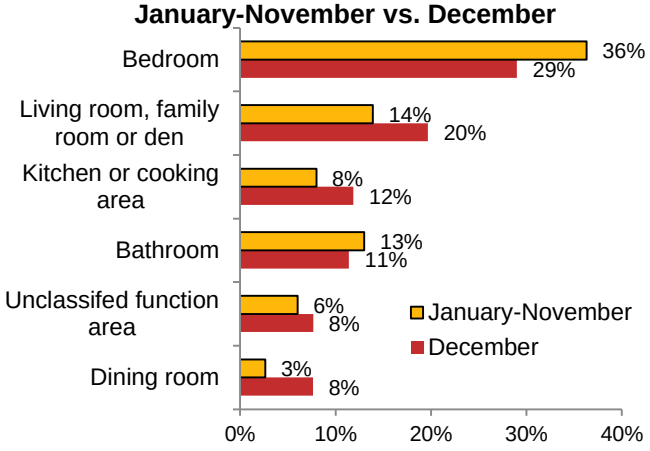


Table 11 shows that from January to November, decorations were first ignited in only 4% of the home candle fires. This jumped to 11% in December. This is consistent with the industry pattern of seasonal business. It also suggests that seasonal candle fires often involve combustible decorations that would 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.

Trends

Home candle fires climbed through the 1990s but have fallen since the 2001 peak. During 2013, U.S. fire departments responded to an estimated 9,000 home structure fires started by candles. This was 4% less than the 9,300 in 2012. The 9,000 fires in 2013 caused an estimated 70 civilian deaths, 840 civilian injuries, and $284 million in direct property damage.

As Figure 5 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 fairly steady decline through 2011. Although candle fires have fallen 53% since 2001, the number of candle fires reported in 2013 is still 1.3 times the low of 6,800 reported in 1990. Table 12 shows the candle fire and loss experience from 1980-2013. Rolling five-year averages are shown by the solid line beginning with the 1980-1984 average above the 1982 column.

Figure 5. Home Candle Fires (in Thousands) by Year: 1980-2013

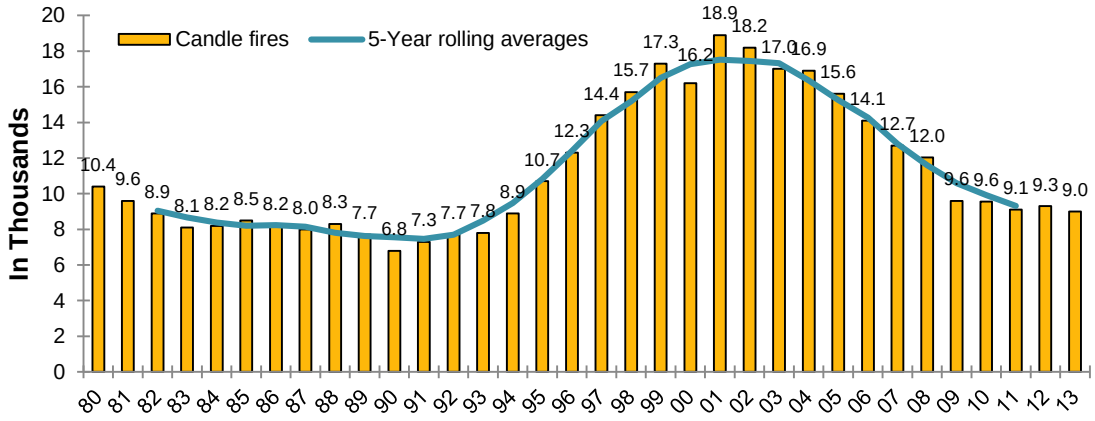


Figure 6 shows that the number of deaths has fluctuated considerably. These deaths tended to be more frequent from 1996 through 2007.

Figure 6. Home Candle Fire Deaths by Year: 1980-2013

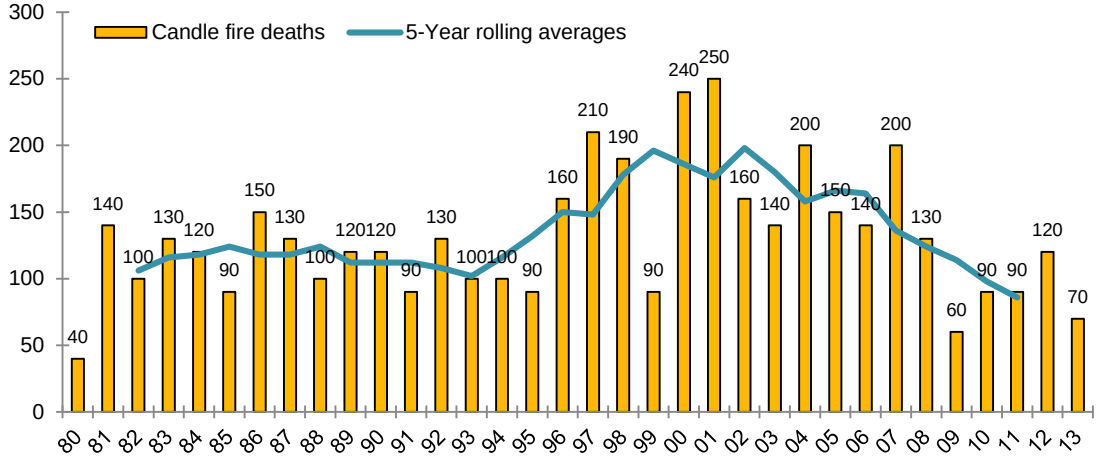
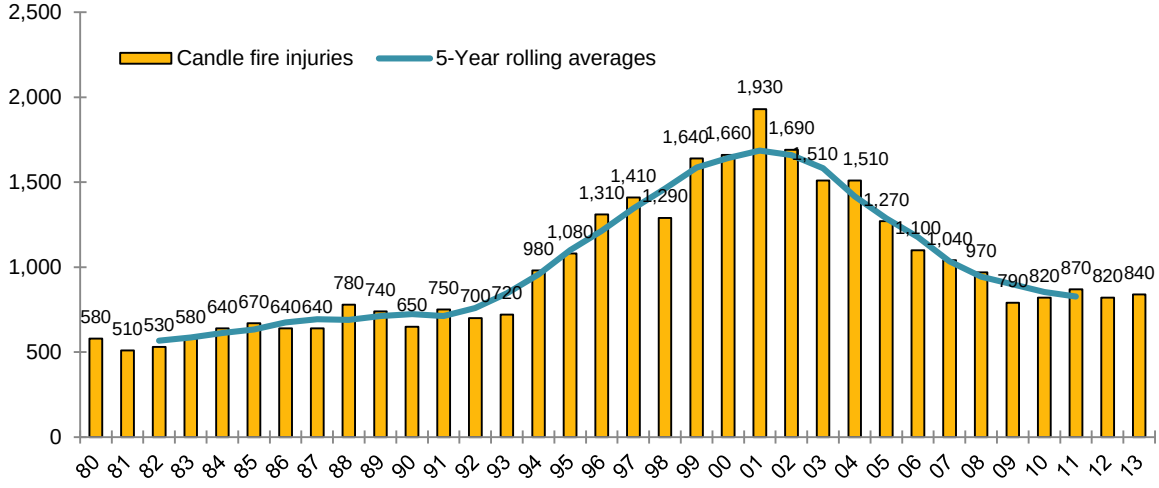


