

HOME FIRES INVOLVING HEATING EQUIPMENT

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Abstract

In 2005, heating equipment was involved in an estimated 62,200 reported home structure fires, 670 civilian deaths, 1,550 civilian injuries, and \$909 million in direct property damage.

In 2005, most home heating fire deaths (73%), injuries (64%), and direct property damage (57%) involved stationary or portable space heaters. Chimneys and chimney connectors accounted for the largest share of home heating fires (36%).

Space heating poses a much higher risk of fire, death, injury, and loss per million users than central heating. Comparisons of risk among different types of space heaters or different types of central heating show no clear, consistent, significant differences.

Keywords: Heating, space heater, water heater, furnace, wood stove, heat tape, fireplace, chimney, fire statistics, home fires, residential fires.

Acknowledgements

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

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Executive Summary

In 2005, heating equipment was involved in an estimated 62,200 reported U.S. home structure fires, with associated losses of 670 civilian deaths, 1,550 civilian injuries, and \$909 million in direct property damage. The estimated home heating fire total is roughly one-fourth (26%) the size of its peak in 1982, and associated deaths are down by 44% from their 1982 peak. “Homes” refers to one- and two-family dwellings (which include manufactured homes) and apartments (which include townhouses). Associated civilian injuries are down by 58% from their 1983 peak and direct property damage adjusted for inflation is down by one-half from the 1980 peak.

Prior to 1990, heating equipment was the leading cause of home fires. The roughly one-fourth decline from 1989 to 1990 dropped it behind cooking, which itself had seen a significant decline in home fires. Cooking equipment has been the leading cause of home fires ever since. In 2005 heating equipment fires accounted for one-sixth (16%) of all reported home fires.

Fixed (stationary) and portable space heaters, excluding fireplaces, chimneys, and chimney connectors, accounted for one-third (32%) of reported 2005 U.S. home heating fires, three-fourths (73%) of associated civilian deaths, two-thirds (64%) of associated civilian injuries, and more than half (57%) of associated direct property damage. In 2005, the central heating shares were one-fifth (18%) of reported U.S. home heating fires, one-seventh (15%) of associated civilian deaths, one-eleventh (9%) of associated civilian injuries, and one-twelfth (8%) of associated direct property damage.

Chimneys and chimney connectors accounted for the largest share of fire incidents (36% in 2005), because of the impact of confined fires. Confined fires accounted for 93% of total 2005 home chimney or chimney connector fires. Excluding confined fires, chimneys and chimney connectors accounted for only 6% of 2005 home heating fires.

Gas-fueled heating devices, particularly space heaters, pose a higher risk of death due to non-fire carbon monoxide poisoning. In 1995-1998 and 2000-2003, there were 2.7 electrocution deaths per year involving electric water heaters and 1.8 electrocution deaths per year involving electric furnaces. Heating equipment accounted for more than 53,000 injuries reported to hospital emergency rooms in 2004, including roughly 12,000 thermal burns. Space heaters accounted for 36% of the injuries and more than two-thirds of the thermal burns.

The decline in home heating fires since 1980 has been more consistent and more dramatic than the general decline in heating demand that resulted from a historically atypical string of warmer winters.

The leading factor contributing to ignition in non-confined home heating equipment fires is heat source too close to combustibles, which contributed to 27% of the home heating fires (excluding confined fires) and 53% of associated deaths. Failure to clean accounted for 64% of home heating equipment fires confined to chimney or flue. This means failure to clean is by far the leading factor for all home heating equipment fires combined.

Excluding confined fires, structural member or framing accounts for the largest share of items first ignited (17%), followed by cooking materials (9%).

Space heaters result in far more fires and losses than central heating devices and have higher risks relative to usage.

Comparative Risk of Central and Space Heating Equipment

A. When Secondary Uses of Equipment Are Included as User Households

Risk Measure	Space Heating	Central Heating	How Much Higher Is Space Heating Risk Than Central Heating Risk?
Fires (per million user households)	269	23	7 times
Civilian deaths (per million user households)	9.5	0.2	36 times
Civilian injuries (per million user households)	18.0	1.3	12 times
Direct property damage (per user household)	\$10.1	\$1.1	8 times

B. When Secondary Uses of Equipment Are Not Included as User Households

Risk Measure	Space Heating	Central Heating	How Much Higher Is Space Heating Risk Than Central Heating Risk?
Fires (per million user household)	400	25	12 times
Civilian deaths (per million user households)	14.2	0.3	58 times
Civilian injuries (per million user households)	26.7	1.5	20 times
Direct property damage (per user household)	\$15.0	\$1.2	14 times

Comparisons of different fuel or power options within central or space heating equipment do not show any types to be clearly better or clearly worse.

- Among central heating equipment, gas-fueled and electric-powered units show a higher rate of fire deaths per user household, but gas-fueled equipment would be clearly the highest if non-fire deaths due to unvented carbon monoxide were included, and electric-powered equipment would be clearly the lowest if electric heat pumps – which have their own NFIRS code, listed with air conditioning and fans, but which have a large number of user households as heating equipment – were included.

- Gas-fueled equipment is clearly lowest among central heating equipment for fire incident rates and property damage rates.
- Liquid-fueled equipment is clearly lowest among central heating equipment for death and injury rates but is clearly highest for property damage rates and would not be lowest for death rates if electric heat pumps were included with electric-powered heating equipment.
- Among space heating equipment, there are no clear differences for fire incident or property damage rates. Gas-fueled units rank low for death rates but would be clearly highest if non-fire deaths due to unvented carbon monoxide were included. Solid-fueled units rank among the lowest-risk units for injury rates but would not if non-fire contact burn injuries reported to hospital emergency rooms were included for all equipment. Liquid-fueled units rank high for death and injury rates but would not be highest for deaths if non-fire deaths due to unvented carbon monoxide were included.

Water heaters show a very large difference in risk for fires, deaths, injuries, and damages, with gas-fueled equipment showing a higher risk than electric-powered equipment.

The large share for cooking materials seems inconsistent with the usual designed use of the equipment – most heating devices are designed and marketed solely for heating – but there is also a possible explanation in terms of data accuracy. The substantive interpretation is that there is considerable use of heating equipment for cooking purposes. The data interpretation is that many stovetop fires on ranges are being coded under heating stoves (or fireplace, insert or stove) because the word “stove” is part of the names for those codes and is not part of the name of any code for cooking equipment.

Excluding confined fires, the leading area of origin for home heating fires is the kitchen (18%), followed by heating room or area (16%) and living room, family room or den (10%).

Home heating fires peak in the early evening. Home heating fires are less common during midnight to 8:00 a.m. This could reflect the practice in many homes of turning down the heat overnight, allowing blankets and bedding to compensate.

Safe Heating Behaviors

- Select and install heating equipment for safety and effectiveness.
- Use heating equipment safely, in accordance with manufacturer’s instructions.
- Keep adequate clearance between heating equipment and any combustibles, both fixed, installed combustibles and moveable contents and furnishings. “Adequate” clearance is typically defined in applicable NFPA codes and standards. A clearance of 3 feet (roughly 1 meter, in metric terms) should be used if the size of the clearance is not set in codes and standards.
- Inspect and maintain heating equipment regularly for safety.

- Make sure your heating equipment has the label showing that it is listed by a recognized testing laboratory.

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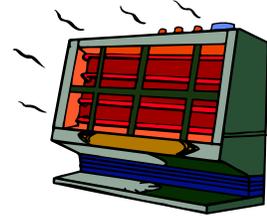
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U.S. Home Heating Equipment Fires

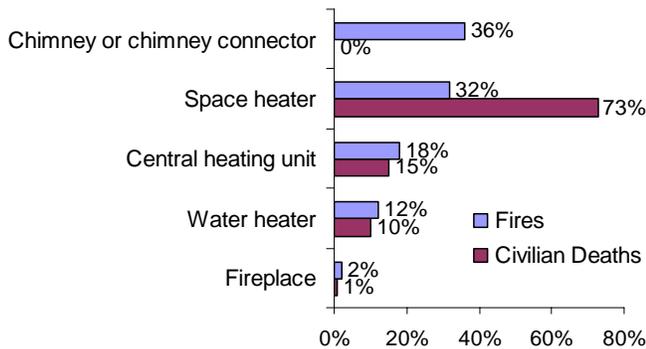
In 2005, U.S. fire departments responded to **62,200** home¹ structure fires that involved heating equipment in 2005. These fires caused

- 670 civilian fire deaths
- 1,550 civilian fire injuries
- \$909 million in direct property damage



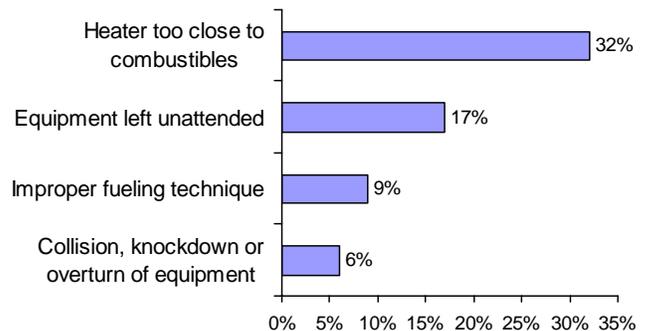
- Heating equipment fires accounted for 16% of all reported home fires in 2005 (second behind cooking) and 22% of home fire deaths.
- In 2002-2005, the leading factor contributing to home heating fires (27%) and deaths (53%) was heating equipment too close to things that can burn, such as upholstered furniture, clothing, mattress, or bedding. These statistics exclude fires that were confined to a chimney, flue, fuel burner, or boiler.
- Nearly half (44%) of all home heating fires occurred in December, January and February in 2002-2005.
- The peak time of home heating fires is between 6:00 p.m. and 9:00 p.m.

U.S. Home Heating Fires by Equipment Involved: 2005



- Chimneys and chimney connectors accounted for the largest share (36%) of home heating fire incidents in 2005.
- Failure to clean accounted for two thirds (64 %) of the confined chimney and chimney connector fires in 2002-2005.

Leading Factors in Space Heater Fires 2002-2005



- Space heaters, whether portable or stationary, accounted for one-third (32%) of the home heating fires and one-quarter (73%) of home heating fire deaths in 2005.
- One-third of space heater fires started when the heater was too close to something that could catch fire. Improper fueling was a particular problem for kerosene heaters.

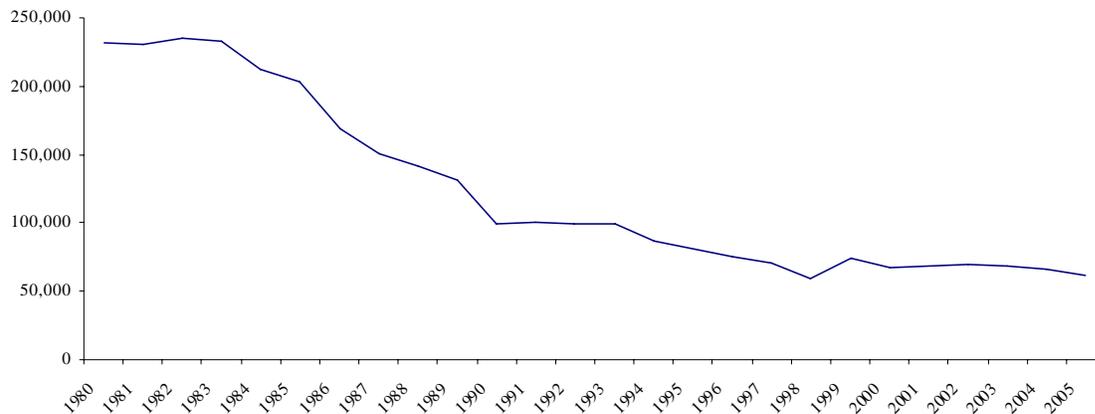
¹ Homes are dwellings, duplexes, manufactured homes, apartments, townhouses, rowhouses and condominiums.

Overview of Heating Equipment Fires

In 2005, heating equipment was involved in an estimated 62,200 reported U.S. home structure fires, with associated losses of 670 civilian deaths, 1,550 civilian injuries, and \$909 million in direct property damage.

The home heating fire total is roughly one-fourth (26%) the size of its peak in 1982, and associated deaths are down by 44% from their 1982 peak. (See Table 1.) “Homes” refers to one- and two-family dwellings (which include manufactured homes) and apartments (which include townhouses). Associated civilian injuries are down by 58% from their 1983 peak and direct property damage adjusted for inflation is down by one-half from the 1980 peak.

Figure 1. Home Fires Involving Heating Equipment, 1980-2005, by Year



Note: Confined fires are fires reported as confined to chimney, flue, fuel burner, or boiler and involving heating equipment; they are analyzed separately but are included above. 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. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. *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.*

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2005) and from NFPA survey.

In 2005 heating equipment fires accounted for one-sixth (16%) of all reported home fires. This was down from a one-third (34%) share for the years of 1980-85 and a one-fourth share (26%) as recently as 1989. These fires also accounted for 22% of the associated civilian deaths and 13% of the direct property damage, also much lower than the shares in the first half of the 1980’s. Heating equipment fires accounted for 12% of home fire civilian injuries.

Heating equipment has not been the leading cause of home fires since 1990. The roughly one-fourth decline from 1989 to 1990 dropped it behind cooking, which itself had seen a significant decline in home fires. Cooking equipment has been the leading cause of home fires ever since.

NFIRS Version 5.0 provides more detail on heating equipment than previous versions of NFIRS.

Prior to 1999, NFIRS provided eight well-defined categories of heating equipment – central heating unit, water heater, stationary local heating unit (space heater), portable local heating unit

(space heater), indoor fireplace, chimney (or gas vent flue), chimney connector (or vent connector), and heat transfer system (steam lines, heating pipes, and hot air ducts). There were also unclassified and unknown-type heating equipment choices. Fuel or power source could be inferred from some of the codes under the form of heat of ignition data element. Chimney and duct were also choices under area of origin, and a case could be made that chimneys, chimney connectors, and heat transfer systems are far more often the location for fires whose igniting heat source was something else, such as a fireplace, wood stove, or furnace.

From 1999 on, NFIRS Version 5.0 has expanded the number of heating-equipment choices to 17 (see table below), creates a new data element to record portability vs. stationary, and creates a third data element to record the source of fuel or power, while also expanding the level of detail beyond the old categories of gas, liquid, solid, and electric. The unclassified and unknown-type heating equipment codes have been combined with each other and with unclassified and unknown-type air conditioning, all contained within the code 100. In this report, code 100 fires are proportionally allocated over all other codes in the 100-199 series. Heat pumps, which can be used for heating or air conditioning, have a code of their own. In this report and in NFIRS Version 5.0 coding, heat pumps are grouped with air conditioners or fans rather than heating equipment.

Changes in coding beginning in 1999 made it easier to code confined fires (e.g., confined to chimney or boiler) as fires. Previously, some of these fires may have been coded as something other than fires, like smoke scares.

In some analyses in this report, statistics include fires coded as contained to fuel burner or boiler (incident type 116) or contained to chimney or flue (incident type 114). In both cases, only those contained or confined fires estimated also to involve heating equipment are included. In spite of the names, these two types of confined fires are each associated with more than one type of heating equipment involved in ignition.

NFIRS Version 5.0 Equipment Type	Where It Is Categorized	Comments
120 – Fireplace or chimney, other	Allocated	This code is treated as a partial unknown that could be any of the equipment coded 121 to 127, but it is not clear whether that is how it was intended or how it is being used.
121 – Fireplace, masonry	Fireplace	NFIRS Version 5.0 provides the first opportunity to separate the two types of fireplaces.
122 – Fireplace, factory- built	Fireplace	NFIRS Version 5.0 provides the first opportunity to separate the two types of fireplaces.

NFIRS Version 5.0 Equipment Type	Where It Is Categorized	Comments
123 – Fireplace, insert or stove	Space heater	NFIRS Version 5.0 separates fireplaces with inserts, which should be designed for significant use in area heating, from ordinary fireplaces. Reference to “stove” is a potential point of confusion with wood stove or even cooking stoves.
124 – Stove, heating	Space heater	There is potential confusion with cooking stoves.
125 – Chimney connector	Chimney or chimney connector	
126 – Chimney, brick or stone	Chimney or chimney connector	NFIRS Version 5.0 provides the first opportunity to separate the two types of chimneys.
127 – Chimney, metal	Chimney or chimney connector	NFIRS Version 5.0 provides the first opportunity to separate the two types of chimneys.
131 – Furnace, local	Space heater	Reference to “furnace” is a potential point of confusion with central heating units.
132 – Furnace, central	Central heating unit	
133 – Boiler	Central heating unit	
141 – Heater, excluding catalytic and oil-filled	Space heater	
142 – Heater, catalytic	Space heater	There is potential for confusion through lack of familiarity with the referenced technology. A catalytic heater uses a catalyst (a metal such as platinum) to promote oxidation of fuel (typically gas or vapor from liquid), producing radiant heat without flame and typically with reduced carbon monoxide production. Some wood-burning stoves also use catalytic features.

NFIRS Version 5.0 Equipment Type	Where It Is Categorized	Comments
143 – Heater, oil filled	Space heater	There is potential for confusion between the oil that is the liquid heating medium and the type of fuel or power for the device.
144 – Heat lamp	Other	
145 – Heat tape	Other	NFIRS Version 5.0 provides the first opportunity to isolate fires involving heat tape.
151 – Water heater	Water heater	
152 – Steamline, heat pipe	Other	This replaces the previous code of “heat transfer system” but does not give as much prominence to hot air ducts as an included equipment type.

In this report, sections are grouped as follows and sequenced as shown here, based on their 2005 share of home heating fire deaths:

- Space heaters (123, 124, 131, 141-143)
 - Then subdivided for some analyses by gas, liquid, solid, and electric;
- Central heating units, including furnaces and boilers (132-133)
 - Subdivided for some analyses by gas, liquid, and electric;
- Water heaters (151)
 - Subdivided for some analyses by gas and electric;
- Fireplaces (121-122);
- Chimneys and chimney connectors (125-127)
 - Includes allocation of nearly all fires coded as contained to chimney or flue (incident type 114);
- Heat tape and heat lamp (144, 145), because steamline or heat pipe (152) does not have enough fires to justify detailed examination.

In NFIRS Version 5.0 and all previous versions of NFIRS, the instructions have been clear that equipment involved in ignition means only the equipment was the ignition heat source and not that the equipment was somehow at fault. Nevertheless, there have been anecdotal reports for years of firefighters who were reluctant to code equipment as involved unless the equipment failed. The advent of NFIRS Version 5.0 seems to have coincided with a substantial increase in this reluctance. One way to correct for this – a change to analysis methods adapted by NFPA and its fire data analysis partners in 2007 – is to treat fires coded “no equipment” as “unknown equipment” unless the heat source code is in the range of 40-99, corresponding to a specific heat source not involving equipment.

Fixed (stationary) and portable space heaters, excluding fireplaces, chimneys, and chimney connectors, accounted for one-third (32%) of reported 2005 U.S. home heating fires, three-fourths (73%) of associated civilian deaths, two-thirds (64%) of associated civilian injuries, and more than half (57%) of associated direct property damage.

In 2005, the central heating shares were one-fifth (18%) of reported U.S. home heating fires, one-seventh (15%) of associated civilian deaths, one-eleventh (9%) of associated civilian injuries, and one-twelfth (8%) of associated direct property damage. The space heater and central heating shares of fires and associated deaths both increased from 1980 to 2005, as shares for fireplaces (for fires and deaths) and for chimneys and chimney connectors (for deaths only) declined sharply.

Chimneys and chimney connectors accounted for the largest share of fire incidents (36% in 2005), because of the impact of confined fires.

Confined fires accounted for 93% of total 2005 home chimney or chimney connector fires. Chimneys and chimney connectors accounted for only 6% of 2005 home heating fires excluding confined fires.

Gas-fueled heating devices, particularly space heaters, pose a higher risk of death due to non-fire carbon monoxide poisoning.*

Studies by the U.S. Consumer Product Safety Commission (CPSC) provide 1980-2004 estimates of non-fire deaths due to carbon monoxide poisoning from home heating equipment, which occurs when carbon monoxide produced by burning fuel is allowed to build up in a confined, occupied space (see Table 2). Gas-fueled space heaters and central heating units accounted for most of these deaths. Electric-powered heating units do not have this risk at all, of course.

In 1995-1998 and 2000-2003, there were 2.7 electrocution deaths per year involving electric water heaters and 1.8 electrocution deaths per year involving electric furnaces.**

These estimates involve the separation of water heaters and furnaces from larger groupings that are used in some years, based on the relative numbers of such deaths in years when statistics are provided separately for water heaters and furnaces. There was no report issued for 1999.

Heating equipment accounted for 51,900 injuries reported to hospital emergency rooms in 2006.

Space heaters accounted for 37% of the injuries, followed by fireplaces (28%), ductwork for heating and/or cooling (13%), and furnaces (12%). Smaller shares were accounted for by water heaters (7%), chimneys (2%), thermostats (1%), heat lamps (0%), and heat tape (0%).***

*Matthew V. Hnatov, "Non-Fire Carbon Monoxide Deaths Associated with the Use of Consumer Products." U.S. Consumer Product Safety Commission, www.cpsc.gov, August 8, 2007, Table 1, and previous reports in series.

** Risana T. Chowdury, "2003 Electrocutions Associated with Consumer Products," December 2006, Table 2, www.cpsc.gov, and previous reports in the series.

***On-line queries of National Electronic Injury Surveillance System (NEISS) at www.cpsc.gov on September 19, 2007.

Gas explosions with no after-fire add very few incidents and deaths to the structure fires estimated for gas-fueled home heating equipment.

A special study of 1988-1992 data estimated that home natural gas explosions with no after-fire averaged 340-420 incidents and 2-3 civilian deaths per year, while home LP gas explosions averaged 110-140 incidents and 2-3 civilian deaths per year. (If an explosion resulted in a structure fire, it should be coded as a structure fire.) These figures represented 2-3% of the fires and fire deaths associated with gas-fueled home heating equipment and a much smaller fraction of the fires and fire deaths associated with all types of gas-fueled home equipment. These estimates are based on an estimated range of scaling ratios entered on the scaling ratios for structure fires. In NFIRS Version 5.0, there no longer is a separate code for gas explosions with no after-fire inside a structure.

Space heaters result in far more fires and losses than central heating devices and have higher risks relative to usage.

Table 3 provides statistics on 2001 usage of different types of central or space heating equipment.

Table A. Comparative Risk of Central and Space Heating Equipment

A. When Secondary Uses of Equipment Are Included as User Households

Risk Measure	Space Heating	Central Heating	How Much Higher Is Space Heating Risk Than Central Heating Risk?
Fires (per million user households)	269	23	7 times
Civilian deaths (per million user households)	9.5	0.2	36 times
Civilian injuries (per million user households)	18.0	1.3	12 times
Direct property damage (per user household)	\$10.1	\$1.1	8 times

B. When Secondary Uses of Equipment Are Not Included as User Households

Risk Measure	Space Heating	Central Heating	How Much Higher Is Space Heating Risk Than Central Heating Risk?
Fires (per million user household)	400	25	12 times
Civilian deaths (per million user households)	14.2	0.3	58 times
Civilian injuries (per million user households)	26.7	1.5	20 times
Direct property damage (per user household)	\$15.0	\$1.2	14 times

Comparisons of different fuel or power options within central or space heating equipment do not show any types to be clearly better or clearly worse.

- Among central heating equipment, gas-fueled and electric-powered units show a higher rate of fire deaths per user household, but gas-fueled equipment would be clearly the highest if non-fire deaths due to unvented carbon monoxide were included, and electric-powered equipment would be clearly the lowest if electric heat pumps – which have their own NFIRS code, listed with air conditioning and fans, but which have a large number of user households as heating equipment – were included.
- Gas-fueled equipment is clearly lowest among central heating equipment for fire incident rates and property damage rates.
- Liquid-fueled equipment is clearly lowest among central heating equipment for death and injury rates but is clearly highest for property damage rates and would not be lowest for death rates if electric heat pumps were included with electric-powered heating equipment.
- Among space heating equipment, there are no clear differences for fire incident or property damage rates. Gas-fueled units rank low for death rates but would be clearly highest if non-fire deaths due to unvented carbon monoxide were included. Solid-fueled units rank among the lowest-risk units for injury rates but would not if non-fire contact burn injuries reported to hospital emergency rooms were included for all equipment. Liquid-fueled units rank high for death and injury rates but would not be highest for deaths if non-fire deaths due to unvented carbon monoxide were included.

Water heaters show a very large difference in risk for fires, deaths, injuries, and damages, with gas-fueled equipment showing a higher risk than electric-powered equipment.

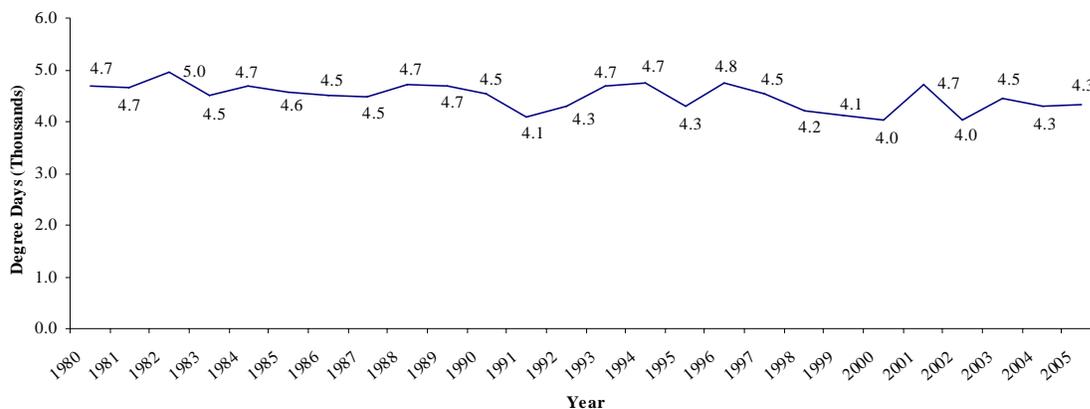
The decline in home heating fires since 1980 has been more consistent and more dramatic than the general decline in heating demand that resulted from a historically atypical string of warmer winters.

The best available measure of the demand for home heating is the National Climatic Center's annual total of "heating degree days." Heating degree days are computed as follows, for any one location: Check the average temperature each day. If it is below 65°F, then that day is assigned a number of degree days equal to the difference between the average temperature and 65°F. For example, a day with an average temperature of 70°F would register no degree days, a day with an average temperature of 60°F would register five degree days, and a day with an average temperature of 50°F would register 15 degree days. Sum the degree days for all the days in the year, and you have an annual total, which is normally calculated in terms of a season from July 1 to June 30. National heating-degree day statistics are estimated from individual measurement stations weighted by the population in the areas nearest those stations.

Figure 2 shows the history of heating degree days for the contiguous 48 states. A linear-regression analysis of home heating fires versus heating degree days explains 26% of the variation. This is a modest relationship, comparable to the strength of the relationship between state fire death rates and percentage of adults in a state who smoke or have less than 12 years of schooling. However, a comparable analysis of home heating fires versus year explains 89% of

the variance. This suggests that warmer winters explain part of the improvement in home heating fires, but the many other changes over the past two decades, including safer equipment, more widespread public education on safe behaviors, and wider use of smoke alarms and other technologies that keep fires that do occur from becoming serious, all collectively explain far more of the improvement in the home heating fire totals.

Figure 2. U.S. Demand for Heating in Thousands of Heating Degree Days, 1980-2005



Source: National Oceanic and Atmospheric Administration website, <http://www.ncdc.noaa.gov>.

Dramatically higher heating costs or reduced fuel availability can induce shifts in equipment usage that can affect home heating fire risks.

Price shocks and fuel supply interruptions for petroleum products, including oil and gas, occurred in the 1970s, before the best national fire incident data begins in 1980. The first Arab oil embargo occurred in 1973-1974, but the big jump in prices did not occur until 1979-1981. (For example, the average price of leaded regular gasoline more than doubled from 1978 to 1981.**) Some NFIRS data is available beginning in 1977, however, and that data indicates a roughly 35,000-fire increase in one- and two-family dwelling heating fires from 1979 to 1980 alone.** Nearly all of this increase was associated with a switch to wood stoves, resulting in a jump in fires involving solid-fueled fixed space heaters and associated chimneys and chimney connectors, as well as a jump in fireplace fires, which may have reflected the use of inserts to convert decorative fireplaces into true space heaters.

The sharp increase in fires reflected not only the generally higher risk of space heaters of all types – because heating surfaces are closer to combustibles than is the case with furnaces and because occupants often must take a more active direct role in fueling and maintaining the equipment – but also a generation-long loss of familiarity with solid-fuel heating by Americans.

In 1940, 77% of the nation’s housing units were heated using solid fuels, with coal and coke outnumbering wood by more than two to one. By 1950, the percentage of homes using solid fuels had fallen to 45%, and wood now outnumbered coal and coke by more than three to

* “Gasoline Retail Prices,” *World Almanac 2005*, World Almanac Books, New York, p. 171.

** *Fire in the United States*, 3rd edition, Federal Emergency Management Agency, 1982, Figures 14-15.

one.* By 1960, the percentage share for solid fuels had fallen to 17%, and by 1970 it fell below 5%.*

Then came the dramatic price increase in petroleum and natural gas products in the 1970's. From 1970 to 1975, the overall consumer price index rose 38.6%, but the index for home fuel oil rose 111.0%, the percentage shares of household heating fuels and power sources showed a 7.8 percentage point shift away from fuel oil and kerosene and a 2.5 percentage point shift away from natural, bottled, tank, and LP (liquefied petroleum) gas. Electricity use for heating went up a corresponding 10.6 percentage points.

Overall, solid fuel usage as a primary heating fuel continued to decline, from 4.6% of all occupied housing units to 4.0% in 1980, but this masked two different patterns – a doubling of the wood share, from 1.7% to 3.4%, and a decline of coal and coke into insignificance, from 2.9% to 0.6%. Thus, while the renewed growth in use of wood as a fuel probably began in the mid-1970's, it was not until roughly 1980 that there was a turnaround for the trend in all solid fuels, as the continued upward trend in wood usage finally overtook the decline in coal usage.

And the millions of new users of wood heating in the late 1970's would have been inexperienced in its use and so more likely to have fires. From 1980 to 1983, usage of solid fuel for primary heating was up from 4.0% to 5.5% of occupied housing units, but wood usage outnumbered coal usage by ten-to-one.

Increased sales of portable kerosene heaters constituted a more recent phenomenon, which is not surprising since kerosene was one of the fuels leading the price increases. The attraction here is the opportunity for savings from compartmentalized heating, i.e., savings from heating only the spaces that are in use. Estimates by the U.S. Consumer Product Safety Commission (CPSC) indicate the period of most growth in use of portable kerosene heaters was 1980-1982.** Toward the end of this period, three states – California, Massachusetts, and Wisconsin – banned home use of portable kerosene heaters.

Another point of interest is the prominent role of heating fires in explaining the typically higher fire death rate in rural areas and the South. An early 1980's analysis at the National Institute of Standards and Technology (NIST) of late 1970's death certificate data from six southern states found that the overall fire death rate per million persons for rural areas was 2.5 times the rate for non-rural areas. The study showed that this separated into a 4.2 ratio for heating fire deaths versus only a 1.5 ratio for fire deaths due to all other known causes (and a 4.2 ratio for deaths in unknown-cause fires).***

Another report on the same data, by Gomberg and Clark, provides more details.**** Rural fires started by heating equipment had a fire death rate of 13.8 deaths per million population, four times the non-rural heating equipment death rate of 3.3.

**Statistical Abstract of the United States 1975*, Washington: U.S. Department of Commerce, Bureau of the Census, 1975, Table 1234.

**Beatrice Harwood, Deborah Kale, and Sheila Kelly, *Hazards Involving Kerosene Heaters*, Washington: U.S. Consumer Product Safety Commission, Directorate for Epidemiology, May 1983, Table 16.

***Alan Gomberg and John R. Hall, "Space Heater – Rural Death Link," *Fire Service Today*, September 1982, pp. 18-21, Figure 2.

****A. Gomberg and L.P. Clark, *Rural and Non-Rural Civilian Residential Fire Fatalities in Twelve States*, NBSIR 82-2519, Center for Fire Research, National Bureau of Standards, Washington, June 1982.

The heating equipment fire death rate was roughly 50% higher for rural areas in high death rate states than for rural areas in low death rate states. In other words, living in a southeastern state and living in a rural area each was associated with an increase in the risk of death from a home heating equipment fire, and the increases were at least somewhat independent.

The report describes a variety of scenarios. The improper installation of solid-fueled heating equipment (wood stoves, fireplaces, chimneys) caused a rural death rate of 2.43 deaths per million population and a non-rural rate of 0.26. In this scenario, a wood stove may be too close to a wood wall, chimneys or vents may have inadequate clearance from wall coverings or framing, or the floor may not be protected from heat or flame.

The rural rate for combustibles (furniture, linens, trash, etc.) placed too close to solid-fueled heating equipment was 0.76 deaths per million population compared to a non-rural rate of 0.10 deaths per million population.

Rural states had a death rate of 0.50 deaths per million population for fires that started when flammable liquids were used to kindle fires in wood stoves and fireplaces. The non-rural rate was 0.02 deaths per million population. Alcohol was a frequent factor in this scenario.

Ignitions of worn clothing by all types of heating equipment resulted in a rural fire death rate of 2.26 deaths per million population and a non-rural rate of 0.8 deaths per million population.

Older adults were frequent victims. Victims tended to be sitting close to a wood stove or local heater. In many cases, only the clothing was involved, and the fire department was never notified as victims were transported privately.

The South has a higher percentage of its population in rural areas than any other region, which may explain why the states of the South often had heating fires rather than the national leader – smoking-material fires – as the leading cause of fire deaths early in the 1980s.*

It may be conjectured from these distinctive patterns in the South that space heater usage is fed by both problems in affording heating and reduced demand for heating. In the poor areas of the South, affordability problems and reduced heating demand are both phenomena of long standing. In the rest of the country, recurrent price shocks and warmer winters can create the same combination, and if the price increases are sufficiently dramatic (or the supply interruptions are sufficiently widespread) and the warmer winters go on long enough to seem like a new norm, there may be a change in people's choices of home heating equipment (which is a long-term decision, involving a capital purchase in most cases) or in their usage of such equipment (e.g., shifting emphasis to what had been auxiliary heating equipment).

The leading factor contributing to ignition in non-confined home heating equipment fires is heat source too close to combustibles.

Table 4 shows factors contributing to ignition for all heating equipment for non-confined fires.

*See, for example, "Preview: Residential Fires in the United States 1979", Washington: Federal Emergency Management Agency, undated; and *Fire in the United States*, Fifth Edition, prepared for the Federal Emergency Management Agency by the National Fire Protection Association, 1984.

The leading factor is heat source too close to combustibles, which contributed to 27% of the home heating fires (excluding confined fires) and 53% of associated deaths. This is why the need to keep at least a 3-foot separation between combustibles and heating equipment features prominently in the list of safe heating rules (shown at end of section text).

Equipment unattended is another high-ranking factor (9% of non-confined home heating equipment fires) that, like too close to combustibles, leads directly to a safe heating rule. Improper fueling technique (8% of non-confined home heating equipment fire deaths) also leads directly to a safe heating rule.

The factors that involve equipment design, construction, or installation and rank high usually lack the detail necessary to infer an appropriate strategy to improve safety. Following manufacturer's instructions and code requirements is essential. Good inspections by professionals when equipment is installed can address a wide range of such problems.

Table 5 shows the human factors contributing to ignition for non-confined home heating equipment fires. The leading factor is unattended or unsupervised person (reported for 6% of fires). It is possible that there is in practice some blurring of the distinction between unattended person as a human factor and unattended equipment as a factor contributing to ignition.

Excluding confined fires, structural member or framing accounts for the largest share of items first ignited (17%), followed by cooking materials (9%).

Table 6 shows the leading items first ignited. Home heating fires begin with ignition of a wide variety of combustibles. Most items are installed rather than moveable combustibles or are flammable or combustible gas or liquid.

The large share for cooking materials seems inconsistent with the usual designed use of the equipment – most heating devices are designed and marketed solely for heating – but there is also a possible explanation in terms of data accuracy. The substantive interpretation is that there is considerable use of heating equipment for cooking purposes. The data interpretation is that many stovetop fires on ranges are being coded under heating stoves (or fireplace, insert or stove) because the word “stove” is part of the names for those codes and is not part of the name of any code for cooking equipment. In fact, nearly all home heating equipment fires starting with cooking materials specifically involved heating stoves, but that could support either interpretation, because heating stoves are the one type of heating equipment with a large, flat, horizontal hot surface suitable for cooking. (Some stoves are designed and promoted for dual use.) Note that a substantial share (10%) of fires reported as confined to cooking equipment involve heating stove, the only type of equipment other than designed cooking equipment to be cited for at least 1% of confined cooking fires.

There is better information available on the reverse phenomenon, which is the use of cooking equipment (specifically the range) for heating. A 2005 survey of assistance recipients for the Low Income Home Energy Association Program found that 24% said they use their stove or oven for heat, including 2% who did so almost every month.* Regionally, the percent using stove or

*National Energy Assistance Directors' Association. 2005 *National Energy Assistance Survey*: Final Report, September 2005. Accessed online at, http://www.neada.org/comm/surveys/NEADA_2005_National?Energy_Assistance_.pdf March 15, 2006.

oven for heat ranged from a low of 18% in the Midwest region to a high of 37% in the South region, where heating demand is lower and poverty is more prevalent. An earlier study found 15% of lower income households had used a gas stove or oven for heat at least once in the past year.*

Excluding confined fires, the leading area of origin for home heating fires is the kitchen (18%), followed by heating room or area (16%) and living room, family room or den (10%).

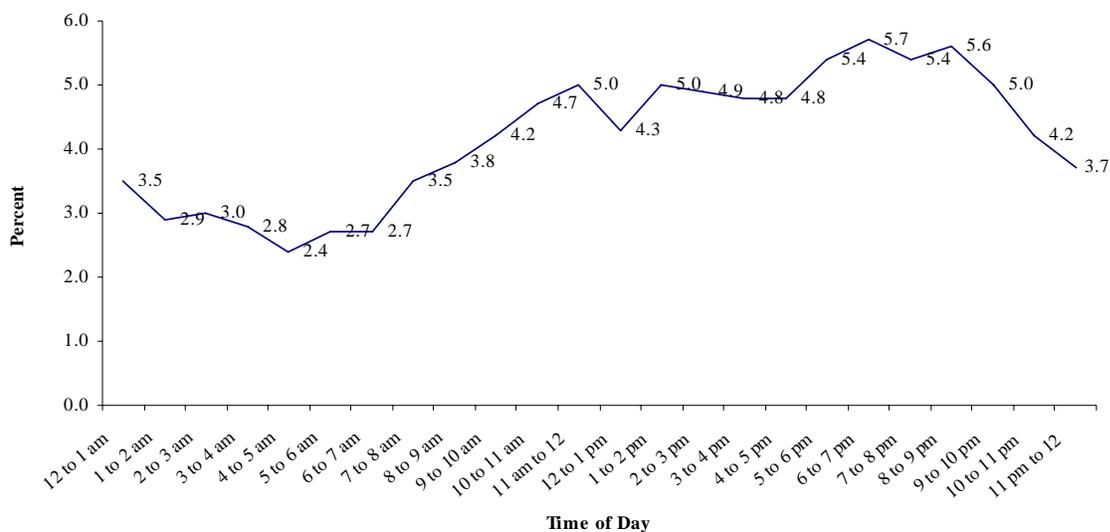
This looks like the heating stove as cooking equipment pattern again, and in fact, most home heating fires originating in the kitchen involve a heating stove. Table 7 shows leading areas of origin for home heating equipment fires that are not confined. More than half the deaths occur in fires starting in living room, family room, or den (37%), or bedroom (19%), consistent with the pattern for total home fire deaths. Because there is no information on which rooms are adjacent to the cited concealed spaces (e.g., wall assembly), it is likely that many of these deaths also occur in fires beginning in these primary rooms of the home.

Table 8 shows victim location relative to the point of fire origin. The majority of non-fatal victims are in the area of fire origin when fire begins, except for fireplace fires and central heating unit fires. The majority of fatal victims were considered to have been involved in the ignition, except for central heating unit fires, but the majority were also located outside the area of origin when fire began.

Home heating fires peak in the early evening.

Home heating fires are less common during midnight to 8:00 a.m. This could reflect the practice in many homes of turning down the heat overnight, allowing blankets and bedding to compensate.

Figure 3. Home Heating Fires, by Time of Day



Source: Data from NFIRS Version 5.0 and NFPA survey

*"Use of Unvented Residential Heating Appliances – 1988-1994," *MMWR*, December 26, 1997, 46, pp. 1221-1224, <http://www.cdc.gov/mmwr/preview/mmwrhtml/00050535.htm>.