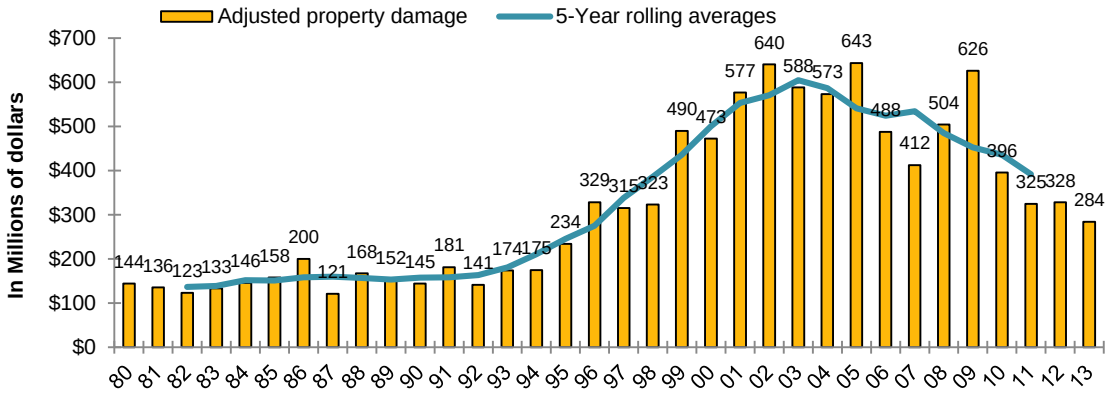
Figure 7 shows that civilian injuries caused by home candle fires have fallen sharply since the turn of the century but remain higher than in the 1980s and early 1990s. NFPA's estimates of candle fire injuries are based only on injuries reported to the fire service. Some injured individuals may be transported from the scene before the fire department arrives or without fire department involvement.

Figure 7. Home Candle Fire Injuries by Year: 1980-2013



Direct property damage from home candle fires, adjusted for inflation, fell 13% from an estimated $328 million in 2012 to $284 million in 2013. Table 12 and Figure 8 show that direct property damage in real dollars was fairly stable through the 1980s and early 1990s and started to climb as candle fires increased. Property damage has been on a generally downward trend in the past several years despite a spike in 2009.

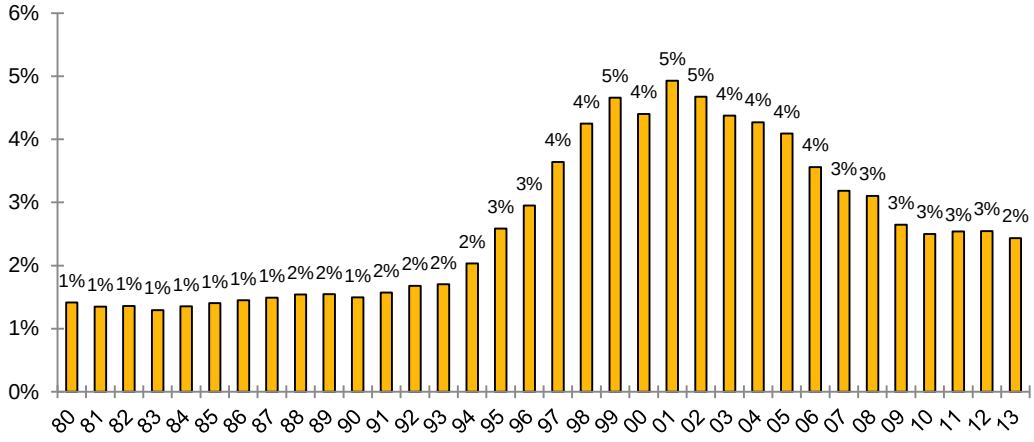
Figure 8. Property Damage in Home Candle Fires by Year: 1980-2013



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. Figure 9 shows that the share fell to 4% from 2003 to 2006, inclusive. In 2007, the share dropped to 3%, where it remained through 2012. (See Table 13.) In 2013, candles caused 2% of home candle fires, 3% of the civilian home fire deaths, 7% of the civilian home fire injuries, and 4% of the direct property damage in reported home fires.

Figure 9. Percent of Reported Home Fires Started by Candles, by Year: 1980-2013



CPSC estimated 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.[10] 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. This survey has not been updated. Consequently, the current

[10] 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.

estimates of unreported candle fires and the percentage of unreported fires started by candles are unknown.

Candle Fires by Occupancy

Eighty-nine percent of candle structure fires occurred in home properties. During 2009-2013, candle fires started an estimated annual average of 10,530 reported structure fires in properties of all types, including homes and non-home properties. These fires caused an average of 91 civilian fire deaths, 892 civilian fire injuries, and an estimated $408 million in direct property damage. Eighty-eight percent 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 1,220 reported non-home structure fires per year, resulting in an average of five civilian deaths, 64 civilian injuries, and $34 million in direct property damage. Twenty-four percent of the candle fires in non-home properties occurred in unclassified residential properties; 8% occurred in unclassified storage properties; 7% occurred in hotels or motels; 5% occurred in places of worship or funeral properties; and another 5% occurred in office 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 Office of the State Fire Marshal of Massachusetts 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.[11] 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 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.

[11] 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.

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.[12]

- 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).

CPSC has issued numerous recalls of candles and candle-related products because of fire danger. 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.[13] Candles and candle holders are still being recalled in 2015, although such recalls are much less common than in the past. To report a problem with a candle or find out about recalls of specific products, see www.saferproducts.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

[12] Signe Hiser. *Candle Fires Pilot Study Summary*, Washington, DC, CPSC, September 2001, available on-line at http://www.cpsc.gov/LIBRARY/FOIA/FOIA02/os/Candles3.pdf.
[13] 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.

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. [14]

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.

Parents of teens and young adult women 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 people use candles when camping.[15]

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 [16]

[14] National Candle Association, "Facts and Figures about Candles" accessed in November 2015.
[15] 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.
[16] Decima Research. Canadians' Behaviour Surrounding Candle Use and Fire Safety: A Quantitative Exploration. Study done for Health Canada, March 2006.

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.

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 survey 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.[17] 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 other home candle fires are found in Appendix B.

- In December 2006, a candle used for light burned down to, and then 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.[18]
- 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. [19]

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[17] 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.

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

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

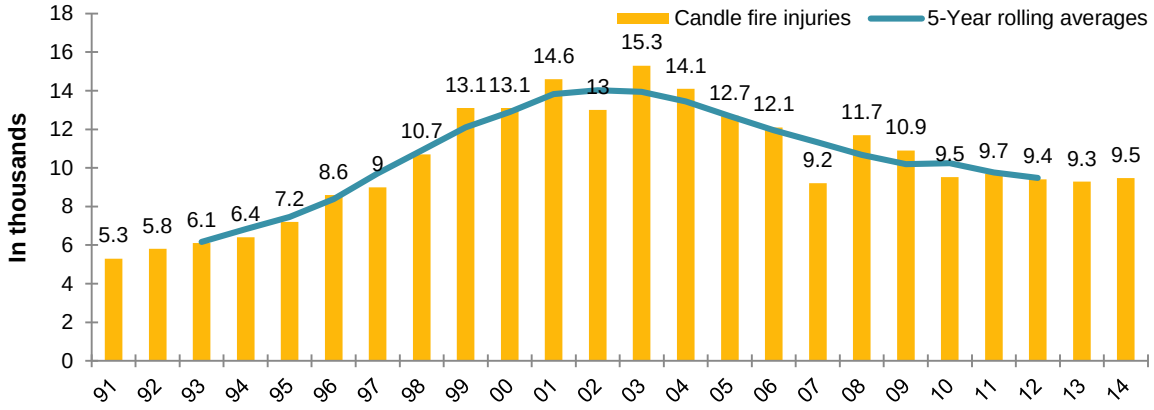
Health Canada focus groups found candles were used differently in power outages. The focus groups in the study done for Health Canada were asked about their use of candles in power outages. Many had a stash of candle stubs, often from tapers, or ugly candles that they would use in blackouts. Most would 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.[20] Because many decorative candles are placed as art objects, their location may be less than safe for actual use.

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 9,500 injuries seen at emergency rooms in 2014, 38% less than the peak of 15,300 in 2003 but almost twice the 5,300 in 1991. Figure 10 shows the injuries seen by year and five-year rolling averages. The 2014 estimates are projections made based on 252 cases seen in sample emergency rooms that year.

Figure 10. Candle-Related Injuries Seen at Hospital Emergency Rooms 1991-2014



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.

[20] 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.

Three out of five (60%) of the people with the candle-related injuries seen at emergency rooms in 2014 were female; 40% were male. Forty percent of the candle-related injuries that year were lacerations and 22% were thermal burns. Some of the lacerations were caused by falling, sharp or broken candleholders; others occurred while wax was being removed from candleholders or containers or the candle was being trimmed. Some of the burns were from the hot wax; some from contact with hot candle holders or containers, and others were from fires started by the candle or the candle flame.

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

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 background on candle-related standards in his March 2003 article in *Standardization News.*[22] To date, ASTM standards on candles include:

F1972, 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, 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, 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. 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.

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

[22] Jim Becker. "Candles: Answering your Burning Questions," *Standardization News,* March 2003, online at http://www.astm.org/SNEWS/MARCH_2003/becker_mar03.html.

F2417, 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, 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.[23]

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

Safety Information

The Educational Messages Advisory Committee (EMAC) to NFPA's Public Education Division developed a collection of safety tips for a wide variety of activities, including the use of candles. New tips have been added for candle use in home worship. Fire and life safety educators can download the Educational Messages Desk Reference - 2015 to find consistent safety messaging.

NFPA also has safety resources to help consumers protect themselves from candle fires and other dangers.

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

Table 1.
Home Candle Structure Fires, by Area of Origin
2009-2013 Annual Averages

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Bedroom	3,360	(36%)	28	(32%)	392	(47%)	$162.3	(43%)
Non-confined	3,270	(35%)	28	(32%)	388	(47%)	$162.3	(43%)
Confined	90	(1%)	0	(0%)	4	(1%)	$0.0	(0%)
Living room, family room or den	1,400	(15%)	28	(32%)	163	(20%)	$69.8	(19%)
Non-confined	1,330	(14%)	28	(32%)	163	(20%)	$69.7	(19%)
Confined	80	(1%)	0	(0%)	0	(0%)	$0.1	(0%)
Bathroom	1,220	(13%)	0	(0%)	56	(7%)	$21.5	(6%)
Non-confined	1,110	(12%)	0	(0%)	56	(7%)	$21.5	(6%)
Confined	110	(1%)	0	(0%)	0	(0%)	$0.0	(0%)
Kitchen or cooking area	970	(10%)	2	(3%)	49	(6%)	$23.9	(6%)
Non-confined	730	(8%)	2	(3%)	41	(5%)	$23.7	(6%)
Confined	240	(3%)	0	(0%)	8	(1%)	$0.2	(0%)
Unclassified function area	590	(6%)	13	(15%)	59	(7%)	$31.0	(8%)
Non-confined	580	(6%)	13	(15%)	59	(7%)	$31.0	(8%)
Confined	20	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Dining room	310	(3%)	5	(6%)	21	(3%)	$7.9	(2%)
Non-confined	280	(3%)	5	(6%)	21	(3%)	$7.9	(2%)
Confined	40	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Unclassified area of origin	150	(2%)	1	(1%)	11	(1%)	$3.6	(1%)
Non-confined	110	(1%)	1	(1%)	11	(1%)	$3.6	(1%)
Confined	40	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Bedroom	3,360	(36%)	28	(32%)	392	(47%)	$162.3	(43%)
Closet	140	(2%)	0	(0%)	17	(2%)	$8.2	(2%)
Non-confined	140	(1%)	0	(0%)	17	(2%)	$8.2	(2%)
Confined	0	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Other known area of origin	1,160	(12%)	9	(11%)	59	(7%)	$45.9	(12%)
Non-confined	1,040	(11%)	9	(11%)	59	(7%)	$45.9	(12%)
Confined	120	(1%)	0	(0%)	0	(0%)	$0.0	(0%)
Total	9,300	(100%)	86	(100%)	827	(100%)	$374.0	(100%)
Non-confined	8,580	(92%)	86	(100%)	815	(99%)	$373.7	(100%)
Confined	720	(8%)	0	(0%)	12	(1%)	$0.3	(0%)
Despite being the area of origin for fewer than 2% of the fires, at least 2% of the civilian deaths resulted from fires originating in the following areas:								
Small assembly area			3	(4%)				

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 fire department experience survey.

Table 2.
Home Candle Structure Fires, by Item First Ignited
2009-2013 Annual Averages