Home heating fire deaths (2002-2005) show a younger age distribution than total home fire deaths (2002-2005).

Children under age 5 and older adults age 65 and older have the highest risk of fire death for home heating equipment fire deaths and for all fire deaths, but between these two groups, young children are highest for heating equipment and older adults are highest for all causes combined. Young adults are the highest risk age group (of those shown) for non-fatal injuries for home heating equipment fires and for all home fires. (See Table B.)

Table B. Age Distribution of Victims of Home Heating Fires

A. Civilian Deaths

Age Group	Percent Home Heating Fire Deaths	Percent All Fire Deaths	Percent Population
Under 5	15%	10%	7%
5-14	10%	8%	14%
15-34	14%	14%	28%
35-64	36%	40%	39%
65 and over	25%	27%	12%

B. Civilian Injuries

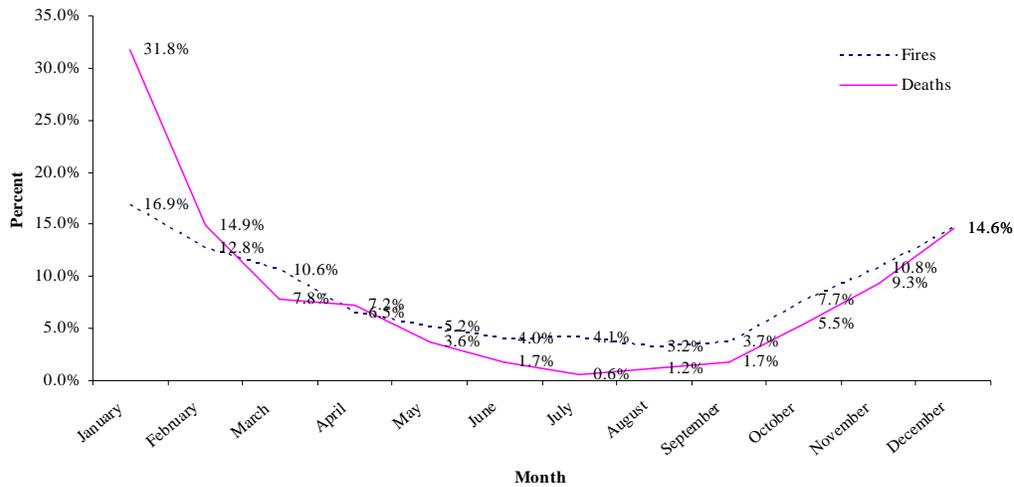
Age Group	Percent Home Heating Fire Injuries	Percent All Fire Injuries	Percent Population
Under 5	6%	5%	7%
5-14	6%	7%	14%
15-34	32%	34%	28%
35-64	42%	42%	39%
65 and over	14%	12%	12%

Source: Data from NFIRS Version 5.0 and NFPA survey

Fireplaces have the shortest season of usage, based on fire incidence.

If fires occurred evenly throughout the year, then every month would have 8.3% (1 in 12) of the fires. As Table 9 shows, water heater fires very nearly match that pattern, while all other heating equipment show some seasonality. For all heating equipment combined, the three peak months of December, January, and February account for 44% of the fires (compared to 25% if every block of three months had an equal share of fires). The December to February share is 47% for central heating units and 46% for space heaters, but it is 50% for fireplaces and 57% for chimneys and chimney connectors. As Figure 4 shows, the seasonality is even more pronounced for home heating fire deaths, with December through February accounting for 51% of those fire deaths.

Figure 4. Home Heating Fires and Fire Deaths, by Month



International comparisons provide additional perspective.

Home heating fires in Canada are comparable to those in the U.S. given that Canada’s population is roughly one-ninth that of the U.S. and Canada’s fire statistics do not isolate homes. (See Table 10A.) Associated deaths are lower in Canada than in the U.S.

Home heating fires in the United Kingdom (U.K.) and the U.S. differ by about the same ratio as do the populations in the two countries; the U.K. population is roughly one-fourth that of the U.S. (See Table 10B.) In recent years the newly distinguishable U.S. reported home heating fires confined to chimney and furnace have been increasing while confined chimney fires in the U.K. have been declining sharply. Associated death rates have long been lower in the U.K. than

in the U.S. but also declined sharply from 2001 to 2004 before rebounding somewhat in 2005, returning to the level of 2003.

Both Canada and the U.K. are achieving comparable or lower home heating fire experience despite having a colder average climate.

Heating fires in U.S. homes are much more common, relative to population, than in Japan structures, given that the population ratio is roughly 2-to-1 and the ratio of number of fires involving heating equipment is more than 30-to-1. (See Table 10.) Property damage ratios are closer (recently 10-to-1) but still show a smaller problem in Japan than in the U.S. (Also, note some mismatch in the categories in that Japan’s statistics include, and even focus on, a device called a bath heater, a specialized water heater rarely seen in the U.S., and include all structures, not just homes.) Heating fires have declined but associated deaths have showed no consistent trend.

Safe Heating Behaviors

- Select and install heating equipment for safety and effectiveness.

- Make sure your choice of heating equipment is permitted by law in your community. For example, kerosene heaters, chimineas, and firepits are not allowed in all communities.
 - Select a space heater that is rated by the manufacturer for the size space you intend to heat.
 - Make sure your heating equipment has the label showing that it is listed by a recognized testing laboratory.
 - Check for product recalls at www.cpsc.gov.
 - Install stationary space heating equipment, water heaters, or central heating equipment according to the local codes and manufacturer's instructions.
 - If possible, have a qualified professional install the equipment.
 - Make sure all fuel-burning equipment is vented to the outside. Make sure the venting for exhaust is kept clear and unobstructed. This includes removal of snow around the outlet to the outside.
 - For portable devices, open a window to ensure adequate venting.
 - For wood-burning equipment, purchase only units that comply with Rule 40 CFR Part 60 (AD-FRL1-3304-8) from the U.S. Environmental Protection Agency. This rule restricts the allowable rate of particulate matter production per minute in new wood-burning home heaters, and although the rule is designed to protect outdoor air quality, it also will have a positive effect on the potential creosote problem.
- Use heating equipment safely, in accordance with manufacturer's instructions.
 - For electric-powered equipment, plug power cords only into outlets with sufficient capacity and never into an extension cord. Do not position heaters near water or where there is danger of water being spilled, to avoid serious risk of electric shock.
 - For liquid-fueled equipment, always use the proper grade of the proper fuel (e.g., only the proper grade of kerosene in a kerosene heater), as specified by the manufacturer. Never use gasoline as a fuel in a device not approved for gasoline, or else the equipment may burn too hot, which could lead to equipment failure.
 - When refueling, allow the appliance to cool and refuel outside or in a well-ventilated area.
 - For wood-fueled equipment, burn only dry, well-seasoned wood that has been split, stacked, and allowed to dry for 12 months. Do not use green wood, trash, or any other combustibles that could burn unevenly, resulting in flare-ups, or burn incompletely, resulting in deposits of creosote, an oily, sticky, combustible byproduct of incomplete burning of wood. Artificial logs, typically made of sawdust and wax, can pose a flare-up risk or a sticky deposit risk in some situations; they should be used only in accordance with manufacturer's instructions and never in wood stoves. Use only newspaper and kindling wood to start a fire. Never use flammable liquids, such as lighter fluid, kerosene or gasoline to start a fire. And when adding wood to a working fire, wear only short, tight-fitting sleeves to reduce the risk of igniting your clothing if the fire flares up during the refueling.

- For wood-fueled equipment, allow ashes to cool before disposing. Dispose ashes in a metal container and keep the ash container at a safe distance from the home and any other nearby buildings.
 - Do not use or store flammable or combustible liquids near or in rooms with heaters, in order to avoid a vapor ignition and possible flash fire.
 - Open fires must always be closely attended. Have a sturdy screen on a fireplace. Keep fireplace doors and screens closed when such equipment is in use, to control the air flow and to keep fires from flaring up or embers from blowing outside the equipment.
 - Turn portable space heaters off when you go to bed or leave the room.
 - Call the local fire department or municipality before outdoor or open air burning. This includes campfires, brush fires, firepits, chimneys, and outdoor fireplaces.
 - Closely attend all outdoor fires.
 - Install and maintain carbon monoxide alarms to avoid risk of carbon monoxide poisoning.
- Keep adequate clearance between heating equipment and any combustibles.
 - Space heaters need space. Keep all things that can burn, such as paper, bedding or furniture, at least 3 feet away from heating equipment.
 - Combustibles include both fixed, installed combustibles and moveable contents and furnishings.
 - “Adequate” clearance is typically defined in applicable NFPA codes and standards. A clearance of 3 feet (roughly 1 meter, in metric terms) should be used if the size of the clearance is not set in codes and standards.
 - For central heating equipment, water heaters, fireplaces, stationary space heaters, and chimneys or chimney connectors, this means installing equipment with proper clearances, typically specified in an NFPA installation standards, to all fixed combustibles, including walls and structural elements.
 - For portable space heaters, this means placing equipment at least 3 feet away from all fixed combustibles.
 - For all heating equipment, this means placing moveable combustibles, such as furniture and bedding, at least 3 feet away from the equipment.
 - Supervise children when open fires and space heaters are being used and install a non-combustible screen around the appliance to prevent burns, which are even more common than fire injuries.
 - Chimineas and fire pits should be used only outside the home and located at least 10 feet away from the home or anything that can burn. They should never be used on or near a structure, wooden deck, wooden shed, or gazebo.
- Inspect and maintain heating equipment regularly for safety.
 - Maintain heating equipment and chimneys by having them cleaned and inspected annually by a qualified professional.

- For wood-fueled equipment, the annual inspection needs to address potential build-up of creosote in heating equipment and associated chimneys and chimney connectors.
 - For electric-powered equipment, inspect cords for cracking, fraying, loose connections, or broken plugs, and replace any damaged equipment before use.
 - The annual inspection can best be timed for just before the beginning of a new heating season. Inspection is also warranted if you move into a new home or begin use of your equipment after a period of non-use.
- Additional safety tips
 - Cooking appliances should not be used to heat a home.
 - For fuel assistance, contact the National Fuel Funds Network at 1-202-824-0660. Contact local officials to find out if local weatherization programs are available in the community.

**Table 1. U.S. Home Heating Fire Problem
Structure Fires Reported to U.S. Fire Departments**

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions of Current Dollars)	Direct Property Damage (in Millions of 2005 Dollars)
1980	232,300	1,020	3,550	\$766	\$1,818
1981	230,300	990	3,030	\$624	\$1,338
1982	235,100	1,190	3,480	\$851	\$1,721
1983	232,800	1,120	3,710	\$848	\$1,661
1984	212,400	870	2,880	\$786	\$1,476
1985	203,500	1,190	3,260	\$892	\$1,616
1986	169,500	810	2,710	\$700	\$1,249
1987	150,400	850	2,860	\$662	\$1,138
1988	141,400	920	3,440	\$824	\$1,361
1989	131,500	800	2,970	\$838	\$1,321
1990	99,600	810	2,470	\$749	\$1,121
1991	100,500	670	2,570	\$1,006*	\$1,442*
1992	98,900	650	2,570	\$721	\$1,005
1993	99,500	680	2,910	\$729	\$985
1994	87,300	620	2,290	\$738	\$973
1995	80,500	570	2,120	\$747	\$958
1996	75,300	810	2,070	\$843	\$1,050
1997	70,500	580	1,590	\$756	\$920
1998	58,000	500	1,720	\$664	\$796
1999	73,800 (42,700)	180 (180)	1,880 (1,880)	\$784 (\$729)	\$918 (\$854)
2000	67,700 (38,000)	840 (840)	1,890 (1,780)	\$857 (\$837)	\$973 (\$950)
2001	68,400 (33,400)	400 (400)	1,600 (1,510)	\$800 (\$783)	\$883 (\$864)
2002	70,000 (32,600)	660 (660)	1,480 (1,450)	\$1,231 (\$1,211)	\$1,337 (\$1,315)
2003	68,000 (26,800)	540 (540)	1,620 (1,490)	\$862 (\$841)	\$915 (\$894)
2004	66,400 (25,300)	680 (680)	1,570 (1,440)	\$842 (\$829)	\$872 (\$858)
2005	62,200 (25,700)	670 (670)	1,550 (1,430)	\$909 (\$886)	\$909 (\$886)
Total Change 1980-2005	-73%	-34%	-56%	+19%	-50%
Average Annual Change 1980-2005	-5%	-2%	-3%	+1%	-3%

* All 1991 home fire property damage figures are inflated by estimation problems related to the handling of the Oakland fire storm.

Note: Numbers in parentheses exclude confined fires. Confined fires are fires reported as confined to chimney, flue, fuel burner, or boiler and involving heating equipment; they are analyzed separately. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and civilian injuries are expressed to the nearest ten and property damage is rounded to the nearest million dollars. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. *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 adjustment to 2005 dollars is done using the consumer price index.

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2005) and from NFPA survey.

Table 2. Estimated U.S. Non-Fire Deaths Due to Carbon Monoxide Poisoning, by Type of Heating Device

Heating device	1980-1984 Average	1985-1989 Average	1990-1994 Average	1995-1999 Average
LP gas-fueled heating equipment	138	104	84	65
Natural gas-fueled heating equipment	64	61	50	47
Water heater (gas-fueled)	14	10	11	6
Liquid-fueled heating equipment	17	17	15	9
Solid-fueled heating equipment	14	5	17	6

Heating device	2000	2001	2002	2003	2004	2000-2004 Average
LP gas-fueled heating equipment	32	29	64	26	34	37
Natural gas-fueled heating equipment	41	32	28	32	41	35
Water heater (gas-fueled)	3	0	1	7	1	2
Liquid-fueled heating equipment	6	6	5	6	4	6
Solid-fueled heating equipment	2	6	5	4	4	4

Note: Data reanalyzed for 1990 on by CPSC in 1997; estimates prior to 1990 may not be comparable. Unspecified-gas devices and unknown-type heating devices have been proportionally allocated.

Source: Matthew V. Hnatov, "Non-Fire Carbon Monoxide Deaths Associated with the Use of Consumer Products," U.S. Consumer Product Safety Commission, www.cpsc.gov, August 8, 2007, Table 1. Additional information from previous reports in this series.

Table 3. Low and High Estimates of 2001 U.S. Usage of All Major Home Heating Devices

Device	Fuel or Power	Low Estimate (Millions of Households)	High Estimate (Millions of Households)
Central heating unit	Gas	56.8 natural gas/warm air-44.8 natural gas/piped steam or hot water-7.9 LP gas/warm air-3.4 natural gas/secondary use/warm air-0.7	60.5 Low estimate plus natural gas/secondary use/"other" device-0.7 LP gas/primary use/"other" device-0.5 natural gas/primary use/"other" device-0.5 LP gas/secondary use/all devices -2.0
Central heating unit	Liquid	7.7 fuel oil/warm air-3.3 fuel oil/piped steam or hot water-4.4	8.5 Low estimate plus fuel oil/primary use/ "other"device-0.3 fuel oil/secondary use/all devices-0.5
Central heating unit	Electricity	12.6 warm air-12.6	15.0 Low estimate plus primary use/ "other" device-1.8 secondary use/"other" device-0.6
Water heater	Gas	57.9	57.9
Water heater	Electricity	40.9	40.9
Space heater	Gas	8.0 natural gas /primary use/room heater -2.8 LP gas/primary use/room heater-1.1 natural gas/primary use/floor, wall, or pipeless furnace-3.1 natural gas/secondary use/room heater-1.0	15.0 Low estimate plus LP gas/secondary use/all devices-2.0 LP gas/primary use/"other" device-0.5 natural gas/secondary use/"other" device-0.7
Space heater	Liquid	3.2 kerosene heater/primary use-0.8 kerosene heater/secondary use-1.9 fuel oil /secondary use/all devices-0.5	3.5 Low estimate plus fuel oil/primary use/"other" device-0.3
Space heater	Solid	5.3 wood/primary use/all devices-2.0 wood/secondary use/wood stove-3.0 wood/secondary use/ "other" device-0.3	14.7 Low estimate plus secondary use/fireplace-9.4
Space heater	Electricity	20.3 portable heater/secondary use-11.8 built-in units/primary use-6.1 built-in unit/secondary use-2.4	25.1 Low estimate plus "other" device/primary use-1.8 "other" device/secondary use-0.6 "other" device/primary use-1.8 "other" device/secondary use-0.6

Source: 2001 Residential Energy Consumption Survey, Table 3.19a and Table 3.29a, from U.S. Department of Energy web site, <http://www.eia.doe.gov/emeu/recs>.

**Table 4. Home Heating Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Heat source too close to combustibles	7,600	(27%)	339	(53%)	567	(39%)	\$364	(39%)
Unclassified mechanical failure or malfunction	3,000	(11%)	29	(4%)	77	(5%)	\$88	(9%)
Equipment unattended	2,400	(9%)	16	(2%)	205	(14%)	\$80	(8%)
Installation deficiency	1,800	(7%)	23	(4%)	28	(2%)	\$54	(6%)
Leak or break	1,400	(5%)	32	(5%)	70	(5%)	\$80	(8%)
Unclassified electrical failure or malfunction	1,200	(5%)	21	(3%)	31	(2%)	\$34	(4%)
Failure to clean	1,200	(4%)	5	(1%)	23	(2%)	\$42	(4%)
Unclassified factor contributed to ignition	1,100	(4%)	11	(2%)	69	(5%)	\$31	(3%)
Unspecified short circuit arc	1,000	(4%)	0	(0%)	14	(1%)	\$19	(2%)
Unclassified misuse of material or product	1,000	(4%)	23	(4%)	76	(5%)	\$22	(2%)
Worn out	800	(3%)	0	(0%)	23	(2%)	\$23	(2%)
Unclassified operational deficiency	800	(3%)	16	(2%)	24	(2%)	\$31	(3%)
Construction deficiency	700	(3%)	5	(1%)	11	(1%)	\$25	(3%)
Unintentionally turned on or not turned off	700	(2%)	0	(0%)	35	(2%)	\$13	(1%)
Abandoned or discarded material or product	600	(2%)	0	(0%)	51	(4%)	\$11	(1%)
Short circuit arc from defective or worn insulation	500	(2%)	5	(1%)	8	(1%)	\$6	(1%)
Equipment not being operated properly	500	(2%)	22	(3%)	42	(3%)	\$13	(1%)
Unclassified design, manufacturing, or installation deficiency	400	(2%)	0	(0%)	8	(1%)	\$21	(2%)
Flammable liquid or gas spilled	400	(1%)	22	(3%)	65	(4%)	\$11	(1%)
Automatic control failure	400	(1%)	5	(1%)	11	(1%)	\$10	(1%)
Arc or spark from operating equipment	400	(1%)	37	(6%)	6	(0%)	\$8	(1%)
Improper container or storage	300	(1%)	0	(0%)	30	(2%)	\$7	(1%)
Design deficiency	300	(1%)	5	(1%)	3	(0%)	\$10	(1%)
Water caused short circuit arc	200	(1%)	0	(0%)	0	(0%)	\$1	(0%)
Improper fueling technique	200	(1%)	54	(8%)	32	(2%)	\$10	(1%)
Equipment overloaded	200	(1%)	6	(1%)	8	(1%)	\$5	(1%)
Unclassified fire spread or control	200	(1%)	5	(1%)	11	(1%)	\$12	(1%)
Equipment used for not intended purpose	200	(1%)	16	(2%)	11	(1%)	\$5	(1%)
Collision, knockdown, or overturn	200	(1%)	32	(5%)	14	(1%)	\$5	(1%)

**Table 4. Home Heating Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)**

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Short circuit arc from mechanical damage	100	(1%)	0	(0%)	3	(0%)	\$3	(0%)
Other known factor	1,100	(4%)	53	(8%)	69	(5%)	\$42	(5%)
Total fires excluding confined fires	27,600	(100%)	637	(100%)	1,453	(100%)	\$942	(100%)
Total factor entries	30,800	(112%)	781	(123%)	1,624	(112%)	\$1,086	(115%)

Note: Multiple entries are allowed, resulting in more factor entries than fires. Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5. and NFPA survey.

**Table 5. Home Heating Fires, by Human Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

Human Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unattended or unsupervised person	1,800	(7%)	25	(4%)	106	(7%)	\$54	(6%)
Asleep	1,100	(4%)	175	(27%)	155	(11%)	\$52	(6%)
Age was a factor	400	(1%)	47	(7%)	77	(5%)	\$18	(2%)
Possibly impaired by alcohol or drugs	200	(1%)	74	(12%)	21	(1%)	\$10	(1%)
Multiple persons involved	200	(1%)	17	(3%)	19	(1%)	\$30	(3%)
Possibly mentally disabled	100	(0%)	14	(2%)	17	(1%)	\$3	(0%)
Physically disabled	100	(0%)	48	(7%)	22	(2%)	\$5	(1%)
None	24,000	(87%)	316	(50%)	1,090	(75%)	\$788	(84%)
Total fires excluding confined fires	27,600	(100%)	637	(100%)	1,453	(100%)	\$942	(100%)
Total factor entries	27,400	(101%)	715	(112%)	1,508	(104%)	\$961	(102%)

Note: Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with human factor contributing to ignition listed as unknown, blank or not reported have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Table 6. Home Heating Fires, by Item First Ignited
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Structural member or framing	4,600	(17%)	89	(14%)	109	(8%)	\$234	(25%)
Cooking materials	2,600	(9%)	0	(0%)	237	(16%)	\$35	(4%)
Flammable or combustible gas or liquid	2,300	(9%)	119	(19%)	283	(19%)	\$82	(9%)
Wire or cable insulation	2,200	(8%)	10	(2%)	16	(1%)	\$22	(2%)
Interior wall covering	1,500	(5%)	30	(5%)	70	(5%)	\$57	(6%)
Unclassified item	1,400	(5%)	31	(5%)	57	(4%)	\$29	(3%)
Floor covering	1,300	(5%)	52	(8%)	57	(4%)	\$34	(4%)
Clothing	1,200	(4%)	25	(4%)	136	(9%)	\$33	(3%)
Unclassified structural component or finish	1,100	(4%)	15	(2%)	31	(2%)	\$42	(4%)
Insulation within structural area	800	(3%)	0	(0%)	23	(2%)	\$18	(2%)
Appliance housing	800	(3%)	5	(1%)	35	(2%)	\$7	(1%)
Mattress or bedding	700	(3%)	60	(9%)	61	(4%)	\$33	(3%)
Exterior wall covering or finish	600	(2%)	10	(2%)	10	(1%)	\$15	(2%)
Cabinetry	500	(2%)	5	(1%)	26	(2%)	\$94	(10%)
Box or bag	500	(2%)	16	(3%)	30	(2%)	\$16	(2%)
Upholstered furniture	500	(2%)	68	(11%)	44	(3%)	\$28	(3%)
Interior ceiling covering or finish	400	(2%)	14	(2%)	10	(1%)	\$22	(2%)
Unclassified soft goods	400	(1%)	14	(2%)	8	(1%)	\$13	(1%)
Multiple items first ignited	400	(1%)	15	(2%)	26	(2%)	\$32	(3%)
Household utensil	300	(1%)	0	(0%)	13	(1%)	\$4	(0%)
Papers	300	(1%)	0	(0%)	10	(1%)	\$13	(1%)
Unclassified furniture or utensil	300	(1%)	25	(4%)	49	(3%)	\$8	(1%)
Linen other than bedding	300	(1%)	0	(0%)	14	(1%)	\$4	(0%)
Dust, fiber, or lint	300	(1%)	0	(0%)	5	(0%)	\$2	(0%)
Unclassified organic materials	200	(1%)	0	(0%)	11	(1%)	\$6	(1%)
Exterior roof covering or finish	200	(1%)	0	(0%)	2	(0%)	\$11	(1%)
Curtains, blinds, or drapery	200	(1%)	14	(2%)	12	(1%)	\$7	(1%)
Trash or waste	200	(1%)	0	(0%)	0	(0%)	\$3	(0%)
Film or residue	200	(1%)	5	(1%)	8	(1%)	\$3	(0%)
Other known item	1,300	(5%)	15	(2%)	59	(4%)	\$35	(4%)
Total	27,600	(100%)	637	(100%)	1,453	(100%)	\$942	(100%)

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Table 7. Home Heating Fires, by Area of Origin
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Kitchen	4,800	(18%)	59	(9%)	360	(25%)	\$74	(8%)
Heating room or area	4,400	(16%)	39	(6%)	172	(12%)	\$102	(11%)
Living room, den, or family room	2,800	(10%)	237	(37%)	201	(14%)	\$188	(20%)
Bedroom	1,900	(7%)	120	(19%)	168	(12%)	\$66	(7%)
Wall assembly	1,700	(6%)	27	(4%)	31	(2%)	\$67	(7%)
Substructure area or crawl space	1,300	(5%)	8	(1%)	57	(4%)	\$46	(5%)
Laundry area	1,200	(4%)	12	(2%)	77	(5%)	\$34	(4%)
Unclassified function area	1,200	(4%)	72	(11%)	110	(8%)	\$46	(5%)
Attic or other space above top story	1,100	(4%)	0	(0%)	13	(1%)	\$54	(6%)
Garage	900	(3%)	4	(1%)	59	(4%)	\$46	(5%)
Bathroom	800	(3%)	8	(1%)	44	(3%)	\$21	(2%)
Closet	700	(3%)	0	(0%)	18	(1%)	\$12	(1%)
Duct	700	(3%)	0	(0%)	28	(2%)	\$19	(2%)
Ceiling/floor assembly or space between stories	700	(2%)	4	(1%)	13	(1%)	\$19	(2%)
Unclassified structural area	600	(2%)	4	(1%)	4	(0%)	\$30	(3%)
Unclassified area of origin	300	(1%)	11	(2%)	13	(1%)	\$9	(1%)
Exterior wall surface	300	(1%)	0	(0%)	2	(0%)	\$8	(1%)
Unclassified storage area	300	(1%)	0	(0%)	11	(1%)	\$9	(1%)
Storage room	200	(1%)	0	(0%)	9	(1%)	\$6	(1%)
Exterior roof surface	200	(1%)	0	(0%)	2	(0%)	\$10	(1%)
Unclassified equipment or service area	200	(1%)	0	(0%)	2	(0%)	\$6	(1%)
Other known area of origin	1,200	(4%)	31	(5%)	59	(4%)	\$69	(7%)
Total	27,600	(100%)	637	(100%)	1,453	(100%)	\$942	(100%)

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Table 8. Home Heating Fire Deaths and Injuries, by Victim Location at Ignition and Major Equipment Group
Percentage of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

A. Civilian Deaths

Victim Location at Ignition	All Heating Equipment	Central Heating	Water Heater	Space Heater	Chimney or Chimney Connector
In area of origin and not involved	19%	27%	10%	22%	0%
Not in area of origin and not involved	28%	40%	30%	25%	27%
Not in area of origin but involved	24%	14%	11%	27%	48%
In area of origin and involved	29%	19%	49%	26%	24%
In area of origin	48%	46%	59%	48%	24%
Not in area of origin	52%	54%	41%	52%	76%
Involved in ignition	53%	33%	60%	53%	73%
Not involved in ignition	47%	67%	40%	47%	27%
Total	100%	100%	100%	100%	100%

B. Civilian Injuries

Victim Location at Ignition	All Heating Equipment	Central Heating	Water Heater	Space Heater	Fireplace	Chimney or Chimney Connector
In area of origin and not involved	27%	20%	23%	29%	49%	40%
Not in area of origin and not involved	22%	38%	26%	18%	51%	15%
Not in area of origin but involved	12%	14%	8%	13%	0%	15%
In area of origin and involved	39%	28%	44%	39%	0%	31%
In area of origin	66%	48%	67%	68%	49%	71%
Not in area of origin	34%	52%	33%	32%	51%	29%
Involved in ignition	51%	42%	51%	52%	0%	45%
Not involved in ignition	49%	58%	49%	48%	100%	55%
Total	100%	100%	100%	100%	100%	100%

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Home fire casualties involving indicated equipment with victim location unknown have been proportionally allocated. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Table 9. Home Heating Fires, by Month and Major Equipment Group
Percentage of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

	All Heating Equipment	Central Heating	Water Heater	Space Heater	Fireplace	Chimney or Chimney Connector
January	16.9%	16.9%	9.6%	18.0%	22.2%	25.2%
February	12.8%	14.0%	8.7%	13.1%	13.9%	16.9%
March	10.6%	11.3%	8.5%	11.4%	8.3%	10.5%
April	6.5%	5.5%	8.2%	6.4%	4.5%	5.5%
May	5.2%	5.0%	9.4%	4.3%	1.8%	2.4%
June	4.0%	2.1%	8.0%	3.6%	1.1%	0.7%
July	4.1%	2.4%	9.2%	3.3%	0.7%	0.1%
August	3.2%	1.0%	6.4%	3.1%	0.7%	0.5%
September	3.7%	2.4%	7.0%	3.3%	1.7%	0.9%
October	7.7%	9.6%	8.4%	7.1%	7.0%	6.0%
November	10.8%	13.4%	8.0%	11.1%	15.2%	13.8%
December	14.6%	16.4%	8.5%	15.3%	22.8%	17.6%

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Table 10. Home Heating Fire Problem in Other Countries

A. Canada, 1990-1999, not limited to homes

Year	Fires	Civilian Deaths	Civilian Injuries	<u>Direct Property Damage (in Millions)</u>		
				Current Canada Dollars	In U.S. Dollars	In 2005 U.S. Dollars
1990	7,900	50	200	\$152	\$130	\$195
1991	7,900	30	210	\$179	\$156	\$224
1992	8,100	40	210	\$171	\$141	\$197
1993	7,300	40	130	\$137	\$106	\$143
1994	7,600	30	190	\$175	\$128	\$169
1995	6,800	50	190	\$140	\$102	\$131
1996	6,900	40	240	\$155	\$113	\$141
1997	4,900	30	110	\$115	\$83	\$101
1998	6,700	30	130	\$155	\$104	\$125
1999	6,400	20	90	\$138	\$93	\$109
2000	6,600	30	170	\$141	\$95	\$108
2001	6,800	20	130	\$138	\$89	\$98
2002	7,500	30	140	\$180	\$115	\$125

B. U.K., 1990-2005, dwellings (corresponds to U.S. homes); confined chimney fires not limited to homes

Year	<u>Fires</u>			<u>Civilian Deaths</u>		<u>Civilian Injuries</u>		
	Space heating	Central and water heating	Total heating	Confined chimney fires without casualties	Total heating*	Space heating	Central and water heating	Total heating
1990	3,500	1,200	4,700	33,100	92	880	80	960
1991	3,800	1,200	5,000	39,000	98	840	90	930
1992	3,400	1,100	4,600	35,400	84	830	100	930
1993	3,100	1,100	4,200	34,900	94	750	80	830
1994	3,100	1,600	4,800	29,300	75	800	160	960
1995	3,000	1,600	4,600	25,500	91	780	180	960
1996	3,300	1,500	4,900	28,600	61	880	130	1,010
1997	2,600	1,700	4,300	22,100	63	680	160	840
1998	2,600	1,400	4,000	18,900	61	640	130	770
1999	2,400	1,400	3,900	16,300	57	620	140	760
2000	2,400	1,400	3,800	15,500	59	590	140	740
2001	2,300	1,400	3,800	16,200	65	600	150	750
2002	1,900	1,300	3,300	12,200	43	510	110	620
2003	1,600	1,300	2,900	11,600	39	430	120	550
2004	1,700	1,200	2,900	9,800	17	370	120	500
2005	1,700	1,300	3,000	9,700	36	370	120	490

*Nearly all heating fire deaths in the U.K. involve space heating; there are usually one or two deaths per year involving central or water heating, so the breakdown of deaths is not shown.

Note: Statistics include a proportional share of fires with undetermined cause. U.K. damage statistics are not available. U.K. statistics in and after 1994 include some incidents (e.g., heat or smoke damage only) that were not included previously and are not included in U.S. statistics. Sums may not equal totals because of rounding.

Source: *Annual Report – Fire Losses in Canada; Fire Statistics – United Kingdom*. Foreign exchange rates from Organisation for Economic Co-operation and Development and consumer price index used to adjust for inflation.

Table 10. Home Heating Fire Problem in Other Countries (Continued)

C. Japan, 1990-2004, all structures

Year	Fires			Deaths			Property			Total in Millions of U.S. \$
	Bath furnace	Other heating equipment	Total heating	Bath furnace	Other heating equipment	Total heating	Bath furnace (billion yen)	Other heating equipment (billion yen)	Total heating (billion yen)	
1990	1,100	2,300	3,400	10	130	140	2.1	10.9	13.1	\$90
1991	1,100	2,400	3,500	10	120	130	2.0	12.5	14.5	\$107
1992	900	2,200	3,100	10	150	170	1.8	12.0	13.8	\$109
1993	900	2,300	3,200	10	140	150	2.1	11.7	13.8	\$124
1994	800	2,100	2,900	10	140	160	1.8	11.9	13.7	\$134
1995	900	2,100	3,000	10	150	160	2.0	10.0	12.9	\$137
1996	800	2,100	2,900	10	150	160	2.0	11.5	13.5	\$124
1997	700	1,900	2,500	10	160	170	1.5	10.3	11.9	\$98
1998	600	1,800	2,400	10	130	140	1.2	9.6	10.7	\$82
1999	600	2,000	2,600	10	160	170	1.4	10.0	11.4	\$100
2000	600	1,800	2,400	10	150	160	1.1	9.5	10.6	\$98
2001	500	1,900	2,500	10	140	140	1.2	9.9	11.1	\$91
2002	500	1,800	2,300	10	140	140	1.2	8.8	10.0	\$80
2003	500	1,900	2,400	10	160	170	1.0	9.4	10.4	\$90
2004	400	1,700	2,100	NA	NA	NA	1.0	8.0	9.0	\$83

NA – Not available because analysis of 2004 fire deaths was still under review.

Note: Statistics include a proportional share of fires with undetermined cause. Sums may not equal totals because of rounding. Japanese injury statistics are not available by cause. A bath furnace is a small local water heater that only heats water for a bath.

Source: Analyses of Japanese fire experience data by Dr. Ai Sekizawa, NRIFD; foreign exchange rates from Organisation for Economic Co-operation and Development; and consumer price index used to adjust for inflation.

Space Heaters

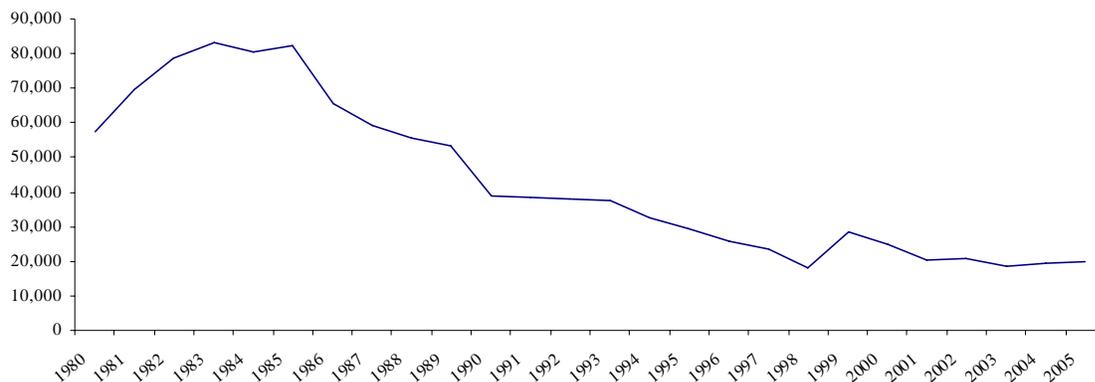
In 2005, an estimated 19,700 reported home structure fires involving stationary or portable space heaters resulted in 490 civilian deaths, 980 civilian injuries, and \$518 million in direct property damage.

From 1980 to 2005, estimated fires declined by 66% (and by 76% from the peak in 1983). Civilian deaths was nearly unchanged from 1980 to 2005 (but decreased by 40% from the peak in 1985). Civilian injuries declined by 18% from 1980 to 2005 (and by 42% from the peak in 1983). And direct property damage adjusted for inflation declined by 12% from 1980 to 2005 (and by 27 % from the peak in 1982).

Space heaters can be portable or stationary (fixed), can have any type of fuel or power, and can involve any heating technology. NFIRS categorizes heating technologies as follows:

- Heating stoves (including wood stoves);
- Heaters (including portable kerosene heaters and portable electric heaters); oil-filled heaters and catalytic heaters can be distinguished, but because most reported home heater fires involve heaters other than oil-filled and catalytic, the three types of heaters are analyzed together everywhere else in this report;
- Local furnaces;
- Fireplace inserts.

Home Fires Involving Portable or Stationary (Fixed) Space Heaters, 1980-2005, by Year



Note: Confined fires are fires reported as confined to chimney, flue, fuel burner, or boiler and involving heating equipment; they are analyzed separately but are included above. 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. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. *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.*

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2005) and from NFPA survey.

Half (53%) of home space heater fires in 2002-2005, excluding fires reported as confined fires, involved electric-powered equipment.

The electric space heater share is even larger for civilian injuries (60%) but not for civilian deaths (37%) or direct property damage (47%).

Comparative Risk of Central and Space Heating Equipment

A. When Secondary Uses of Equipment Are Included as User Households

Risk Measure	Space Heating	Central Heating	How Much Higher Is Space Heating Risk Than Central Heating Risk?
Fires (per million user households)	269	23	7 times
Civilian deaths (per million user households)	9.5	0.2	36 times
Civilian injuries (per million user households)	18.0	1.3	12 times
Direct property damage (per user household)	\$10.1	\$1.1	8 times

B. When Secondary Uses of Equipment Are Not Included as User Households

Risk Measure	Space Heating	Central Heating	How Much Higher Is Space Heating Risk Than Central Heating Risk?
Fires (per million user household)	400	25	12 times
Civilian deaths (per million user households)	14.2	0.3	58 times
Civilian injuries (per million user households)	26.7	1.5	20 5imes
Direct property damage (per user household)	\$15.0	\$1.2	14 times

Nearly half (47%) of home space heater fires, excluding fires reported as confined fires, involve devices coded as heating stoves.

Heaters including oil-filled or catalytic heaters accounted for the largest share of associated civilian deaths (52%) and of direct property damage (47%). Heating stoves and heaters have the same share of civilian injuries (44%).

Six heating devices are grouped in this section on space heaters – heating stoves (6,800 reported non-confined fires per year in 2002-2005), heaters excluding catalytic or oil-filled (3,800 fires per year), local furnaces (2,000 fires per year), fireplace inserts (900 fires per year), oil-filled heaters (800 fires per year), and catalytic heaters (300 fires per year).

Heating stoves. The principal types of heating stoves for homes are gas-fueled and solid (wood)-fueled, but 58% of home heating stove non-confined fires are electric-powered. Many of these heating stoves are advertised for use in heating and cooking, but electric-powered stoves are primarily part of electric ranges for cooking only. This suggests many fires coded as electric-powered heating stoves are actually electric-powered ranges with fire beginning on the stovetop.

Solid-fueled heating stoves accounted for 22% of home heating stove fires and 69% of associated deaths. The fuel is nearly always wood, which outnumbers coal nearly 100-to-1.

Gas-fueled heating stoves accounted for 18% of home heating stove fires and 20% of associated deaths. The fuel is usually natural gas, which outnumbers LP gas by 6-1/2-to-1.

Liquid-fueled heating stoves accounted for 1% of home heating stove fires and 7% of associated deaths. The fuel is usually kerosene, diesel fuel, or number 1 or 2 fuel oil, which collectively outnumbered number 4, 5, or 6 fuel oil by 5-to-1. Some of these fires may be miscoded portable kerosene heater fires, but there are too few of them for such miscodings to have much of an effect.

Heaters. Reported non-confined home fires starting with heaters, including oil-filled or catalytic heaters, break down as 64% electric-powered, 19% gas-fueled (which mostly involved LP gas by 4-to-1 over natural gas), 16% liquid-fueled (which nearly all involve kerosene, diesel fuel, or number 1 or 2 fuel oil), and 1% solid-fueled.

Oil-filled heaters use oil as a heating medium but are actually electric-powered. However, reported non-confined home fires starting with oil-filled heaters break down roughly 2-to-1 as kerosene (or related liquid)-fueled vs. electric-powered. This suggests that most reported oil-filled heaters are really miscoded portable kerosene heaters. That possibility combined with the fact that very few fires are reported as catalytic heaters support the decision here to analyze fuel and power for all three heater types combined.

The rules for safe heating include emphasis on the importance of using the right grade of the right fuel for the device being used for heating. Gasoline should never be used to fuel a portable kerosene heater, but it should be noted that there are portable heaters available whose manufacturer's instructions permit use of some grades of gasoline.

This means space heaters had a risk of fire 7-12 times higher than that for central heating equipment, a 36-58 times higher risk of death, a 12-20 times higher risk of injury, and an 8-14 times higher risk of direct property damage.