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Mattress or bedding	1,070	(12%)	17	(19%)	170	(21%)	$63.5	(17%)
Non-confined	1,050	(11%)	17	(19%)	170	(21%)	$63.5	(17%)
Confined	20	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Unclassified furniture or utensils	970	(10%)	4	(5%)	80	(10%)	$42.4	(11%)
Non-confined	940	(10%)	4	(5%)	80	(10%)	$42.4	(11%)
Confined	30	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Curtain, blinds, drapery or tapestry	800	(9%)	3	(3%)	85	(10%)	$33.1	(9%)
Non-confined	790	(9%)	3	(3%)	85	(10%)	$33.1	(9%)
Confined	10	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Cabinetry	610	(7%)	0	(0%)	37	(5%)	$22.2	(6%)
Non-confined	580	(6%)	0	(0%)	37	(5%)	$22.2	(6%)
Confined	30	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Upholstered furniture	510	(5%)	14	(16%)	77	(9%)	$37.2	(10%)
Non-confined	500	(5%)	14	(16%)	75	(9%)	$37.2	(10%)
Confined	10	(0%)	0	(0%)	3	(0%)	$0.0	(0%)
Unclassified item first ignited	500	(5%)	3	(3%)	33	(4%)	$12.6	(3%)
Non-confined	390	(4%)	3	(3%)	33	(4%)	$12.5	(3%)
Confined	120	(1%)	0	(0%)	0	(0%)	$0.1	(0%)
Clothing	470	(5%)	8	(9%)	53	(6%)	$19.1	(5%)
Non-confined	460	(5%)	8	(9%)	53	(6%)	$19.1	(5%)
Confined	10	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Magazine, newspaper, or writing paper	460	(5%)	0	(0%)	32	(4%)	$20.2	(5%)
Non-confined	390	(4%)	0	(0%)	30	(4%)	$20.2	(5%)
Confined	70	(1%)	0	(0%)	2	(0%)	$0.0	(0%)
Interior wall covering, excluding drapes	430	(5%)	3	(3%)	19	(2%)	$16.9	(5%)
Non-confined	420	(5%)	3	(3%)	19	(2%)	$16.9	(5%)
Confined	10	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Decoration	430	(5%)	0	(0%)	27	(3%)	$10.5	(3%)
Non-confined	390	(4%)	0	(0%)	27	(3%)	$10.5	(3%)
Confined	30	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Linen (other than bedding)	360	(4%)	0	(0%)	26	(3%)	$9.1	(2%)
Non-confined	330	(4%)	0	(0%)	26	(3%)	$9.1	(2%)
Confined	20	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Floor covering rug, carpet, or mat	310	(3%)	4	(5%)	26	(3%)	$11.8	(3%)
Non-confined	310	(3%)	4	(5%)	26	(3%)	$11.8	(3%)
Confined	0	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Multiple items first ignited	290	(3%)	9	(11%)	23	(3%)	$13.1	(4%)
Non-confined	270	(3%)	9	(11%)	23	(3%)	$13.1	(4%)
Confined	20	(0%)	0	(0%)	0	(0%)	$0.0	(0%)

Table 2.
Home Candle Structure Fires, by Item First Ignited
2009-2013 Annual Averages, (Continued)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified soft goods or wearing apparel	280	(3%)	1	(2%)	20	(2%)	$10.5	(3%)
Non-confined	260	(3%)	1	(2%)	20	(2%)	$10.5	(3%)
Confined	20	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Rubbish, trash, or waste	220	(2%)	0	(0%)	8	(1%)	$2.8	(1%)
Non-confined	120	(1%)	0	(0%)	8	(1%)	$2.8	(1%)
Confined	90	(1%)	0	(0%)	0	(0%)	$0.0	(0%)
Appliance housing or casing	190	(2%)	3	(4%)	13	(2%)	$3.9	(1%)
Non-confined	150	(2%)	3	(4%)	13	(2%)	$3.9	(1%)
Confined	40	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Box, carton, bag, basket, or barrel	180	(2%)	0	(0%)	9	(1%)	$4.1	(1%)
Non-confined	160	(2%)	0	(0%)	9	(1%)	$4.1	(1%)
Confined	20	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Flammable or combustible liquids or gases, piping or filter	140	(2%)	1	(2%)	22	(3%)	$4.0	(1%)
Non-confined	130	(1%)	1	(2%)	22	(3%)	$4.0	(1%)
Confined	20	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Other known item first ignited	1,090	(12%)	15	(18%)	68	(8%)	$36.9	(10%)
Non-confined	940	(10%)	15	(18%)	61	(7%)	$36.7	(10%)
Confined	150	(2%)	0	(0%)	7	(1%)	$0.2	(0%)
Total	9,300	(100%)	86	(100%)	827	(100%)	$374.0	(100%)
Non-confined	8,580	(92%)	86	(100%)	815	(99%)	$373.7	(100%)
Confined	720	(8%)	0	(0%)	12	(1%)	$0.3	(0%)
Despite being the item first ignited for fewer than 2% of the fires, at least 2% of the civilian deaths resulted from fires starting with the following items:								
Christmas tree			4	(5%)				
Goods not made up, including fabric			2	(2%)				
Structural member or framing			2	(2%)				
Ironing board			1	(2%)				
Interior ceiling cover or finish			1	(2%)				
Unclassified organic materials			1	(2%)				
Flammable or combustible liquids or gases, piping or filter			1	(2%)				
Material being used to make a product			1	(2%)				
Toy or game			1	(2%)				

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 fire department experience survey.

Table 3.
Home Candle Structure Fires, by Cause of Ignition
2009-2013 Annual Averages

Cause	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unintentional	8,850	(95%)	78	(90%)	802	(97%)	$361	(96%)
Non-confined	8,200	(88%)	78	(90%)	789	(95%)	$360	(96%)
Confined	650	(7%)	0	(0%)	12	(1%)	$0	(0%)
Intentional	250	(3%)	0	(0%)	17	(2%)	$7	(2%)
Non-confined	200	(2%)	0	(0%)	17	(2%)	$7	(2%)
Confined	50	(1%)	0	(0%)	0	(0%)	$0	(0%)
Failure of equipment or heat source	120	(1%)	4	(5%)	6	(1%)	$2	(1%)
Non-confined	110	(1%)	4	(5%)	6	(1%)	$2	(1%)
Confined	10	(0%)	0	(0%)	0	(0%)	$0	(0%)
Other known cause of ignition	80	(1%)	4	(4%)	3	(0%)	$4	(1%)
Non-confined	80	(1%)	4	(4%)	3	(0%)	$4	(1%)
Confined	0	(0%)	0	(0%)	0	(0%)	$0	(0%)
Total	9,300	(100%)	86	(100%)	827	(100%)	$374.0	(100%)
Non-confined	8,580	(92%)	86	(100%)	815	(99%)	$373.7	(100%)
Confined	720	(8%)	0	(0%)	12	(1%)	$0.3	(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 fire department experience survey.

Table 4.
Home Candle Structure Fires, by Factor Contributing to Ignition
2009-2013 Annual Averages

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	5,410	(58%)	63	(73%)	543	(66%)	$226.6	(61%)
Non-confined	5,120	(55%)	63	(73%)	540	(65%)	$226.6	(61%)
Confined	300	(3%)	0	(0%)	2	(0%)	$0.0	(0%)
Abandoned or discarded material or product	1,230	(13%)	7	(8%)	64	(8%)	$53.8	(14%)
Non-confined	1,130	(12%)	7	(8%)	61	(7%)	$53.8	(14%)
Confined	100	(1%)	0	(0%)	2	(0%)	$0.0	(0%)
Unclassified misuse of material or product	1,020	(11%)	8	(10%)	87	(10%)	$32.4	(9%)
Non-confined	890	(10%)	8	(10%)	80	(10%)	$32.4	(9%)
Confined	120	(1%)	0	(0%)	7	(1%)	$0.0	(0%)
Unclassified factor contributed to ignition	460	(5%)	2	(2%)	29	(3%)	$19.1	(5%)
Non-confined	420	(5%)	2	(2%)	29	(3%)	$19.1	(5%)
Confined	40	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Equipment unattended	400	(4%)	2	(2%)	26	(3%)	$14.6	(4%)
Non-confined	360	(4%)	2	(2%)	26	(3%)	$14.6	(4%)
Confined	30	(0%)	0	(0%)	0	(0%)	$0.1	(0%)
Playing with heat source	370	(4%)	2	(2%)	38	(5%)	$19.1	(5%)
Non-confined	320	(3%)	2	(2%)	38	(5%)	$19.1	(5%)
Confined	50	(1%)	0	(0%)	0	(0%)	$0.0	(0%)
Collision, knock down or overturn	200	(2%)	5	(6%)	22	(3%)	$9.3	(2%)
Non-confined	180	(2%)	5	(6%)	22	(3%)	$9.3	(2%)
Confined	20	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Other known factor contributing to ignition	750	(8%)	7	(8%)	65	(8%)	$32.2	(9%)
Non-confined	640	(7%)	7	(8%)	65	(8%)	$32.0	(9%)
Confined	110	(1%)	0	(0%)	0	(0%)	$0.2	(0%)
Total fires	9,300	(100%)	86	(100%)	827	(100%)	$374.0	(100%)
Non-confined	8,580	(92%)	86	(100%)	815	(99%)	$373.7	(100%)
Confined	720	(8%)	0	(0%)	12	(1%)	$0.3	(0%)
					0			
Total factors	9,830	(106%)	94	(110%)	873	(105%)	$407.1	(109%)
Non-confined	9,070	(97%)	94	(110%)	861	(104%)	$406.8	(109%)
Confined	770	(8%)	0	(0%)	12	(1%)	$0.3	(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 fire department experience survey.

Table 5.
Home Candle Structure Fires, by Human Factor Contributing to Ignition
2009-2013 Annual Averages

Human Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unattended or unsupervised person	1,740	(19%)	6	(6%)	100	(12%)	$59.2	(16%)
Non-confined	1,620	(17%)	6	(6%)	98	(12%)	$59.0	(16%)
Confined	120	(1%)	0	(0%)	2	(0%)	$0.2	(0%)
Asleep	1,000	(11%)	25	(30%)	200	(24%)	$47.0	(13%)
Non-confined	990	(11%)	25	(30%)	200	(24%)	$47.0	(13%)
Confined	10	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
Age was a factor	390	(4%)	6	(6%)	49	(6%)	$19.1	(5%)
Non-confined	340	(4%)	6	(6%)	49	(6%)	$19.1	(5%)
Confined	50	(1%)	0	(0%)	0	(0%)	$0.0	(0%)
Possibly impaired by alcohol or drugs	180	(2%)	14	(16%)	42	(5%)	$9.3	(2%)
Non-confined	170	(2%)	14	(16%)	40	(5%)	$9.3	(2%)
Confined	10	(0%)	0	(0%)	2	(0%)	$0.0	(0%)
Other known human factor	210	(2%)	7	(8%)	31	(4%)	$9.8	(3%)
Non-confined	190	(2%)	7	(8%)	31	(4%)	$9.8	(3%)
Confined	20	(0%)	0	(0%)	0	(0%)	$0.0	(0%)
No human factor involved	6,010	(65%)	39	(45%)	450	(54%)	$242.2	(65%)
Non-confined	5,490	(59%)	39	(45%)	442	(53%)	$242.0	(65%)
Confined	520	(6%)	0	(0%)	8	(1%)	$0.2	(0%)
Total fires*	9,300	(100%)	86	(100%)	827	(100%)	$374.0	(100%)
Non-confined	8,580	(92%)	86	(100%)	815	(99%)	$373.7	(100%)
Confined	720	(8%)	0	(0%)	12	(1%)	$0.3	(0%)
Total factors*	9530	102%	96	(112%)	873	105%	386.6	103%
Non-confined	8790	95%	96	(112%)	861	104%	386.3	103%
Confined		8%	0	(0%)	12	1%	0.3	0%
Despite contributing to fewer than 2% of the fires, the following human factors played a role in at least 2% of the civilian deaths:								
Physically disabled			5	(5%)				

* 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 fire department experience survey.

Table 6.
Home Candle Structure Fires, by Extent of Fire Spread
2009-2013 Annual Averages

Extent of Fire Spread	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined fire identified by incident type	720	(8%)	0	(0%)	12	(1%)	$0.3	(0%)
Confined to object of origin	1,390	(15%)	5	(5%)	65	(8%)	$9.1	(2%)
Confined to room of origin	4,780	(51%)	12	(14%)	405	(49%)	$87.3	(23%)
Confined to floor of origin	760	(8%)	16	(19%)	119	(14%)	$56.6	(15%)
Confined to building of origin	1,500	(16%)	50	(58%)	198	(24%)	$202.1	(54%)
Extended beyond building of origin	160	(2%)	3	(4%)	29	(3%)	$18.6	(5%)
Total	9,300	(100%)	86	(100%)	827	(100%)	$374.0	(100%)

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

Source: NFIRS 5.0 and NFPA fire department experience survey.

Table 7.
Home Candle Structure Fire Deaths and Injuries, by Age of Victim
2009-2013 Annual Averages

Age group	2011 Population in Millions		Civilian Deaths		Deaths per Million	Relative Risk	Civilian Injuries		Injuries per Million	Relative Risk
Under 5	20.1	(6%)	8	(9%)	0.4	1.4	37	(5%)	1.9	0.7
5-9	20.3	(7%)	10	(12%)	0.5	1.8	26	(3%)	1.3	0.5
10-14	20.7	(7%)	2	(3%)	0.1	0.4	31	(4%)	1.5	0.6
15-19	21.6	(7%)	3	(4%)	0.2	0.6	52	(6%)	2.4	0.9
20-34	64.0	(21%)	11	(13%)	0.2	0.6	21	(26%)	3.3	1.2
35-49	62.8	(20%)	11	(13%)	0.2	0.6	211	(26%)	3.4	1.3
50-64	60.6	(19%)	23	(27%)	0.4	1.4	170	(21%)	2.8	1.1
65-74	22.5	(7%)	5	(6%)	0.2	0.9	48	(6%)	2.1	0.8
75-84	13.2	(4%)	8	(9%)	0.6	2.1	26	(3%)	1.9	0.7
85+	5.7	(2%)	4	(5%)	0.7	2.7	14	(2%)	2.4	0.9
Total	311.6	(100%)	86	(100%)	0.3	1.0	827	(100%)	2.7	1.0
Selected age groups										
14 and under	61.2	(20%)	20	(24%)	0.3	1.2	95	(12%)	1.6	0.6
65 and over	41.4	(13%)	17	(20%)	0.4	1.5	88	(11%)	2.1	0.8

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 fire department experience survey. Population estimates were obtained from Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2010 to July 1, 2011 (NST-EST2011-01

Table 8.
Home Candle Structure Fires, by Day of Week
2009-2013 Annual Averages
(Includes both Non-confined and confined fires)