Heaters involved in reported non-confined home fires split as 67% portable vs. 33% stationary. All other space heaters involved in reported non-confined home fires split as 90% stationary vs. 10% portable, with fireplace inserts being 95% stationary, local furnaces 93% stationary, and heating stoves 89% stationary.

Local furnaces. Reported non-confined home fires starting with local furnaces break down as 63% gas-fueled, 30% electric-powered, 7% liquid-fueled, and 1% solid-fueled.

Fireplace inserts. Reported non-confined home fires starting with fireplace inserts break down as 75% solid-fueled (all wood), 18% gas (which divides as 10-to-1 natural gas over LP gas), and 7% electric-powered.

Space heaters collectively pose a much higher risk of fire and associated losses, relative to usage, than does central heating of all types combined.

Comparisons of different fuel or power options within space heating equipment do not show any types to be clearly better or clearly worse. Solid-fueled devices tend to have the lowest risks among space heaters, but these figures do not reflect any chimney or chimney connector fires, and these related venting fires are far more a factor, for all types of loss, for solid-fueled equipment than for other devices.

Heat source too close to combustibles was cited in one-third (32%) of home space heater fires, three-fifths (62%) of associated deaths, two-fifths (40%) of associated injuries, and half (49%) of direct property damage.

Equipment unattended ranks second with one-sixth (17%) of total home space heater fires. Factors that feature prominently for some types of space heaters more than others include failure to clean (10% for solid-fueled devices but at most 2% for any other device group), installation deficiency (20% for solid-fueled devices but at most 4% for any other device group), and flammable liquid or gas spill and improper fueling technique (12% and 11%, respectively, for liquid-fueled devices but at most 1% for any other device group).

The leading item first ignited in home space heater fires is cooking materials (18%).

Nearly all of the cooking material fires specifically involved heating stoves. These fires are an unknown combination of heating stoves used for cooking and cooking stovetop fires miscoded under the only equipment code with “stove” in its name.

Items first ignited with large shares of fires for more specific equipment groups include cooking materials (30% of electric space heater fires), structural member or framing (33% for solid-fueled space heater fires), and flammable or combustible liquid or gas (33% for liquid-fueled space heater fires).

The leading area of origin for home space heater fires is the kitchen (32%).

The kitchen share is probably increased by the cooking-related fires, where there are questions, as just discussed, about the circumstances driving the statistics. Most combined home space heater fire deaths resulted from fires that began in living rooms, family rooms, or dens (42%); or bedrooms (22%). Bedrooms were the leading area of origin for home fire deaths for electric-powered (portable or stationary) space heaters. Kitchens were the leading area of origin for home fire deaths for gas-fueled space heaters.

Safe Heating Behaviors

- Select and install heating equipment for safety and effectiveness.
 - Make sure your choice of heating equipment is permitted by law in your community. For example, kerosene heaters, chimineas, and firepits are not allowed in all communities.
 - Select a space heater that is rated by the manufacturer for the size space you intend to heat.
 - Make sure your heating equipment has the label showing that it is listed by a recognized testing laboratory.
 - Check for product recalls at www.cpsc.gov.
 - Install stationary space heating equipment according to the local codes and manufacturer's instructions.
 - If possible, have a qualified professional install the equipment.
 - Make sure all fuel-burning equipment is vented to the outside. Make sure the venting for exhaust is kept clear and unobstructed. This includes removal of snow around the outlet to the outside.
 - For wood-burning equipment, purchase only units that comply with Rule 40 CFR Part 60 (AD-FRLI-3304-8) from the U.S. Environmental Protection Agency. This rule restricts the allowable rate of particular matter production per minute in new wood-burning home heaters, and although the rule is designed to protect outdoor air quality, it also will have a positive effect on the potential creosote problem.

- Use heating equipment safely, in accordance with manufacturer's instructions.
 - For electric-powered equipment, plug power cords only into outlets with sufficient capacity and never into an extension cord. Do not position heaters near water or where there is danger of water being spilled, to avoid serious risk of electric shock.
 - For liquid-fueled equipment, always use the proper grade of the proper fuel (e.g., only the proper grade of kerosene in a kerosene heater), as specified by the manufacturer. Never use gasoline as a fuel in a device not approved for gasoline, or else the equipment may burn too hot, which could lead to equipment failure.
 - When refueling, allow the appliance to cool and refuel outside or in a well-ventilated area.
 - For wood-fueled equipment, burn only dry, well-seasoned wood that has been split, stacked, and allowed to dry for 12 months. Do not use green wood, trash, or any other combustibles that could burn unevenly, resulting in flare-ups, or burn incompletely, resulting in deposits of creosote, an oily, sticky, combustible byproduct of incomplete burning of wood. Artificial logs, typically made of sawdust and wax, can pose a flare-up risk or a sticky deposit risk in some situations; they should be used only in accordance with manufacturer's instructions and never in wood stoves. Use only newspaper and kindling wood to start a fire. Never use flammable liquids, such as lighter

- fluid, kerosene or gasoline to start a fire. And when adding wood to a working fire, wear only short, tight-fitting sleeves to reduce the risk of igniting your clothing if the fire flares up during the refueling.
- For wood-fueled equipment, allow ashes to cool before disposing. Dispose ashes in a metal container and keep the ash container at a safe distance from the home and any other nearby buildings.
 - Do not use or store flammable or combustible liquids near or in rooms with heaters, in order to avoid a vapor ignition and possible flash fire.
 - Open fires must always be closely attended. Have a sturdy screen on a fireplace. Keep fireplace doors and screens closed when such equipment is in use, to control the air flow and to keep fires from flaring up or embers from blowing outside the equipment.
 - Turn portable space heaters off when you go to bed or leave the room.
 - Call the local fire department or municipality before outdoor or open air burning. This includes campfires, brush fires, firepits, chimneys, and outdoor fireplaces.
 - Install and maintain carbon monoxide alarms to avoid risk of carbon monoxide poisoning.
- Keep adequate clearance between heating equipment and any combustibles.
 - Space heaters need space. Keep all things that can burn, such as paper, bedding or furniture, at least 3 feet away from heating equipment.
 - Combustibles include both fixed, installed combustibles and moveable contents and furnishings.
 - “Adequate” clearance is typically defined in applicable NFPA codes and standards. A clearance of 3 feet (roughly 1 meter, in metric terms) should be used if the size of the clearance is not set in codes and standards.
 - For central heating equipment, water heaters, fireplaces, stationary space heaters, and chimneys or chimney connectors, this means installing equipment with proper clearances, typically specified in an NFPA installation standards, to all fixed combustibles, including walls and structural elements.
 - For portable space heaters, this means placing equipment at least 3 feet away from all fixed combustibles.
 - For all heating equipment, this means placing moveable combustibles, such as furniture and bedding, at least 3 feet away from the equipment.
 - Supervise children when open fires and space heaters are being used and install a non-combustible screen around the appliance to prevent burns, which are even more common than fire injuries.
 - Chimineas and fire pits should be used only outside the home and located at least 10 feet away from the home or anything that can burn. They should never be used on or near a structure, wooden deck, wooden shed, or gazebo.
 - Inspect and maintain heating equipment regularly for safety.
 - Maintain heating equipment and chimneys by having them cleaned and inspected annually by a qualified professional.

- For wood-fueled equipment, the annual inspection needs to address potential build-up of creosote in heating equipment and associated chimneys and chimney connectors.
 - For electric-powered equipment, inspect cords for cracking, fraying, loose connections, or broken plugs, and replace any damaged equipment before use.
 - The annual inspection can best be timed for just before the beginning of a new heating season. Inspection is also warranted if you move into a new home or begin use of your equipment after a period of non-use.
- Additional safety tips
 - Cooking appliances should not be used to heat a home.
 - For fuel assistance, contact the National Fuel Funds Network at 1-202-824-0660. Contact local officials to find out if local weatherization programs are available in the community.

**Home Fires Involving Portable or Stationary Space Heaters, by Year
Structure Fires Reported to U.S. Fire Departments**

Year	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)			
							As Reported		In 2005 Dollars	
1980	57,300		480		1,190		\$249		\$591	
1981	69,700		490		1,110		\$201		\$430	
1982	78,500		650		1,410		\$352		\$713	
1983	83,400		800		1,690		\$321		\$628	
1984	80,700		550		1,270		\$307		\$576	
1985	82,400		810		1,510		\$366		\$664	
1986	65,700		570		1,250		\$279		\$498	
1987	59,400		580		1,290		\$260		\$447	
1988	55,700		680		1,590		\$330		\$545	
1989	53,200		630		1,670		\$347		\$547	
1990	39,000		520		1,170		\$272		\$407	
1991	38,400		500		1,070		\$361*		\$517*	
1992	38,200		400		1,260		\$312		\$434	
1993	37,700		520		1,530		\$290		\$392	
1994	32,700		450		1,050		\$317		\$418	
1995	29,400		380		1,000		\$290		\$372	
1996	25,900		540		1,010		\$348		\$433	
1997	23,300		410		760		\$283		\$344	
1998	17,900		320		790		\$247		\$297	
1999	28,500	(21,500)	180	(180)	1,570	(1,570)	\$335	(\$331)	\$393	(\$388)
2000	25,000	(20,000)	500	(500)	1,180	(1,120)	\$435	(\$433)	\$494	(\$492)
2001	20,200	(16,600)	290	(290)	1,200	(1,180)	\$404	(\$403)	\$446	(\$444)
2002	20,600	(16,700)	590	(590)	1,080	(1,080)	\$844	(\$842)	\$916	(\$914)
2003	18,500	(13,900)	390	(390)	930	(920)	\$441	(\$439)	\$468	(\$467)
2004	19,500	(13,600)	620	(620)	1,020	(1,000)	\$420	(\$418)	\$435	(\$433)
2005	19,700	(14,600)	490	(490)	980	(930)	\$518	(\$516)	\$518	(\$516)

*All 1991 home fire property damage figures are inflated by estimation problems related to the handling of the Oakland fire storm.

Note: Numbers in parentheses exclude confined fires. Confined fires are fires reported as confined to chimney, flue, fuel burner, or boiler and involving heating equipment; they are analyzed separately. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and civilian injuries are expressed to the nearest ten and direct property damage is rounded to the nearest million dollars. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. *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 adjustment to 2005 dollars is done using the consumer price index.

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2005) and from NFPA survey.

**Home Fires Involving Portable or Stationary Space Heaters, by Type of Fuel or Power
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

A. Fires

Fuel or Power	Heating stove		Local furnace		Fireplace insert		Heater (including catalytic and oil-filled)		All space heaters	
Gas	1,300	(18%)	1,300	(63%)	200	(18%)	900	(19%)	3,600	(25%)
Liquid	100	(1%)	100	(7%)	0	(0%)	800	(16%)	1,000	(7%)
Solid	1,500	(22%)	0	(1%)	700	(75%)	0	(1%)	2,300	(15%)
Electric	4,000	(58%)	600	(30%)	100	(7%)	3,100	(64%)	7,800	(53%)
Total	6,800	(100%)	2,100	(100%)	900	(100%)	4,900	(100%)	14,700	(100%)

B. Civilian Deaths

Fuel or Power	Heating stove		Local furnace		Fireplace insert		Heater (including catalytic and oil-filled)		All space heaters	
Gas	36	(20%)	35	(83%)	0	(0%)	20	(7%)	90	(17%)
Liquid	12	(7%)	4	(9%)	0	(0%)	77	(28%)	93	(18%)
Solid	124	(69%)	0	(0%)	22	(86%)	0	(0%)	146	(28%)
Electric	7	(4%)	4	(9%)	4	(14%)	177	(65%)	192	(37%)
Total	180	(100%)	42	(100%)	26	(100%)	273	(100%)	521	(100%)

C. Civilian Injuries

Fuel or Power	Heating stove		Local furnace		Fireplace insert		Heater (including catalytic and oil-filled)		All space heaters	
Gas	55	(13%)	58	(68%)	5	(13%)	70	(16%)	189	(19%)
Liquid	7	(2%)	3	(3%)	0	(0%)	106	(24%)	116	(12%)
Solid	70	(16%)	0	(0%)	24	(67%)	0	(0%)	94	(10%)
Electric	296	(69%)	25	(29%)	7	(20%)	257	(59%)	585	(60%)
Total	428	(100%)	87	(100%)	37	(100%)	432	(100%)	984	(100%)

D. Direct Property Damage (in Millions)

Fuel or Power	Heating stove		Local furnace		Fireplace insert		Heater (including catalytic and oil-filled)		All space heaters	
Gas	\$24	(14%)	\$36	(67%)	\$28	(41%)	\$48	(18%)	\$135	(24%)
Liquid	\$4	(2%)	\$2	(4%)	\$0	(0%)	\$28	(11%)	\$34	(6%)
Solid	\$81	(47%)	\$1	(1%)	\$38	(57%)	\$2	(1%)	\$122	(22%)
Electric	\$64	(37%)	\$15	(28%)	\$1	(2%)	\$182	(70%)	\$263	(47%)
Total	\$174	(100%)	\$53	(100%)	\$67	(100%)	\$260	(100%)	\$554	(100%)

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating of air conditioning equipment type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and type of fuel or power unknown have also been allocated proportionally.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Home Fires Involving Portable or Stationary Space Heaters, by Type of Device
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

A. Fires

Fuel or Power	Heating stove		Local furnace		Fireplace insert		Heater (including catalytic and oil-filled)		All space heaters	
Gas	1,300	(35%)	1,300	(35%)	200	(4%)	900	(25%)	3,600	(100%)
Liquid	100	(8%)	100	(14%)	0	(0%)	800	(78%)	1,000	(100%)
Solid	1,500	(68%)	0	(1%)	700	(30%)	0	(1%)	2,300	(100%)
Electric	4,000	(51%)	600	(8%)	100	(1%)	3,100	(40%)	7,800	(100%)
All	6,800	(47%)	2,100	(14%)	900	(6%)	4,900	(33%)	14,700	(100%)

B. Civilian Deaths

Fuel or Power	Heating stove		Local furnace		Fireplace insert		Heater (including catalytic and oil-filled)		All space heaters	
Gas	36	(40%)	35	(38%)	0	(0%)	20	(22%)	90	(100%)
Liquid	12	(13%)	4	(4%)	0	(0%)	77	(83%)	93	(100%)
Solid	124	(85%)	0	(0%)	22	(15%)	0	(0%)	146	(100%)
Electric	7	(4%)	4	(2%)	4	(2%)	177	(92%)	192	(100%)
All	180	(35%)	42	(8%)	26	(5%)	273	(52%)	521	(100%)

C. Civilian Injuries

Fuel or Power	Heating stove		Local furnace		Fireplace insert		Heater (including catalytic and oil-filled)		All space heaters	
Gas	55	(29%)	58	(31%)	5	(3%)	70	(37%)	189	(100%)
Liquid	7	(6%)	3	(2%)	0	(0%)	106	(91%)	116	(100%)
Solid	70	(74%)	0	(0%)	24	(26%)	0	(0%)	94	(100%)
Electric	296	(51%)	25	(4%)	7	(1%)	257	(44%)	585	(100%)
All	428	(44%)	87	(9%)	37	(4%)	432	(44%)	984	(100%)

D. Direct Property Damage (in Millions)

Fuel or Power	Heating stove		Local furnace		Fireplace insert		Heater (including catalytic and oil-filled)		All space heaters	
Gas	\$24	(18%)	\$36	(26%)	\$28	(21%)	\$48	(35%)	\$135	(100%)
Liquid	\$4	(12%)	\$2	(6%)	\$0	(0%)	\$28	(82%)	\$34	(100%)
Solid	\$81	(67%)	\$1	(0%)	\$38	(31%)	\$2	(2%)	\$122	(100%)
Electric	\$64	(25%)	\$15	(6%)	\$1	(1%)	\$182	(69%)	\$263	(100%)
All	\$174	(32%)	\$53	(9%)	\$67	(12%)	\$260	(47%)	\$554	(100%)

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating of air conditioning equipment type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and type of fuel or power unknown have also been allocated proportionally.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Space Heater Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	4,700	(32%)	321	(62%)	394	(40%)	\$269	(49%)
Equipment unattended	2,400	(17%)	16	(3%)	211	(21%)	\$80	(14%)
Unclassified mechanical failure or malfunction	1,100	(7%)	17	(3%)	38	(4%)	\$33	(6%)
Installation deficiency	700	(5%)	11	(2%)	17	(2%)	\$26	(5%)
Unclassified misuse of material or product	700	(5%)	17	(3%)	59	(6%)	\$15	(3%)
Unintentionally turned on or not turned off	700	(5%)	0	(0%)	28	(3%)	\$13	(2%)
Unclassified factor contributed to ignition	600	(4%)	5	(1%)	51	(5%)	\$13	(2%)
Abandoned or discarded material or product	600	(4%)	0	(0%)	48	(5%)	\$10	(2%)
Unclassified electrical failure or malfunction	500	(4%)	11	(2%)	12	(1%)	\$23	(4%)
Failure to clean	500	(3%)	0	(0%)	0	(0%)	\$11	(2%)
Leak or break	400	(3%)	0	(0%)	22	(2%)	\$37	(7%)
Unspecified short circuit arc	300	(2%)	0	(0%)	12	(1%)	\$12	(2%)
Unclassified operational deficiency	300	(2%)	16	(3%)	12	(1%)	\$8	(1%)
Equipment not being operated properly	300	(2%)	22	(4%)	26	(3%)	\$9	(2%)
Worn out	300	(2%)	0	(0%)	17	(2%)	\$7	(1%)
Short circuit arc from defective or worn insulation	200	(2%)	5	(1%)	3	(0%)	\$4	(1%)
Flammable liquid or gas spilled	200	(1%)	11	(2%)	37	(4%)	\$6	(1%)
Improper fueling technique	200	(1%)	49	(9%)	27	(3%)	\$8	(1%)
Unclassified design, manufacturing, or installation deficiency	100	(1%)	0	(0%)	3	(0%)	\$5	(1%)
Arc or spark from operating equipment	100	(1%)	37	(7%)	3	(0%)	\$4	(1%)
Construction deficiency	100	(1%)	0	(0%)	6	(1%)	\$6	(1%)
Equipment overloaded	100	(1%)	6	(1%)	8	(1%)	\$3	(1%)
Automatic control failure	100	(1%)	5	(1%)	8	(1%)	\$2	(0%)
Equipment used for not intended purpose	100	(1%)	16	(3%)	8	(1%)	\$3	(1%)
Collision, knockdown, or overturn	100	(1%)	31	(6%)	9	(1%)	\$4	(1%)
Playing with heat source	100	(1%)	5	(1%)	3	(0%)	\$1	(0%)
Unclassified fire spread or control	100	(1%)	5	(1%)	12	(1%)	\$6	(1%)
Design deficiency	100	(1%)	5	(1%)	3	(0%)	\$2	(0%)
Improper container or storage	100	(1%)	0	(0%)	8	(1%)	\$1	(0%)

**Home Space Heater Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)**

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Other known factor	400	(3%)	43	(8%)	29	(3%)	\$17	(3%)
Total fires excluding confined fires	14,700	(100%)	521	(100%)	984	(100%)	\$554	(100%)
Total factor entries	16,400	(111%)	654	(125%)	1,114	(113%)	\$637	(115%)

Note: Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Home Portable or Stationary Electric Space Heater Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles.	2,300	(30%)	168	(87%)	238	(41%)	\$165	(63%)
Equipment unattended	1,900	(25%)	9	(5%)	180	(31%)	\$37	(14%)
Unintentionally turned on or not turned off	500	(7%)	0	(0%)	25	(4%)	\$8	(3%)
Unclassified electrical failure or malfunction	500	(6%)	9	(5%)	12	(2%)	\$17	(6%)
Abandoned or discarded material or product	400	(6%)	0	(0%)	44	(8%)	\$6	(2%)
Unclassified mechanical failure or malfunction	400	(5%)	10	(5%)	25	(4%)	\$8	(3%)
Unclassified misuse of material or product	400	(5%)	0	(0%)	30	(5%)	\$7	(3%)
Unclassified factor contributed to ignition	300	(4%)	0	(0%)	27	(5%)	\$6	(2%)
Unspecified short circuit arc	300	(4%)	0	(0%)	9	(2%)	\$9	(3%)
Short circuit arc from defective or worn insulation	200	(3%)	5	(2%)	0	(0%)	\$3	(1%)
Equipment not being operated properly	200	(2%)	0	(0%)	24	(4%)	\$4	(1%)
Failure to clean	200	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Arc or spark from operating equipment	100	(2%)	33	(17%)	3	(1%)	\$3	(1%)
Installation deficiency	100	(1%)	0	(0%)	6	(1%)	\$2	(1%)
Unclassified operational deficiency	100	(1%)	0	(0%)	6	(1%)	\$1	(0%)
Equipment overloaded	100	(1%)	0	(0%)	9	(1%)	\$2	(1%)
Worn out	100	(1%)	0	(0%)	3	(0%)	\$0	(0%)
Short circuit arc from mechanical damage	100	(1%)	0	(0%)	3	(0%)	\$1	(0%)
Collision, knockdown or overturn	100	(1%)	0	(0%)	3	(1%)	\$2	(1%)
Flammable liquid or gas spilled	100	(1%)	0	(0%)	3	(0%)	\$0	(0%)

**Home Portable or Stationary Electric Space Heater Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)**

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Other known factor	400	(5%)	5	(2%)	29	(5%)	\$11	(4%)
Total fires excluding confined fires	7,800	(100%)	192	(100%)	585	(100%)	\$263	(100%)
Total factor entries	8,700	(111%)	239	(124%)	679	(116%)	\$290	(110%)

Note: Multiple entries are allowed, resulting in more factor entries than fires. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fire reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Gas-Fueled Space Heater Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	1,300	(36%)	62	(68%)	104	(55%)	\$49	(37%)
Unclassified mechanical failure or malfunction	500	(13%)	0	(0%)	6	(3%)	\$17	(13%)
Equipment unattended	300	(9%)	6	(6%)	21	(11%)	\$24	(18%)
Leak or break	300	(8%)	0	(0%)	17	(9%)	\$33	(24%)
Unclassified misuse of material or product	200	(6%)	0	(0%)	6	(3%)	\$2	(2%)
Installation deficiency	100	(4%)	6	(6%)	0	(0%)	\$4	(3%)
Unclassified factor contributed to ignition	100	(4%)	6	(6%)	9	(5%)	\$1	(1%)
Unintentionally turned on or not turned off	100	(3%)	0	(0%)	0	(0%)	\$4	(3%)
Abandoned or discarded material or product	100	(3%)	0	(0%)	6	(3%)	\$2	(2%)
Unclassified operational deficiency	100	(3%)	0	(0%)	0	(0%)	\$2	(1%)
Worn out	100	(3%)	0	(0%)	3	(2%)	\$4	(3%)
Failure to clean	100	(2%)	0	(0%)	0	(0%)	\$2	(1%)
Equipment not being operated properly	100	(2%)	6	(6%)	0	(0%)	\$2	(2%)
Playing with heat source	100	(1%)	6	(6%)	0	(0%)	\$1	(1%)
Other known factor	400	(12%)	6	(7%)*	22	(12%)	\$13	(10%)
Total fires excluding confined fires	3,600	(100%)	90	(100%)	189	(100%)	\$135	(100%)
Total factor entries	4,000	(109%)	96	(106%)	195	(103%)	\$161	(119%)

* Including improper setup (7%).