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	1,430	(15%)	16	(18%)	135	(16%)	$55.0	(15%)
Monday	1,310	(14%)	16	(18%)	114	(14%)	$46.7	(12%)
Tuesday	1,280	(14%)	9	(10%)	113	(14%)	$49.3	(13%)
Wednesday	1,200	(13%)	8	(9%)	111	(13%)	$39.9	(11%)
Thursday	1,280	(14%)	7	(8%)	107	(13%)	$44.0	(12%)
Friday	1,310	(14%)	15	(18%)	130	(16%)	$89.8	(24%)
Saturday	1,490	(16%)	16	(19%)	117	(14%)	$49.3	(13%)
Total	9,300	(100%)	86	(100%)	827	(100%)	$374.0	(100%)
Average by day of week	1,330	(14%)	12	(14%)	118	(14%)	$53.4	(14%)

Table 9.
Home Candle Structure Fires, by Time Period
2009-2013 Annual Averages
(Includes both Non-confined and confined fires)

Time Period	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Midnight - 3 a.m.	990	(11%)	17	(19%)	116	(14%)	$84.9	(23%)
3 - 6 a.m.	720	(8%)	23	(27%)	125	(15%)	$36.1	(10%)
6 - 9 a.m.	700	(7%)	11	(13%)	79	(10%)	$24.2	(6%)
9 a.m. - Noon	960	(10%)	5	(6%)	94	(11%)	$33.9	(9%)
Noon - 3 p.m.	1,250	(13%)	3	(4%)	79	(10%)	$42.0	(11%)
3 - 6 p.m.	1,460	(16%)	2	(3%)	90	(11%)	$48.7	(13%)
6 - 9 p.m.	1,740	(19%)	8	(9%)	127	(15%)	$53.7	(14%)
9 p.m. - midnight	1,490	(16%)	17	(19%)	118	(14%)	$50.6	(14%)
Total	9,300	(100%)	86	(100%)	827	(100%)	$374.0	(100%)
Average by time period	1,160	(13%)	11	(13%)	103	(13%)	$46.8	(13%)

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

Source: NFIRS 5.0 and NFPA fire department experience survey.

Table 10.
Home Candle Structure Fires, by Month
2009-2013 Annual Aver ages
(Includes both Non-confined and confined fires)

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	980	(10%)	7	(8%)	97	(12%)	$34.0	(9%)
February	790	(8%)	12	(14%)	99	(12%)	$30.6	(8%)
March	800	(9%)	4	(5%)	88	(11%)	$69.1	(18%)
April	760	(8%)	11	(13%)	67	(8%)	$29.0	(8%)
May	700	(7%)	2	(3%)	69	(8%)	$23.7	(6%)
June	610	(7%)	2	(3%)	38	(5%)	$20.4	(5%)
July	620	(7%)	2	(3%)	53	(6%)	$21.8	(6%)
August	610	(7%)	3	(4%)	42	(5%)	$24.3	(7%)
September	660	(7%)	8	(9%)	55	(7%)	$25.4	(7%)
October	830	(9%)	4	(5%)	67	(8%)	$24.5	(7%)
November	880	(9%)	13	(15%)	67	(8%)	$32.0	(9%)
December	1,080	(12%)	16	(19%)	85	(10%)	$39.0	(10%)
Total	9,300	(100%)	86	(100%)	827	(100%)	$374.0	(100%)
Monthly average	780	(8%)	7	(8%)	69	(8%)	$31.2	(8%)

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

Source: NFIRS 5.0 and NFPA fire department experience survey.

Table 11.
Home Candle Structure Fires, by Item First Ignited:
January-November and December
2009-2013 Annual Averages
(Includes both non-confined and confined fires)

January-November	Fires		December	Fires	
Mattress or bedding	960	(12%)	Decoration	120	(11%)
Unclassified furniture or utensil	860	(10%)	Mattress or bedding	110	(10%)
Curtain, blinds, drapery or tapestry	720	(9%)	Unclassified furniture or utensil	110	(10%)
Cabinetry	540	(7%)	Curtains, blinds, drapery, or tapestry	80	(8%)
Unclassified item first ignited	450	(6%)	Cabinetry	70	(7%)
Upholstered furniture	450	(5%)	Upholstered furniture	60	(5%)
Clothing	420	(5%)	Unclassified item first ignited	50	(5%)
Magazine, newspaper, or writing paper	410	(5%)	Magazine, newspaper, or writing paper	50	(4%)
Interior wall covering, excluding drapes	390	(5%)	Linen other than bedding	40	(4%)
Linen other than bedding	310	(4%)	Clothing	40	(4%)
Decoration	310	(4%)	Interior wall covering, excluding drapes	40	(4%)
Floor covering rug, carpet, or mat	280	(3%)	Floor covering rug, carpet, or mat	30	(3%)
Multiple items first ignited	260	(3%)	Rubbish, trash, or waste	30	(3%)
Unclassified soft goods or wearing apparel	250	(3%)	Unclassified soft goods or wearing apparel	30	(3%)
Rubbish, trash, or waste	180	(2%)	Multiple items first ignited	30	(3%)
Appliance housing or casing	170	(2%)	Appliance housing or casing	30	(2%)
Box, carton, bag, basket or barrel	160	(2%)	Box, carton, bag, basket or barrel	20	(2%)
Flammable or combustible liquids or gases, piping or filter	130	(2%)	Other known item first ignited	150	(14%)
Other known item first ignited	950	(12%)			
Total	8,220	(100%)	Total	1,080	(100%)

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

Source: NFIRS 5.0 and NFPA fire department experience survey.

Table 12.
Candle Fires in the Home by Year: 1980-2013

Year	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions) As Reported		In 2013 Dollars
1980	10,400		40		580		$51		$144
1981	9,600		140		510		$53		$136
1982	8,900		100		530		$51		$123
1983	8,100		130		580		$57		$133
1984	8,200		120		640		$65		$146
1985	8,500		90		670		$73		$158
1986	8,200		150		640		$94		$200
1987	8,000		130		640		$59		$121
1988	8,300		100		780		$85		$168
1989	7,700		120		740		$81		$152
1990	6,800		120		650		$81		$145
1991	7,300		90		750		$106		$181
1992	7,700		130		700		$85		$141
1993	7,800		100		720		$108		$174
1994	8,900		100		980		$111		$175
1995	10,700		90		1,080		$153		$234
1996	12,300		160		1,310		$221		$329
1997	14,400		210		1,410		$217		$315
1998	15,700		190		1,290		$226		$323
1999	17,300	(16,800)	90	(90)	1,640	(1,640)	$350	($348)	$490
2000	16,200	(15,800)	240	(240)	1,660	(1,660)	$349	($349)	$473
2001	18,900	(18,000)	250	(250)	1,930	(1,900)	$438	($437)	$577
2002	18,200	(17,600)	160	(160)	1,690	(1,690)	$494	($494)	$640
2003	17,000	(15,700)	140	(140)	1,510	(1,510)	$464	($462)	$588
2004	16,900	(15,600)	200	(200)	1,510	(1,490)	$464	($462)	$573
2005	15,600	(14,900)	150	(150)	1,270	(1,270)	$539	($538)	$643
2006	14,200	(13,000)	140	(140)	1,100	(1,090)	$422	($422)	$488
2007	12,700	(11,900)	200	(200)	1,040	((1,020)	$367	($367)	$412
2008	12,000	(10,900)	130	(130)	970	(960)	$465	($465)	$504
2009	9,600	(8,900)	60	(60)	790	(790)	$576	($576)	$626
2010	9,600	(8,700)	90	(90)	820	(800)	$370	($369)	$396
2011	9,100	(8,400)	90	(90)	870	(870)	$313	($312)	$325
2012	9,300	(8,700)	120	(120)	820	(790)	$323	($323)	$328
2013	9,000	(8,300)	70	(70)	840	(820)	$284	($284)	$284

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 (1999-2011) and from NFPA fire department experience survey

Table 13.
Candle Fires in the Home as a Share of All Home Structure Fires, 1980-2013

Year	Home Fires	Home Candle Fires	Percent of Home Fires Started by Candles
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%
2010	384,000	9,600	3%
2011	370,000	9,100	3%
2012	365,000	9,300	3%
2013	369,500	9,000	2%

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 fire department experience survey. Candle fire estimates are derived from NFIRS and the NFPA fire department experience survey. See Appendix A for information on the methodology used.

Table 14.
Candle Fires in Non-Home Properties by Occupancy Class
2009-2013 Annual Averages
(Includes both non-confined and confined fires)

Occupancy	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Non-home residential	500	(41%)	1	(27%)	23	(35%)	$12.8	(38%)
Hotel or motel	90	(7%)	0	(0%)	3	(4%)	$1.8	(5%)
Dormitory, fraternity, sorority or barracks	50	(4%)	0	(0%)	5	(7%)	$0.4	(1%)
Rooming or lodging house	50	(4%)	0	(0%)	5	(8%)	$1.0	(3%)
Residential board and care or assisted living	10	(1%)	0	(0%)	0	(0%)	$0.2	(1%)
Unclassified residential property	290	(24%)	1	(27%)	10	(16%)	$9.5	(28%)
Mercantile or office	220	(18%)	1	(16%)	9	(14%)	$7.9	(23%)
Office, bank or mail facility	60	(5%)	0	(0%)	0	(0%)	$2.9	(9%)
Specialty shop	50	(4%)	0	(0%)	2	(3%)	$2.0	(6%)
Personal service, recreational or home repair	30	(2%)	0	(0%)	1	(1%)	$0.2	(1%)
Grocery or convenience store	10	(1%)	0	(0%)	0	(0%)	$0.2	(1%)
Department store or unclassified general retail	10	(1%)	0	(0%)	0	(0%)	$0.2	(1%)
Laundry, dry cleaning or professional supplies or services	10	(1%)	0	(0%)	2	(3%)	$0.1	(0%)
Textile or apparel sales	10	(1%)	1	(16%)	0	(0%)	$0.2	(1%)
Service station or vehicle sales, service or repair	10	(1%)	0	(0%)	1	(1%)	$0.1	(0%)
Unclassified mercantile or business property	40	(3%)	0	(0%)	4	(6%)	$1.4	(4%)
Storage	140	(12%)	0	(0%)	9	(14%)	$4.6	(14%)
Vehicle storage, garage or fire station*	40	(3%)	0	(0%)	3	(5%)	$0.9	(3%)
Warehouse or residential or self-storage	10	(1%)	0	(0%)	3	(4%)	$2.6	(8%)
Unclassified or unknown-type storage property	90	(8%)	0	(0%)	3	(5%)	$1.0	(3%)
Public assembly	130	(11%)	0	(0%)	10	(16%)	$6.1	(18%)
Place of worship or funeral property	60	(5%)	0	(0%)	6	(9%)	$5.5	(16%)
Eating or drinking place	40	(3%)	0	(0%)	4	(6%)	$0.2	(0%)
Club	10	(1%)	0	(0%)	0	(0%)	$0.1	(0%)
Unclassified or unknown-type public assembly property	10	(1%)	0	(0%)	1	(1%)	$0.0	(0%)

* 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
2009-2013 Annual Averages
(Includes both Non-confined and confined fires)
(Continued)

Occupancy	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Outside or special property	80	(7%)	1	(16%)	7	(11%)	$0.6	(2%)
Highway, street, or parking area	30	(2%)	0	(0%)	5	(7%)	$0.3	(1%)
Open land, beach, or campsite	20	(2%)	0	(0%)	1	(1%)	$0.2	(1%)
Bridge, tunnel, or outbuilding	20	(2%)	0	(0%)	2	(3%)	$0.1	(0%)
Unclassified outside or special property	10	(1%)	0	(0%)	0	(0%)	$0.0	(0%)
Educational	40	(3%)	0	(0%)	0	(0%)	$0.2	(1%)
Preschool through grade 12	20	(2%)	0	(0%)	0	(0%)	$0.2	(1%)
Adult education or college classroom	10	(1%)	0	(0%)	0	(0%)	$0.0	(0%)
Unclassified or unknown-type public educational property	10	(1%)	0	(0%)	0	(0%)	$0.0	(0%)
Health care, detention or correction	30	(2%)	2	(41%)	3	(4%)	$0.4	(1%)
Nursing home	10	(1%)	2	(41%)	3	(4%)	$0.4	(1%)
Clinic or doctor's office	10	(1%)	0	(0%)	0	(0%)	$0.0	(0%)
Industrial, utility defense, agriculture, mining or manufacturing	10	(1%)	0	(0%)	1	(1%)	$0.1	(0%)
Unclassified or unknown property use	80	(6%)	0	(0%)	2	(3%)	$1.0	(3%)
Total	1,220	(100%)	5	(100%)	64	(100%)	$33.7	(100%)

Note: Specific occupancies are listed only if they accounted for at least 1% of the fires. 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 fire department experience 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.

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.

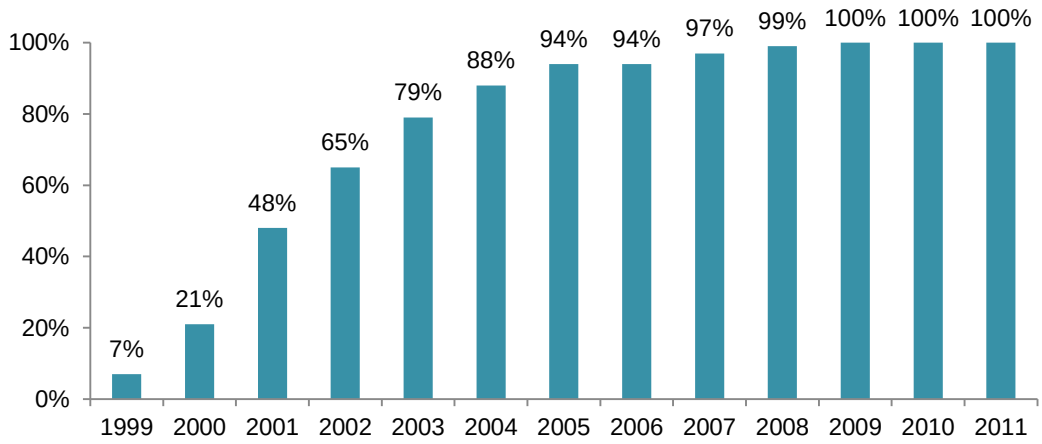
Figure A.1 shows the percentage of fires originally collected in the NFIRS 5.0 system. Each year's release version of NFIRS data also includes data collected in older versions of NFIRS that were converted to NFIRS 5.0 codes.