Note: Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Home Wood Stove, Fireplace Insert and Other Solid-Fueled Space Heater Fires,
by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	700	(31%)	63	(43%)	36	(38%)	\$37	(30%)
Installation deficiency	500	(20%)	7	(5%)	14	(15%)	\$28	(23%)
Failure to clean	200	(10%)	0	(0%)	0	(0%)	\$8	(7%)
Equipment unattended	100	(6%)	0	(0%)	0	(0%)	\$12	(10%)
Unclassified operational deficiency	100	(5%)	21	(14%)	0	(0%)	\$5	(4%)
Construction deficiency	100	(4%)	0	(0%)	4	(4%)	\$5	(4%)
Unclassified factor contributed to ignition	100	(4%)	0	(0%)	0	(0%)	\$4	(4%)
Unclassified mechanical failure or malfunction	100	(4%)	0	(0%)	0	(0%)	\$6	(5%)
Worn out	100	(4%)	0	(0%)	10	(11%)	\$4	(3%)
Unclassified design, manufacturing, or installation deficiency	100	(4%)	0	(0%)	0	(0%)	\$5	(4%)
Leak or break	100	(3%)	0	(0%)	0	(0%)	\$3	(3%)
Unclassified misuse of material or product	100	(3%)	7	(5%)	7	(8%)	\$4	(4%)
Equipment not being operated properly	100	(2%)	14	(10%)	0	(0%)	\$5	(4%)
Other known factor	300	(14%)	77	(52%)*	37	(39%)	\$20	(16%)
Total fires excluding confined fires	2,300	(100%)	146	(100%)	94	(100%)	\$122	(100%)
Total factor entries	2,600	(113%)	188	(129%)	108	(115%)	\$147	(121%)

* Including flammable liquid used to kindle (14%), unclassified natural condition (14%), equipment used for not intended purpose (10%), design deficiency (5%), high wind (5%).

Note: Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Home heating fires with type of heating equipment unknown are also allocated. Home solid-fueled space heater fires with factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Home Liquid-Fueled Space Heater Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	400	(34%)	12	(13%)	16	(14%)	\$11	(33%)
Improper fueling technique	100	(13%)	45	(49%)	25	(21%)	\$7	(21%)
Unclassified mechanical failure or malfunction	100	(13%)	6	(7%)	10	(8%)	\$3	(9%)
Flammable liquid or gas spilled	100	(10%)	12	(13%)	22	(19%)	\$4	(12%)
Equipment unattended	100	(8%)	0	(0%)	6	(6%)	\$3	(10%)
Other known factor	400	(39%)	63	(68%)*	56	(48%)	\$14	(40%)
Total fires excluding confined fires	1,000	(100%)	93	(100%)	116	(100%)	\$34	(100%)
Total factor entries	1,200	(117%)	138	(149%)	135	(117%)	\$43	(125%)

* Including collision, knockdown or overturn (35%), unclassified misuse of material or product (13%), equipment not being operated properly (7%), equipment overloaded (7%), automatic control failure (6%).

Note: Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Space Heater Fires, by Item First Ignited
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian		Civilian		Direct Property	
			Deaths	Injuries	Injuries	Damage (in Millions)		
Cooking materials	2,700	(18%)	0	(0%)	252	(26%)	\$38	(7%)
Structural member or framing	1,600	(11%)	31	(6%)	56	(6%)	\$100	(18%)
Flammable or combustible gas or liquid	900	(6%)	80	(15%)	119	(12%)	\$34	(6%)
Interior wall covering	900	(6%)	32	(6%)	45	(5%)	\$36	(7%)
Floor covering	800	(5%)	45	(9%)	33	(3%)	\$25	(5%)
Mattress or bedding	700	(4%)	64	(12%)	62	(6%)	\$30	(5%)
Clothing	600	(4%)	27	(5%)	84	(9%)	\$15	(3%)
Unclassified item	600	(4%)	23	(4%)	30	(3%)	\$11	(2%)
Wire or cable insulation	600	(4%)	10	(2%)	6	(1%)	\$13	(2%)
Appliance housing or casing	500	(3%)	5	(1%)	29	(3%)	\$3	(1%)
Cabinetry	400	(3%)	0	(0%)	22	(2%)	\$101	(18%)
Unclassified structural component or finish	400	(3%)	5	(1%)	25	(3%)	\$15	(3%)
Upholstered furniture	400	(3%)	72	(14%)	38	(4%)	\$26	(5%)
Box or bag	300	(2%)	18	(3%)	21	(2%)	\$10	(2%)
Unclassified furniture or utensil	300	(2%)	26	(5%)	25	(3%)	\$7	(1%)
Exterior wall covering or finish	300	(2%)	10	(2%)	10	(1%)	\$7	(1%)
Household utensil	200	(2%)	0	(0%)	10	(1%)	\$4	(1%)
Interior ceiling covering	200	(2%)	15	(3%)	5	(1%)	\$7	(1%)
Linen other than bedding	200	(2%)	0	(0%)	15	(2%)	\$3	(1%)
Insulation within structural area	200	(2%)	0	(0%)	5	(1%)	\$5	(1%)
Papers	200	(1%)	0	(0%)	8	(1%)	\$11	(2%)
Unclassified soft goods or clothing	200	(1%)	15	(3%)	3	(0%)	\$6	(1%)
Multiple items first ignited	200	(1%)	16	(3%)	17	(2%)	\$19	(3%)
Curtains or drapes	200	(1%)	15	(3%)	13	(1%)	\$4	(1%)
Unclassified organic materials	100	(1%)	0	(0%)	6	(1%)	\$3	(0%)
Trash or waste	100	(1%)	0	(0%)	0	(0%)	\$1	(0%)
Dust, fiber, or lint	100	(1%)	0	(0%)	3	(0%)	\$1	(0%)
Other known item	700	(5%)	10	(2%)	41	(4%)	\$17	(3%)
Total fires excluding confined fires	14,700	(100%)	521	(100%)	984	(100%)	\$554	(100%)

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Portable or Stationary Electric Space Heater Fires, by Item First Ignited
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Cooking materials	2,400	(30%)	0	(0%)	237	(40%)	\$28	(10%)
Mattress or bedding	500	(7%)	54	(28%)	64	(11%)	\$27	(10%)
Wire or cable insulation	500	(7%)	10	(5%)	6	(1%)	\$9	(4%)
Cabinetry	400	(5%)	0	(0%)	24	(4%)	\$96	(37%)
Interior wall covering	300	(4%)	9	(5%)	24	(4%)	\$13	(5%)
Clothing	300	(4%)	0	(0%)	34	(6%)	\$7	(3%)
Unclassified item	300	(4%)	0	(0%)	15	(3%)	\$4	(1%)
Appliance housing	300	(4%)	0	(0%)	26	(4%)	\$2	(1%)
Floor covering	300	(4%)	16	(8%)	6	(1%)	\$8	(3%)
Structural member or framing	200	(3%)	0	(0%)	14	(2%)	\$10	(4%)
Upholstered furniture	200	(3%)	62	(32%)	21	(4%)	\$12	(4%)
Unclassified furniture or utensil	200	(2%)	19	(10%)	15	(3%)	\$5	(2%)
Household utensil	200	(2%)	0	(0%)	11	(2%)	\$2	(1%)
Box or bag	200	(2%)	16	(8%)	22	(4%)	\$5	(2%)
Flammable or combustible gas or liquid	200	(2%)	0	(0%)	3	(0%)	\$8	(3%)
Linen other than bedding	100	(2%)	0	(0%)	16	(3%)	\$2	(1%)
Unclassified soft goods or clothing	100	(1%)	5	(3%)	0	(0%)	\$3	(1%)
Papers	100	(1%)	0	(0%)	8	(1%)	\$4	(2%)
Unclassified structural component or finish	100	(1%)	0	(0%)	3	(0%)	\$3	(1%)
Curtain or drape	100	(1%)	0	(0%)	3	(0%)	\$1	(1%)
Insulation within structural area	100	(1%)	0	(0%)	3	(0%)	\$1	(0%)
Multiple items first ignited	100	(1%)	0	(0%)	9	(2%)	\$6	(2%)
Exterior wall covering or finish	100	(1%)	0	(0%)	0	(0%)	\$1	(1%)
Other known item	400	(5%)	0	(0%)	21	(4%)	\$6	(2%)
Total	7,800	(100%)	192	(100%)	585	(100%)	\$263	(100%)

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Gas-Fueled Space Heater Fires, by Item First Ignited
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Structural member or framing	600	(16%)	17	(19%)	27	(14%)	\$50	(37%)
Flammable or combustible gas or liquid	400	(10%)	0	(0%)	37	(20%)	\$13	(10%)
Cooking materials	400	(10%)	0	(0%)	21	(11%)	\$5	(4%)
Interior wall covering	200	(6%)	5	(6%)	3	(1%)	\$8	(6%)
Floor covering	200	(6%)	0	(0%)	0	(0%)	\$9	(7%)
Clothing	200	(6%)	18	(19%)	31	(17%)	\$5	(4%)
Unclassified item	200	(4%)	18	(20%)	5	(3%)	\$2	(2%)
Appliance housing	100	(4%)	5	(6%)	5	(3%)	\$1	(1%)
Unclassified structural component or finish	100	(3%)	0	(0%)	11	(6%)	\$4	(3%)
Upholstered furniture	100	(3%)	0	(0%)	16	(9%)	\$7	(5%)
Mattress or bedding	100	(2%)	0	(0%)	3	(1%)	\$2	(1%)
Linen other than bedding	100	(2%)	0	(0%)	0	(0%)	\$1	(1%)
Box or bag	100	(2%)	0	(0%)	0	(0%)	\$3	(2%)
Cabinetry	100	(2%)	0	(0%)	0	(0%)	\$3	(2%)
Wire or cable insulation	100	(2%)	0	(0%)	0	(0%)	\$3	(2%)
Unclassified soft goods or clothing	100	(2%)	5	(6%)	3	(1%)	\$2	(1%)
Unclassified furniture or utensil	100	(1%)	0	(0%)	8	(4%)	\$1	(1%)
Multiple items first ignited	100	(1%)	0	(0%)	0	(0%)	\$2	(1%)
Curtain or drape	100	(1%)	16	(18%)	3	(1%)	\$1	(1%)
Household utensil	100	(1%)	0	(0%)	0	(0%)	\$2	(2%)
Other known item	500	(13%)	5	(6%)*	16	(9%)	\$13	(10%)
Total	3,600	(100%)	90	(100%)	189	(100%)	\$135	(100%)

* Including person, living or dead (6%).

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Home Wood Stove, Fireplace Insert and Other Solid-Fueled Space Heater Fires, by Item First Ignited
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Structural member or framing	700	(33%)	23	(16%)	14	(15%)	\$41	(34%)
Interior wall covering	300	(11%)	8	(5%)	14	(15%)	\$15	(12%)
Floor covering	200	(7%)	23	(16%)	17	(19%)	\$5	(4%)
Unclassified structural component or finish	100	(6%)	0	(0%)	3	(4%)	\$8	(7%)
Interior ceiling covering	100	(6%)	23	(16%)	3	(4%)	\$5	(4%)
Unclassified item	100	(5%)	0	(0%)	3	(4%)	\$3	(3%)
Exterior wall covering or finish	100	(5%)	16	(11%)	7	(7%)	\$6	(5%)
Insulation within structural area	100	(3%)	0	(0%)	0	(0%)	\$3	(2%)
Other known item	500	(23%)	54	(37%)*	32	(34%)	\$36	(29%)
Total	2,300	(100%)	146	(100%)	94	(100%)	\$122	(100%)

* Including clothing (11%), multiple items (10%), gas or liquid (5%), mattress or bedding (5%), agricultural crop (5%).

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, an direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Liquid-Fueled Space Heater Fires, by Item First Ignited
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Flammable or combustible gas or liquid	300	(33%)	61	(66%)	60	(52%)	\$13	(37%)
Floor covering	100	(9%)	9	(10%)	11	(9%)	\$3	(8%)
Structural member or framing	100	(9%)	0	(0%)	2	(2%)	\$3	(8%)
Interior wall covering	100	(6%)	9	(10%)	9	(8%)	\$3	(9%)
Other known item	400	(43%)	13	(14%)*	33	(29%)	\$13	(38%)
Total	1,000	(100%)	93	(100%)	116	(100%)	\$34	(100%)

* Including unclassified furniture (5%), unclassified structural component or finish (5%).

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Space Heater Fires, by Area of Origin
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian		Civilian		Direct Property	
			Deaths	Injuries	Injuries	Damage (in Millions)		
Kitchen	4,800	(32%)	58	(11%)	343	(35%)	\$73	(13%)
Living room, den, or family room	2,100	(14%)	219	(42%)	180	(18%)	\$160	(29%)
Bedroom	1,700	(12%)	113	(22%)	164	(17%)	\$63	(11%)
Unclassified function area	800	(6%)	55	(11%)	94	(10%)	\$32	(6%)
Heating room or area	700	(5%)	7	(1%)	11	(1%)	\$19	(3%)
Wall assembly	700	(5%)	19	(4%)	14	(1%)	\$22	(4%)
Bathroom	600	(4%)	8	(2%)	30	(3%)	\$16	(3%)
Substructure area or crawl space	500	(3%)	4	(1%)	11	(1%)	\$24	(4%)
Garage*	400	(3%)	4	(1%)	34	(3%)	\$27	(5%)
Attic or other space above top story	300	(2%)	0	(0%)	4	(0%)	\$10	(2%)
Unclassified structural area	200	(2%)	4	(1%)	4	(0%)	\$15	(3%)
Ceiling/floor assembly or space between stories	200	(2%)	4	(1%)	7	(1%)	\$7	(1%)
Duct	200	(2%)	0	(0%)	13	(1%)	\$9	(2%)
Unclassified area of origin	200	(1%)	11	(2%)	7	(1%)	\$4	(1%)
Laundry area	200	(1%)	0	(0%)	15	(2%)	\$8	(1%)
Exterior wall surface	100	(1%)	0	(0%)	2	(0%)	\$1	(0%)
Corridor	100	(1%)	7	(1%)	4	(0%)	\$9	(2%)
Unclassified storage area	100	(1%)	0	(0%)	9	(1%)	\$3	(1%)
Entrance way or lobby	100	(1%)	0	(0%)	2	(0%)	\$3	(1%)
Other known area of origin	600	(4%)	8	(2%)	37	(4%)	\$46	(8%)
Total	14,700	(100%)	521	(100%)	984	(100%)	\$554	(100%)

* Excludes dwelling garages coded as separate property.

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Portable or Stationary Electric Space Heater Fires, by Area of Origin
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian		Civilian		Direct Property	
			Deaths	Injuries	Injuries	Damage (in Millions)		
Kitchen	3,700	(48%)	11	(6%)	295	(50%)	\$50	(19%)
Bedroom	1,400	(18%)	83	(43%)	133	(23%)	\$50	(19%)
Living room, den, or family room	600	(8%)	74	(38%)	40	(7%)	\$97	(37%)
Bathroom	400	(6%)	4	(2%)	26	(5%)	\$11	(4%)
Unclassified function area	300	(4%)	8	(4%)	35	(6%)	\$9	(4%)
Heating room or area	200	(3%)	0	(0%)	7	(1%)	\$4	(1%)
Wall assembly	200	(2%)	4	(2%)	9	(2%)	\$4	(2%)
Substructure area or crawl space	100	(2%)	0	(0%)	0	(0%)	\$7	(3%)
Garage*	100	(1%)	0	(0%)	0	(0%)	\$4	(1%)
Unclassified structural area	100	(1%)	4	(2%)	2	(0%)	\$7	(3%)
Attic or other space above top story	100	(1%)	0	(0%)	0	(0%)	\$2	(1%)
Duct	100	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Laundry area	100	(1%)	0	(0%)	11	(2%)	\$4	(2%)
Other known area of origin	400	(5%)	4	(2%)	26	(4%)	\$13	(5%)
Total	7,800	(100%)	192	(100%)	585	(100%)	\$263	(100%)

* Excludes dwelling garages coded as separate property.

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Gas-Fueled Space Heater Fires, by Area of Origin
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Kitchen	900	(26%)	28	(31%)	40	(21%)	\$14	(11%)
Living room, den, or family room	600	(18%)	23	(25%)	57	(30%)	\$19	(14%)
Heating room or area	300	(9%)	4	(4%)	2	(1%)	\$11	(8%)
Unclassified function area	200	(6%)	8	(9%)	15	(8%)	\$9	(7%)
Substructure area or crawl space	200	(6%)	4	(4%)	0	(0%)	\$7	(5%)
Bedroom	200	(6%)	9	(9%)	25	(13%)	\$8	(6%)
Wall assembly	200	(6%)	4	(4%)	3	(2%)	\$5	(4%)
Bathroom	100	(4%)	4	(4%)	5	(3%)	\$4	(3%)
Garage*	100	(3%)	4	(4%)	10	(5%)	\$10	(8%)
Duct	100	(3%)	0	(0%)	0	(0%)	\$1	(1%)
Ceiling/floor assembly or space between stories	100	(2%)	4	(5%)	2	(1%)	\$3	(2%)
Corridor	100	(2%)	0	(0%)	0	(0%)	\$8	(6%)
Unclassified structural area	100	(2%)	0	(0%)	0	(0%)	\$3	(2%)
Laundry area	100	(2%)	0	(0%)	5	(3%)	\$1	(1%)
Other known area of origin	300	(8%)	0	(0%)	25	(13%)	\$30	(22%)
Total	3,600	(100%)	90	(100%)	189	(100%)	\$135	(100%)

* Excludes dwelling garages coded as separate property.