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

NFPA survey projections
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.

Figure A.1. Fires Originally Collected in NFIRS 5.0 by Year



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.

Because this analysis focused on fatalities only, no distinction was made between confined and non-confined fires.

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.

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.

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.

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.

Heat Source. 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.

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

$$\frac{\text{All fires}}{\text{(All fires – blank – undetermined – [fires in which EII =NNN and heat source <>40-99])}}$$

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.

Code Grouping	EII Code	NFIRS definitions
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)

Code Grouping	**EII Code**	**NFIRS definitions**
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.

One Child Dies, Two Injured in House Fire, Minnesota
A 4-year-old boy died and two other children suffered burns and smoke inhalation injuries in a house fire that started as a result of children playing with a lit candle.

The two-story, wood-frame farmhouse, which was over 100 years old, had a wooden plank roof covered in asphalt shingles. Smoke alarms had been installed, but they did not work. There were no sprinklers.

The boys' father left his four sons, ages 4, 5, 14, and 15, home while he went to help their mother disconnect a trailer she was using to haul furniture to her retail store. The 15-year-old told investigators that he was doing schoolwork in the living room, where a scented candle was burning on a table that also contained artificial plants. He had stepped out of the room to make a phone call when he heard his younger brothers screaming.

He quickly ran into the room where he found the two little boys standing near the burning plant arrangement. Grabbing the 5-year-old, he told his 4-year-old brother to follow him and yelled upstairs to tell his 14-year-old brother, who had been sleeping, to go out the window. Once outside, he put the little boy on the ground and tried unsuccessfully to go back inside for the 4-year-old. The 14-year-old managed to escape through a window and jumped off the porch roof to safety.

The children's father called 911 at 10:19 a.m. after he found two of his sons running down the driveway when he returned from helping his wife. By the time the fire department arrived, the house was collapsing into the basement, and firefighters were unable to enter it.

After crews extinguished the fire, they found the body of the 4-year-old, who had died of smoke inhalation and burns. The 5- and 15-year-old also suffered burns and smoke inhalation.

The fire destroyed the house, which was valued at $154,000, and its contents, valued at $93,000.
Kenneth J. Tremblay, 2013," Firewatch", *NFPA Journal*, November/December 19-20.

Unattended Candle Ignites Fatal Fire, Maryland
A 30-year-old man and his 60-year-old mother died in a fire started by an unattended candle in the bathroom of their single-family house.

The three-story, wood-frame house had brick walls. Investigators found a smoke detector mounting bracket on the wall in the first-floor stairwell, but the smoke alarm had been removed before the fire. There were no sprinklers.

Firefighters were called to the home at 3:39 p.m. and found the man kneeling under the window, dead as a result of smoke inhalation and burns. His mother was lying on the floor near another window, also dead of burns and smoke inhalation.

Investigators interviewed a 16-year-old girl who was on the first floor of the house when the fire started. She said that she had looked up the stairs and seen light from the fire in the bathroom. She alerted the man, who went upstairs to rescue his mother, but neither was able to escape.

The investigators discovered a tea light, a disposable lighter, and a makeshift ashtray on top of a small refrigerator in the second-floor bathroom. The girl told them that the bathroom light fixture did not work and the tea light was used for illumination. The investigators determined that the candle ignited a blanket hung over a window as a curtain and that the fire spread to wood paneling and other combustibles in the room. It then spread out of the room into the hallway and the other rooms on the second and third floors. The fire also spread out of several windows, damaging the houses on either side.

The house sustained $15,000 in damage, and its contents sustained $5,000. The homes on either side of the fire building had estimated damages of $500 each.

Kenneth J. Tremblay, 2013," Firewatch", *NFPA Journal*, January/February, 22.

Candle Starts Fatal Fire during Power Outage, Minnesota
A 61-year-old man with a physical disability died in a fire in his manufactured home that started when heat from a burning candle ignited papers on which the candle was sitting.

The manufactured home, which was approximately 60 feet (18 meters) long and 30 feet (9 meters) wide, sat on a wooden foundation over a basement, creating a two-story, split-level home. There were no sprinklers, and the presence of smoke alarms or detectors was not determined.

An electrical power company employee working in the area saw the house on fire and called 911 at 1:06 a.m. Firefighters arrived 21 minutes later to find the home engulfed in flames and concentrated on preventing the fire from spreading to other homes. They discovered the victim near a rear door opening onto a deck.

Investigators determined that the man had been using candles for illumination because the area had lost power that evening, and he had left a candle burning on top of some papers. They also

found evidence that a number of candles were being used throughout the manufactured home to light the interior.

Damage to the structure, valued at $110,000, was estimated at $75,000. The amount of damage to its contents was not reported.

Kenneth J. Tremblay, 2012, "Firewatch," *NFPA Journal*, September/October 26-27.

Woman Dies when Candle Ignites Clothing, Nevada

A 74-year-old women died of smoke inhalation and burns after a candle apparently ignited her clothing when she used it to provide illumination while she changed a light bulb in a closet.

The single-story, single-family, wood-frame house, which covered approximately 1,600 square feet (150 square meters), had a smoke alarm in the hallway that operated as designed. There were no sprinklers.

A passerby who saw smoke coming from the attic vents called 911 at 6:15 p.m. Firefighters arriving six minutes later initially saw nothing from outside the house, but they heard a smoke alarm operating and smelled something burning. They forced open the front door, found light smoke, and began a primary search for occupants and the fire. When they entered a bedroom, they found the victim, who lived alone, in the closet. The fire was extinguished in less than a minute.

Damage to the house and its contents, valued at $225,000, was estimated at $5,000.

Kenneth J. Tremblay, 2012, *NFPA Journal*, July/August, 26.

Man with Mobility Challenges Dies in Fire, Michigan

A man who used a wheelchair died in a fire in his single-family home. Another occupant tried unsuccessfully to extinguish the fire and move the victim out of harm's way, but the intense smoke and heat made it impossible.

The single-story, wood-frame house, which was 32 feet (10 meters) long and 29 feet (9 meters) wide, had a wooden roof deck covered with asphalt shingles. The house did not have a sprinkler system, but there was a battery-operated smoke alarm in the main hallway.

Investigators determined that the fire started when a lighted candle fell onto a bed in one of the bedrooms and ignited the bedding.

The fire was confined to the bedroom, although the adjacent hallway sustained smoke and heat damage.

The smoke from the fire, which was reported at 12:06 a.m. by an occupant, did not activate the smoke alarm. Investigators could not determine why the alarm failed to go off, as its battery was connected and was sufficiently charged.

Eighty percent of the house and 90 percent of its contents were damaged.

Kenneth J. Tremblay, 2012, *NFPA Journal*, May/June, 28-29.

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 rife 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.

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.