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Home Wood Stove, Fireplace Insert and Other Solid-Fueled Space Heater Fires, by Area of Origin
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Living room, den, or family room	600	(27%)	85	(58%)	37	(40%)	\$35	(29%)
Wall assembly	400	(16%)	12	(8%)	2	(2%)	\$14	(11%)
Unclassified function area	200	(9%)	15	(11%)	15	(16%)	\$11	(9%)
Attic or other space above top story	200	(7%)	0	(0%)	2	(2%)	\$8	(6%)
Garage*	100	(6%)	0	(0%)	2	(2%)	\$8	(7%)
Ceiling/floor assembly or space between stories	100	(5%)	0	(0%)	2	(3%)	\$2	(2%)
Heating room or area	100	(4%)	4	(3%)	0	(0%)	\$4	(4%)
Substructure area or crawl space	100	(4%)	0	(0%)	5	(5%)	\$9	(7%)
Unclassified structural area	100	(4%)	0	(0%)	2	(3%)	\$6	(5%)
Kitchen	100	(3%)	8	(5%)	2	(2%)	\$2	(2%)
Exterior wall surface	100	(2%)	0	(0%)	2	(2%)	\$1	(0%)
Other known area of origin	300	(13%)	23	(16%)**	21	(22%)	\$21	(18%)
Total	2,300	(100%)	146	(100%)	94	(100%)	\$122	(100%)

* Excludes dwelling garages coded as separate property.

** Including unclassified area (8%), corridor or hallway (5%).

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Liquid-Fueled Space Heater Fires, by Area of Origin
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Living room, den, or family room	200	(21%)	37	(40%)	33	(29%)	\$9	(27%)
Unclassified function area	100	(12%)	26	(28%)	30	(26%)	\$5	(14%)
Garage*	100	(10%)	0	(0%)	22	(19%)	\$5	(15%)
Bedroom	100	(9%)	12	(13%)	9	(8%)	\$3	(8%)
Heating room or area	100	(8%)	0	(0%)	0	(0%)	\$1	(2%)
Substructure area or crawl space	100	(8%)	0	(0%)	5	(4%)	\$2	(6%)
Kitchen	100	(6%)	12	(13%)	10	(8%)	\$2	(5%)
Other known area of origin	300	(25%)	5	(5%)**	7	(6%)	\$8	(24%)
Total	1,000	(100%)	93	(100%)	116	(100%)	\$34	(100%)

* Excludes dwelling garages coded as separate property.

** Including tool or supply storage area (5%).

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

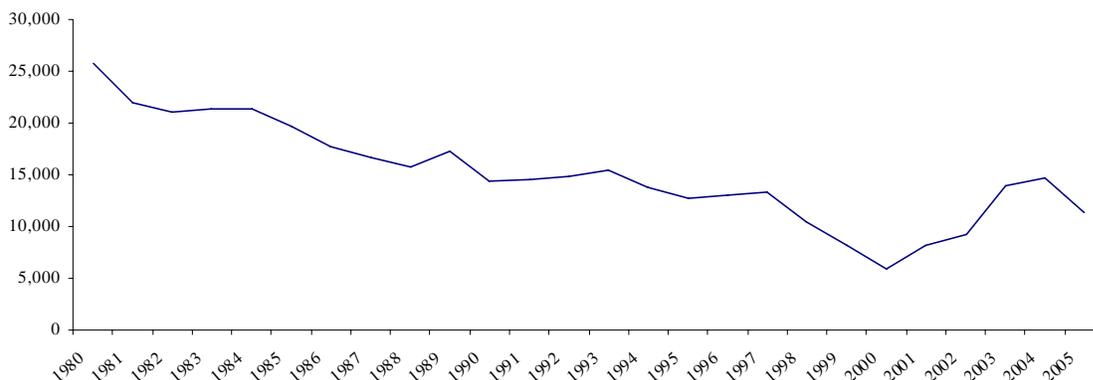
Source: Data from NFIRS Version 5.0 and NFPA survey.

Central Heating Units

In 2005, an estimated 11,400 reported home structure fires involving central heating units resulted in 100 civilian deaths, 130 civilian injuries, and \$71 million in direct property damage.

The number of fires declined sharply from 1980 to 1998. There is some evidence of an upward trend since 1998, perhaps driven by confined fires, many of which might have been coded as something other than fire (e.g., smoke scare) prior to 1999.

Home Fires Involving Furnaces, Boilers, or Other Central Heating Units, 1980-2005, by Year



Note: Confined fires are fires reported as confined to chimney, flue, fuel burner, or boiler and involving heating equipment; they are analyzed separately but are included above. 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. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. *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.*

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2005) and from NFPA survey.

Of the 2002-2005 central heating unit fires, excluding fires reported as confined fires, 48% involved gas-fueled equipment, 37% electric-powered equipment, 13% liquid-fueled equipment, and 2% solid-fueled equipment.

The gas-fueled units split 91% natural gas vs. 9% LP-gas. The liquid-fueled equipment split 70% kerosene or #1 or #2 fuel oil, 22% as #4, #5, or #6 fuel oil, and 8% gasoline. The solid-fueled units were 83% wood-burning vs. 17% coal-burning.

In 1995-1998 and 2000-2003, there were 1.8 electrocution deaths per year involving electric furnaces.*

These estimates involve the separation of water heaters and furnaces from larger groupings that are used in some years, based on the relative numbers of such deaths in years when statistics are provided separately for water heaters and furnaces. There was no report issued for 1999.

Central heating of all types combined pose a much lower risk of fire and associated losses, relative to usage, than do space heaters collectively.

* Risana T. Chowdbury, "2003 Electrocutions Associated with Consumer Products," December 2006, Table 2, www.cpsc.gov, and previous reports in the series.

Comparative Risk of Central and Space Heating Equipment

A. When Secondary Uses of Equipment Are Included as User Households

Risk Measure	Space Heating	Central Heating	How Much Higher Is Space Heating Risk Than Central Heating Risk?
Fires (per million user households)	269	23	7 times
Civilian deaths (per million user households)	9.5	0.2	36 times
Civilian injuries (per million user households)	18.0	1.3	12 times
Direct property damage (per user household)	\$10.1	\$1.1	8 times

B. When Secondary Uses of Equipment Are Not Included as User Households

Risk Measure	Space Heating	Central Heating	How Much Higher Is Space Heating Risk Than Central Heating Risk?
Fires (per million user household)	400	25	12 times
Civilian deaths (per million user households)	14.2	0.3	58 times
Civilian injuries (per million user households)	26.7	1.5	20 times
Direct property damage (per user household)	\$15.0	\$1.2	14 times

Comparisons of different fuel or power options within central or space heating equipment do not show any types to be clearly better or clearly worse. Gas-fueled equipment has low risk of fire death, but this equipment accounts for nearly all the non-fire carbon monoxide deaths, and those deaths completely transform the risk comparison.

The leading factors contributing to ignition are mostly lacking in specifics on what equipment component failed, why, or how.

Unclassified mechanical failure or malfunction was reported in 25% of the non-confined fires and 17% of associated civilian deaths. Heat source too close to combustibles was reported in 24% of the fires and 43% of associated civilian deaths.

One-third (31%) of home central heating non-confined fires began with ignition of structural member or framing (17%) or wire or cable insulation (14%).

Flammable or combustible liquid or gas accounted for a large share of fires also (12% for all central heating units, 12% for gas-fueled units, and 36% for liquid-fueled units).

One-third (36%) of home central heating non-confined fires began in a designated heating equipment room or area.

Many of the other fires began in a concealed or structure space, including crawl spaces and ducts.

Safe Heating Behaviors

- Select and install heating equipment for safety and effectiveness.
 - Install central heating equipment according to the local codes and manufacturer's instructions.
 - If possible, have a qualified professional install the equipment.
 - Make sure all fuel-burning equipment is vented to the outside. Make sure the venting for exhaust is kept clear and unobstructed. This includes removal of snow around the outlet to the outside.
- Use heating equipment safely, in accordance with manufacturer's instructions.
 - For electric-powered equipment, make sure it is connected to a circuit with sufficient capacity. Do not position heaters near water or where there is danger of water being spilled, to avoid serious risk of electric shock.
 - For liquid-fueled equipment, always use the proper grade of the proper fuel (e.g., only the proper grade of kerosene in a kerosene heater), as specified by the manufacturer. Never use gasoline as a fuel in a device not approved for gasoline, or else the equipment may burn too hot, which could lead to equipment failure. When refueling, allow the appliance to cool and refuel outside or in a well-ventilated area.
 - Do not use or store flammable or combustible liquids near or in rooms with heaters, in order to avoid a vapor ignition and possible flash fire.
 - Install and maintain carbon monoxide alarms to avoid risk of carbon monoxide poisoning.
- Keep adequate clearance between heating equipment and any combustibles.
 - Space heaters need space. Keep all things that can burn, such as paper, bedding or furniture, at least 3 feet away from heating equipment.
 - This means installing equipment with proper clearances, typically specified in an NFPA installation standard, to all fixed combustibles, including walls and structural elements.
 - This means placing moveable combustibles, such as furniture and bedding, at least 3 feet away from the equipment.
- Inspect and maintain heating equipment regularly for safety.
 - Maintain heating equipment by having it cleaned and inspected annually by a qualified professional.

- The annual inspection can best be timed for just before the beginning of a new heating season.
- Inspection is also warranted if you move into a new home or begin use of your equipment after a period of non-use.
- For electric-powered equipment, inspect cords for cracking, fraying, loose connections, or broken plugs, and replace any damaged equipment before use.

**Home Fires Involving Furnaces, Boilers, or Other Central Heating Units, by Year
Structure Fires Reported to U.S. Fire Departments**

Year	Fires	Civilian		Civilian		Direct Property Damage (in Millions)			
		Deaths	Injuries	As Reported	In 2005 Dollars)				
1980	25,700	110	470	\$125	\$297				
1981	21,900	130	620	\$80	\$171				
1982	21,100	120	530	\$113	\$229				
1983	21,400	80	450	\$126	\$247				
1984	21,300	100	340	\$105	\$198				
1985	19,700	150	450	\$113	\$204				
1986	17,700	70	280	\$87	\$156				
1987	16,700	60	320	\$92	\$159				
1988	15,800	100	390	\$110	\$182				
1989	17,300	50	350	\$122	\$193				
1990	14,400	90	310	\$116	\$174				
1991	14,500	30	360	\$154*	\$221*				
1992	14,900	50	340	\$105	\$146				
1993	15,400	60	360	\$111	\$150				
1994	13,800	80	350	\$109	\$144				
1995	12,700	110	320	\$99	\$127				
1996	13,000	50	300	\$118	\$148				
1997	13,300	30	280	\$122	\$149				
1998	10,400	50	260	\$98	\$118				
1999	8,200 (5,900)	0 (0)	80 (80)	\$76 (\$74)	\$89 (\$86)				
2000	5,900 (3,700)	40 (40)	30 (0)	\$70 (\$69)	\$80 (\$79)				
2001	8,200 (3,400)	20 (20)	130 (90)	\$74 (\$73)	\$82 (\$81)				
2002	9,200 (3,500)	20 (20)	110 (110)	\$121 (\$117)	\$132 (\$127)				
2003	14,000 (3,100)	20 (20)	200 (120)	\$108 (\$104)	\$115 (\$110)				
2004	14,700 (2,700)	30 (30)	200 (110)	\$119 (\$117)	\$124 (\$121)				
2005	11,400 (2,400)	100 (100)	130 (120)	\$71 (\$68)	\$71 (\$68)				

* All 1991 home fire property damage figures are inflated by estimation problems related to the handling of the Oakland fire storm.

Note: Numbers in parentheses exclude confined fires. Confined fires are fires reported as confined to chimney, flue, fuel burner, or boiler and involving heating equipment; they are analyzed separately. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and civilian injuries are expressed to the nearest ten and direct property damage is rounded to the nearest million dollars. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. *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 adjustment to 2005 dollars is done using the consumer price index.

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2005) and from NFPA survey.

Home Central Heating Unit Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified mechanical failure or malfunction	700	(25%)	7	(17%)	6	(5%)	\$34	(33%)
Heat source too close to combustibles	700	(24%)	18	(43%)	51	(43%)	\$23	(23%)
Unclassified electrical failure or malfunction	200	(6%)	6	(16%)	11	(9%)	\$8	(7%)
Leak or break	200	(5%)	0	(0%)	8	(6%)	\$8	(8%)
Worn out	100	(5%)	0	(0%)	4	(3%)	\$3	(3%)
Unspecified short circuit arc	100	(5%)	0	(0%)	0	(0%)	\$4	(4%)
Installation deficiency	100	(4%)	3	(8%)	0	(0%)	\$3	(3%)
Automatic control failure	100	(4%)	0	(0%)	5	(4%)	\$3	(3%)
Failure to clean	100	(3%)	0	(0%)	0	(0%)	\$2	(2%)
Unclassified operational deficiency	100	(3%)	0	(0%)	4	(3%)	\$5	(4%)
Short circuit arc from defective or worn insulation	100	(2%)	0	(0%)	0	(0%)	\$1	(1%)
Arc or spark from operating equipment	100	(2%)	0	(0%)	2	(2%)	\$1	(1%)
Equipment not being operated properly	100	(2%)	0	(0%)	7	(6%)	\$3	(3%)
Unclassified misuse of material or product	100	(2%)	3	(8%)	0	(0%)	\$1	(1%)
Unclassified factor contributed to ignition	100	(2%)	3	(8%)	7	(6%)	\$4	(4%)
Other known factor	400	(14%)	6	(16%)*	23	(20%)	\$12	(12%)
Total fires excluding confined fires	2,900	(100%)	41	(100%)	116	(100%)	\$101	(100%)
Total factor entries	3,200	(108%)	47	(116%)	126	(109%)	\$112	(110%)

* Including improper startup (8%), construction deficiency (8%).

Note: Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment or undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Home Gas-Fueled Central Heating Unit Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	400	(30%)	8	(47%)	37	(47%)	\$14	(25%)
Unclassified mechanical failure or malfunction	400	(25%)	0	(0%)	3	(4%)	\$17	(30%)
Leak or break	100	(7%)	0	(0%)	7	(9%)	\$7	(12%)
Worn out	100	(5%)	0	(0%)	4	(5%)	\$2	(3%)
Installation deficiency	100	(4%)	2	(11%)	0	(0%)	\$2	(3%)
Other known factor	500	(35%)	8	(53%)*	29	(37%)	\$18	(33%)
Total fires excluding confined fires	1,400	(100%)	16	(100%)	80	(100%)	\$55	(100%)
Total factor entries	1,500	(107%)	18	(111%)	81	(102%)	\$59	(107%)

* Including unclassified electrical failure or malfunction (21%), improper startup (11%), unclassified factor (11%), unclassified misuse of material or product (11%).

Note: Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Home Electric-Powered Central Heating Unit Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified mechanical failure or malfunction	300	(23%)	2	(53%)	2	(8%)	\$6	(28%)
Heat source too close to combustibles	200	(15%)	2	(47%)	10	(35%)	\$5	(23%)
Unclassified electrical failure or malfunction	100	(13%)	0	(0%)	4	(15%)	\$4	(17%)
Unspecified short circuit arc	100	(10%)	0	(0%)	0	(0%)	\$2	(10%)
Worn out	100	(5%)	0	(0%)	0	(0%)	\$0	(2%)
Short circuit arc from defective or worn insulation	100	(5%)	0	(0%)	0	(0%)	\$0	(2%)
Failure to clean	100	(5%)	0	(0%)	0	(0%)	\$0	(0%)
Other known factor	300	(32%)	0	(0%)	20	(73%)	\$8	(35%)
Total fires excluding confined fires	1,100	(100%)	5	(100%)	28	(100%)	\$22	(100%)
Total factor entries	1,200	(109%)	5	(100%)	37	(131%)	\$26	(118%)

Note: Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Home Liquid-Fueled Central Heating Unit Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified mechanical failure or malfunction	200	(39%)	0	(NA)	0	(0%)	\$7	(43%)
Heat source too close to combustibles	100	(17%)	0	(NA)	2	(45%)	\$3	(21%)
Other known factor	200	(54%)	0	(NA)	2	(55%)	\$8	(49%)
Total fires excluding confined fires	400	(100%)	0	(NA)	4	(100%)	\$16	(100%)
Total factor entries	400	(109%)	0	(NA)	4	(100%)	\$18	(113%)

NA – Not applicable because total is zero.

Note: Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Central Heating Unit Fires, by Item First Ignited
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Structural member or framing	500	(17%)	17	(43%)	19	(16%)	\$26	(26%)
Wire or cable insulation	400	(14%)	0	(0%)	4	(3%)	\$6	(6%)
Flammable or combustible gas or liquid	300	(12%)	4	(9%)	29	(25%)	\$14	(14%)
Unclassified item	200	(7%)	4	(9%)	6	(5%)	\$4	(4%)
Clothing	100	(5%)	4	(10%)	8	(7%)	\$5	(5%)
Floor covering	100	(5%)	0	(0%)	1	(1%)	\$5	(5%)
Interior wall covering	100	(4%)	0	(0%)	3	(3%)	\$6	(6%)
Unclassified structural component or finish	100	(4%)	0	(0%)	1	(1%)	\$7	(7%)
Dust, fiber, or lint	100	(3%)	0	(0%)	2	(2%)	\$1	(1%)
Insulation within structural area	100	(3%)	0	(0%)	3	(3%)	\$1	(1%)
Box or bag	100	(2%)	0	(0%)	3	(3%)	\$3	(3%)
Interior ceiling covering	100	(2%)	0	(0%)	3	(3%)	\$6	(6%)
Other known items	600	(22%)	12	(29%)*	34	(29%)	\$17	(17%)
Total	2,900	(100%)	41	(100%)	116	(100%)	\$101	(100%)

* Including curtain or drape (14%), upholstered furniture (9%), unclassified liquid, gas, piping or filter (5%).

Note: Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved to ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Gas-Fueled Central Heating Unit Fires, by Item First Ignited
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Structural member or framing	300	(23%)	4	(26%)	17	(21%)	\$15	(27%)
Flammable or combustible gas or liquid	200	(12%)	3	(16%)	20	(25%)	\$9	(16%)
Clothing	100	(6%)	3	(17%)	8	(10%)	\$3	(6%)
Wire or cable insulation	100	(6%)	0	(0%)	0	(0%)	\$1	(1%)
Floor covering	100	(6%)	0	(0%)	0	(0%)	\$4	(8%)
Unclassified item	100	(6%)	3	(16%)	3	(4%)	\$2	(4%)
Interior wall covering	100	(5%)	0	(0%)	0	(0%)	\$4	(7%)
Unclassified structural component or finish	100	(4%)	0	(0%)	2	(2%)	\$3	(5%)
Other known item	500	(32%)	4	(24%)	30	(38%)	\$14	(26%)
Total	1,400	(100%)	16	(100%)	80	(80%)	\$55	(100%)

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Electric-Powered Central Heating Unit Fires, by Item First Ignited
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Wire or cable insulation	300	(29%)	0	(0%)	3	(12%)	\$4	(19%)
Structural member or framing	100	(10%)	0	(0%)	3	(10%)	\$3	(13%)
Unclassified item first ignited	100	(8%)	0	(0%)	1	(5%)	\$1	(5%)
Flammable or combustible gas or liquid	100	(7%)	0	(0%)	7	(24%)	\$2	(7%)
Dust, fiber, or lint	100	(6%)	0	(0%)	0	(0%)	\$0	(1%)
Other known item	400	(40%)	5	(100%)	14	(50%)	\$12	(54%)
Total	1,100	(100%)	5	(100%)	28	(100%)	\$22	(100%)

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Liquid-Fueled Central Heating Unit Fires, by Item First Ignited
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Flammable or combustible gas or liquid	100	(36%)	0	(NA)	1	(32%)	\$7	(42%)
Other known item	300	(64%)	0	(NA)	3	(68%)	\$9	(58%)
Total	400	(100%)	0	(NA)	4	(100%)	\$16	(100%)

NA – Not applicable because total is zero.

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Central Heating Unit Fires, by Area of Origin
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heating room or area	1,000	(36%)	9	(22%)	40	(34%)	\$33	(33%)
Duct	300	(11%)	0	(0%)	7	(6%)	\$7	(7%)
Living room, den, or family room	300	(9%)	13	(32%)	19	(16%)	\$9	(9%)
Substructure area or crawl space	200	(8%)	2	(5%)	3	(2%)	\$10	(10%)
Unclassified function area	100	(4%)	2	(6%)	8	(7%)	\$8	(7%)
Bedroom	100	(4%)	5	(12%)	6	(5%)	\$4	(4%)
Attic or other space above top story	100	(4%)	0	(0%)	1	(1%)	\$6	(6%)
Laundry area	100	(4%)	2	(6%)	6	(5%)	\$4	(4%)
Wall assembly	100	(3%)	2	(5%)	3	(2%)	\$2	(2%)
Ceiling/floor assembly or space between stories	100	(3%)	2	(6%)	0	(0%)	\$3	(3%)
Bathroom	100	(2%)	2	(5%)	8	(6%)	\$3	(3%)
Garage*	100	(2%)	0	(0%)	0	(0%)	\$2	(2%)
Other known area of origin	300	(11%)	0	(0%)	16	(14%)	\$11	(11%)
Total	2,900	(100%)	41	(100%)	116	(100%)	\$101	(100%)

* Excludes dwelling garages coded as separate property.

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home central heating unit fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Gas-Fueled Central Heating Unit Fires, by Area of Origin
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heating room or area	400	(32%)	5	(30%)	23	(28%)	\$17	(31%)
Living room, den, or family room	200	(12%)	4	(22%)	17	(22%)	\$6	(11%)
Substructure area or crawl space	100	(10%)	1	(7%)	3	(3%)	\$6	(10%)
Duct	100	(9%)	0	(0%)	7	(9%)	\$3	(6%)
Unclassified function area	100	(5%)	1	(8%)	7	(9%)	\$6	(10%)
Wall assembly	100	(4%)	0	(0%)	0	(0%)	\$1	(3%)
Laundry area	100	(4%)	0	(0%)	6	(7%)	\$2	(4%)
Other known area of origin	300	(25%)	5	(32%)	17	(21%)	\$14	(25%)
Total	1,400	(100%)	16	(100%)	80	(100%)	\$55	(100%)

* Excludes dwelling garages coded as separate property.

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Liquid-Fueled Central Heating Unit Fires, by Area of Origin
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heating room or area	200	(51%)	0	(NA)	3	(63%)	\$5	(30%)
Other known area of origin	200	(49%)	0	(NA)	2	(37%)	\$11	(70%)
Total	400	(100%)	0	(NA)	4	(100%)	\$16	(100%)

NA – Not applicable because total is zero.

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Electric-Powered Central Heating Unit Fires, by Area of Origin
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heating room or area	400	(38%)	0	(0%)	11	(40%)	\$7	(32%)
Duct	200	(15%)	0	(0%)	0	(0%)	\$3	(12%)
Bedroom	100	(6%)	0	(0%)	3	(10%)	\$2	(10%)
Substructure area or crawl space	100	(5%)	0	(0%)	0	(0%)	\$1	(6%)
Living room, den, or family room	100	(5%)	2	(47%)	1	(5%)	\$1	(5%)
Attic or other space above top story	100	(5%)	0	(0%)	0	(0%)	\$2	(7%)
Other known area of origin	300	(27%)	2	(53%)*	13	(45%)	\$6	(27%)
Total	1,100	(100%)	5	(100%)	28	(100%)	\$22	(100%)

* Including laundry room or area (53%).

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

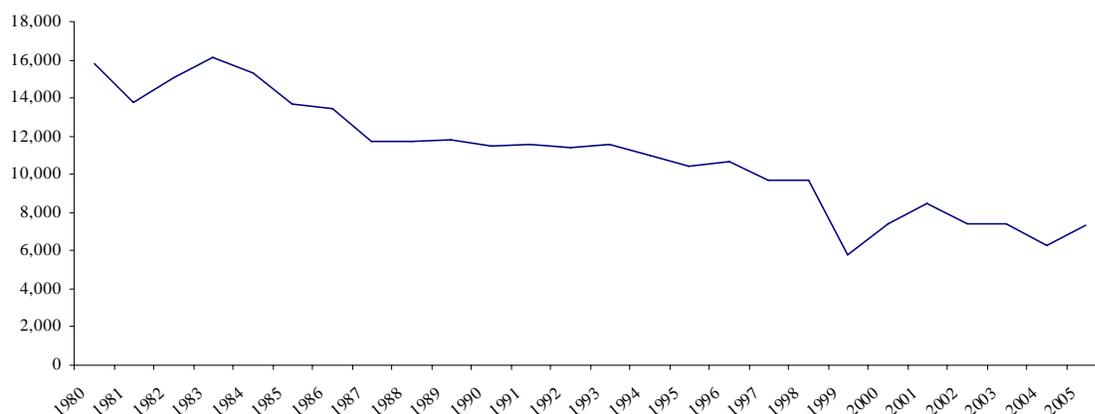
Source: Data from NFIRS Version 5.0 and NFPA survey.

Water Heaters

In 2005, an estimated 7,300 reported home structure fires involving water heaters resulted in 70 civilian deaths, 310 civilian injuries, and \$141 million in direct property damage.

The number of fires and associated losses have declined substantially since 1980, but there has been no sustained, significant decline since 2000.

Home Fires Involving Water Heaters, 1980-2005, by Year



Note: Confined fires are fires reported as confined to chimney, flue, fuel burner, or boiler and involving heating equipment; they are analyzed separately but are included above. 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. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. *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.*

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2005) and from NFPA survey.

Two-thirds (65%) of home water heater fires in 2002-2005, excluding fires reported as confined fires, involved gas-fueled equipment.

Another 34% involved electric-powered water heaters, and 1% involved liquid-fueled water heaters. The gas-fueled equipment split as 86% natural gas and 14% LP-gas.

Water heaters show a very large difference in risk for fires, death, injuries, and direct property damage, with gas-fueled equipment showing higher risk than electric-powered equipment.

In 2001, the last year with published detailed usage statistics, gas-fueled water heaters had 42% more users than electric-powered water heaters (57.9 million households vs. 40.9 million households). By contrast, gas-fueled water heaters had twice as many fires, five times as much direct property damage, ten times as many civilian fire deaths, and 12 times as many civilian fire injuries.

In 1995-1998 and 2000-2003, there were 2.7 electrocution deaths per year involving electric water heaters.*

These estimates involve the separation of water heaters and furnaces from larger groupings that are used in some years, based on the relative numbers of such deaths in years when statistics are provided separately for water heaters and furnaces. There was no report issued for 1999.

Most of the equipment failures shown under factor contributing to ignition were lacking in specifics.

Heat source too close to combustibles had a large share (28% of fires and 46% of the injuries). Heat source too close to combustibles had a much larger share of home water heater fires for gas-fueled equipment (39%) than for electric-powered equipment (8%).

The leading items first ignited in home water heater fires were flammable or combustible liquid or gas (18%) and wire or cable insulation (17%).

Flammable or combustible liquid or gas accounted for 27% of the fires and 52% of associated civilian fire deaths for gas-fueled equipment but at most 3% of fires for the electric-powered equipment. Wire or cable insulation accounted for 50% of the fires for electric-powered equipment but not enough gas-fueled equipment fires to make the table, which has a minimum threshold of 1%. The 2001 edition of ANSI Z21.10.1/CSA4.1, *Gas Water Heaters*, introduced a phased schedule for requiring new gas water heaters to pass a new test for resistance to flammable vapor ignition.

The majority of home water heater fires began in a designated heating equipment room or area (37%) or the laundry room or area (16%).

These two areas also accounted for 56% of reported injuries and 60% of the reported deaths.

Safe Heating Behaviors

- Select and install heating equipment for safety and effectiveness.
 - Install water heaters according to the local codes and manufacturer's instructions.
 - If possible, have a qualified professional install the equipment.
 - Make sure all fuel-burning equipment is vented to the outside. Make sure the venting for exhaust is kept clear and unobstructed. This includes removal of snow around the outlet to the outside.
- Use heating equipment safely, in accordance with manufacturer's instructions.
 - For electric-powered equipment, make sure it is connected to a circuit with sufficient capacity. Do not position heaters near water or where there is danger of water being spilled, to avoid serious risk of electric shock.
 - Do not use or store flammable or combustible liquids near or in rooms with heaters, in order to avoid a vapor ignition and possible flash fire.

* Risana T. Chowdbury, "2003 Electrocutions Associated with Consumer Products," December 2006, Table 2, www.cpsc.gov, and previous reports in the series.

- Install and maintain carbon monoxide alarms to avoid risk of carbon monoxide poisoning.
- Keep adequate clearance between heating equipment and any combustibles.
 - This means installing equipment with proper clearances, typically specified in an NFPA installation standard, to all fixed combustibles, including walls and structural elements.
 - This means placing moveable combustibles, such as furniture and bedding, at least 3 feet away from the equipment.
- Inspect and maintain heating equipment regularly for safety.
 - Maintain heating equipment and chimneys by having them cleaned and inspected annually by a qualified professional.
 - The annual inspection can best be timed for just before the beginning of a new heating season. Inspection is also warranted if you move into a new home or begin use of your equipment after a period of non-use.
 - For electric-powered equipment, inspect cords for cracking, fraying, loose connections, or broken plugs, and replace any damaged equipment before use.

**Home Fires Involving Water Heaters, by Year
Structure Fires Reported to U.S. Fire Departments**

Year	Fires	Civilian		Direct Property Damage (in Millions)	
		Deaths	Injuries	As Reported	In 2005 Dollars)
1980	15,800	140	990	\$86	\$205
1981	13,800	50	800	\$77	\$164
1982	15,100	190	930	\$88	\$178
1983	16,100	70	1,010	\$113	\$221
1984	15,300	80	790	\$103	\$194
1985	13,700	80	820	\$101	\$182
1986	13,400	50	680	\$95	\$169
1987	11,700	30	890	\$81	\$140
1988	11,700	40	700	\$101	\$167
1989	11,800	30	550	\$90	\$142
1990	11,500	60	620	\$135	\$202
1991	11,600	70	770	\$170*	\$243*
1992	11,400	60	550	\$81	\$113
1993	11,600	50	670	\$97	\$131
1994	11,000	40	620	\$102	\$134
1995	10,400	30	510	\$97	\$125
1996	10,700	70	450	\$129	\$160
1997	9,700	60	300	\$118	\$144
1998	9,700	90	510	\$107	\$128
1999	5,800 (5,400)	0 (0)	160 (160)	\$65 (\$65)	\$76 (\$76)
2000	7,400 (6,900)	130 (130)	290 (290)	\$88 (\$88)	\$100 (\$100)
2001	8,500 (7,300)	20 (20)	230 (23)	\$101 (\$99)	\$112 (\$109)
2002	7,400 (6,700)	50 (50)	210 (210)	\$110 (\$110)	\$119 (\$119)
2003	7,400 (5,600)	40 (40)	330 (320)	\$109 (\$109)	\$116 (\$116)
2004	6,300 (5,300)	30 (30)	250 (250)	\$108 (\$108)	\$112 (\$112)
2005	7,300 (5,500)	70 (70)	310 (290)	\$141 (\$141)	\$141 (\$141)

* All 1991 home fire property damage figures are inflated by estimation problems related to the handling of the Oakland fire storm.

Note: Numbers in parentheses exclude confined fires. Confined fires are fires reported as confined to chimney, flue, fuel burner, or boiler and involving heating equipment; they are analyzed separately. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and civilian injuries are expressed to the nearest ten and direct property damage is rounded to the nearest million dollars. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes (40-99) are also treated as unknown equipment and allocated. *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 adjustment to 2003 dollars is done using the consumer price index.

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2005) and from NFPA survey.

Home Water Heater Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	1,600	(28%)	10	(21%)	122	(46%)	\$45	(38%)
Unclassified mechanical failure or malfunction	900	(15%)	0	(0%)	31	(12%)	\$15	(13%)
Leak or break	500	(8%)	10	(22%)	21	(8%)	\$14	(12%)
Unspecified short circuit arc	400	(7%)	0	(0%)	0	(0%)	\$1	(1%)
Unclassified electrical failure or malfunction	400	(6%)	0	(0%)	0	(0%)	\$5	(4%)
Unclassified misuse of material or product	200	(4%)	0	(0%)	16	(6%)	\$6	(5%)
Unclassified factor contributed to ignition	200	(4%)	5	(11%)	6	(2%)	\$7	(6%)
Installation deficiency	200	(4%)	11	(25%)	3	(1%)	\$5	(4%)
Worn out	200	(3%)	0	(0%)	0	(0%)	\$1	(1%)
Water caused short circuit arc	200	(3%)	0	(0%)	0	(0%)	\$0	(0%)
Improper container or storage	200	(3%)	0	(0%)	16	(6%)	\$5	(4%)
Flammable liquid or gas spilled	200	(3%)	10	(22%)	18	(7%)	\$5	(4%)
Automatic control failure	200	(3%)	0	(0%)	0	(0%)	\$4	(4%)
Short circuit arc from defective or worn insulation	100	(2%)	0	(0%)	0	(0%)	\$1	(1%)
Arc or spark from operating equipment	100	(2%)	0	(0%)	0	(0%)	\$2	(1%)
Unclassified operational deficiency	100	(2%)	0	(0%)	6	(2%)	\$2	(2%)
Arc from faulty contact or broken conductor	100	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Failure to clean	100	(1%)	0	(0%)	3	(1%)	\$0	(0%)
Other known factor	500	(9%)	0	(0%)	45	(17%)	\$13	(11%)
Total fires excluding confined fires	5,800	(100%)	46	(100%)	266	(100%)	\$117	(100%)
Total factor entries	6,300	(110%)	46	(100%)	287	(108%)	\$129	(111%)

Note: Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fire with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Gas-Fueled Water Heater Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	1,500	(39%)	5	(12%)	109	(45%)	\$40	(42%)
Unclassified mechanical failure or malfunction	600	(16%)	0	(0%)	31	(13%)	\$13	(13%)
Leak or break	400	(9%)	10	(24%)	21	(9%)	\$11	(12%)
Unclassified misuse of material or product	200	(5%)	0	(0%)	16	(6%)	\$5	(6%)
Improper container or storage	200	(4%)	0	(0%)	15	(6%)	\$5	(5%)
Flammable liquid or gas spilled	200	(4%)	10	(24%)	18	(7%)	\$5	(5%)
Unclassified factor contributed to ignition	200	(4%)	5	(12%)	0	(0%)	\$4	(5%)
Worn out	200	(4%)	0	(0%)	0	(0%)	\$1	(1%)
Installation deficiency	200	(4%)	12	(27%)	3	(1%)	\$4	(5%)
Unclassified operational deficiency	100	(2%)	0	(0%)	3	(1%)	\$1	(1%)
Automatic control failure	100	(2%)	0	(0%)	0	(0%)	\$3	(3%)
Failure to clean	100	(2%)	0	(0%)	3	(1%)	\$0	(0%)
Other known factor	400	(12%)	0	(0%)	40	(16%)	\$12	(13%)
Total fires excluding confined fires	3,800	(100%)	42	(100%)	242	(100%)	\$95	(100%)
Total factor entries	4,100	(110%)	42	(100%)	257	(106%)	\$105	(110%)

Note: Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Electric-Powered Water Heater Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unspecified short circuit arc	400	(22%)	0	(0%)	0	(0%)	\$2	(8%)
Unclassified electrical failure or malfunction	400	(19%)	0	(0%)	0	(0%)	\$5	(24%)
Unclassified mechanical failure or malfunction	200	(12%)	0	(0%)	0	(0%)	\$2	(13%)
Water caused short circuit arc	200	(9%)	0	(0%)	0	(0%)	\$0	(2%)
Heat source too close to combustibles	200	(8%)	4	(100%)	20	(81%)	\$5	(25%)
Leak or break	100	(6%)	0	(0%)	0	(0%)	\$1	(7%)
Short circuit arc from defective or worn insulation	100	(6%)	0	(0%)	0	(0%)	\$1	(5%)
Arc or spark from operating equipment	100	(5%)	0	(0%)	0	(0%)	\$1	(6%)
Arc from faulty contact or broken conductor	100	(4%)	0	(0%)	0	(0%)	\$0	(2%)
Automatic control failure	100	(3%)	0	(0%)	0	(0%)	\$1	(6%)
Other known factor	300	(15%)	0	(0%)	13	(51%)	\$3	(17%)
Total fires excluding confined fires	1,900	(100%)	4	(100%)	24	(100%)	\$19	(100%)
Total factor entries	2,100	(109%)	4	(100%)	32	(132%)	\$22	(117%)

Note: Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Water Heater Fires, by Item First Ignited
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Flammable or combustible gas or liquid	1,000	(18%)	22	(48%)	116	(44%)	\$36	(31%)
Wire or cable insulation	1,000	(17%)	0	(0%)	2	(1%)	\$2	(2%)
Clothing	500	(8%)	0	(0%)	45	(17%)	\$14	(12%)
Structural member or framing	400	(7%)	12	(26%)	5	(2%)	\$9	(8%)
Unclassified item	400	(6%)	0	(0%)	16	(6%)	\$4	(3%)
Floor covering	300	(6%)	7	(16%)	16	(6%)	\$3	(2%)
Interior wall covering	300	(6%)	0	(0%)	18	(7%)	\$12	(10%)
Appliance housing	300	(5%)	0	(0%)	2	(1%)	\$2	(2%)
Unclassified soft goods or clothing	200	(3%)	0	(0%)	5	(2%)	\$6	(5%)
Insulation within structural area	200	(3%)	0	(0%)	4	(2%)	\$1	(1%)
Unclassified structural component or finish	200	(3%)	0	(0%)	3	(1%)	\$2	(1%)
Box or bag	100	(2%)	0	(0%)	4	(2%)	\$6	(5%)
Multiple items first ignited	100	(2%)	0	(0%)	4	(2%)	\$7	(6%)
Exterior wall covering or finish	100	(1%)	0	(0%)	0	(0%)	\$2	(1%)
Household utensil	100	(1%)	0	(0%)	3	(1%)	\$0	(0%)
Unclassified storage supplies	100	(1%)	0	(0%)	0	(0%)	\$2	(2%)
Dust, fiber, or lint	100	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Papers	100	(1%)	0	(0%)	0	(0%)	\$2	(1%)
Trash or waste	100	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Other known item	400	(7%)	4	(9%)*	23	(9%)	\$9	(8%)
Total	5,800	(100%)	46	(100%)	266	(100%)	\$117	(100%)

* Including cabinetry (9%).

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Gas-Fueled Water Heater Fires, by Item First Ignited
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Flammable or combustible gas or liquid	1,000	(27%)	22	(52%)	115	(48%)	\$35	(37%)
Clothing	400	(10%)	0	(0%)	39	(16%)	\$11	(12%)
Structural member or framing	400	(10%)	8	(20%)	5	(2%)	\$8	(8%)
Floor covering	300	(8%)	7	(18%)	17	(7%)	\$2	(2%)
Interior wall covering	300	(7%)	0	(0%)	18	(8%)	\$10	(11%)
Unclassified item	200	(5%)	0	(0%)	8	(3%)	\$2	(2%)
Unclassified soft goods or clothing	100	(4%)	0	(0%)	5	(2%)	\$5	(5%)
Unclassified structural component or finish	100	(3%)	0	(0%)	3	(1%)	\$1	(1%)
Box or bag	100	(3%)	0	(0%)	5	(2%)	\$4	(4%)
Appliance housing	100	(2%)	0	(0%)	2	(1%)	\$1	(1%)
Insulation within structural area	100	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Multiple items first ignited	100	(2%)	0	(0%)	5	(2%)	\$3	(4%)
Household utensil	100	(2%)	0	(0%)	3	(1%)	\$0	(0%)
Exterior wall covering	100	(2%)	0	(0%)	0	(0%)	\$1	(1%)
Dust, fiber, or lint	100	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Papers	100	(1%)	0	(0%)	0	(0%)	\$2	(2%)
Other known item	400	(11%)	4	(10%)*	16	(7%)	\$8	(8%)
Total	3,800	(100%)	42	(100%)	242	(100%)	\$95	(100%)

* Including cabinetry (10%).

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Electric-Powered Water Heater Fires, by Item First Ignited
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Wire or cable insulation	1,000	(50%)	0	(0%)	2	(9%)	\$3	(14%)
Appliance housing	200	(9%)	0	(0%)	0	(0%)	\$1	(4%)
Unclassified item	100	(8%)	0	(0%)	2	(9%)	\$1	(6%)
Clothing	100	(5%)	0	(0%)	7	(27%)	\$2	(10%)
Insulation within structural area	100	(4%)	0	(0%)	4	(18%)	\$0	(2%)
Structural member or framing	100	(3%)	4	(100%)	0	(0%)	\$2	(9%)
Interior wall covering	100	(3%)	0	(0%)	0	(0%)	\$1	(8%)
Other known item	300	(18%)	0	(0%)	9	(37%)	\$9	(48%)
Total	1,900	(100%)	4	(100%)	24	(100%)	\$19	(100%)

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Water Heater Fires, by Area of Origin
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heating room or area	2,100	(37%)	19	(43%)	90	(34%)	\$36	(31%)
Laundry area	900	(16%)	8	(17%)	58	(22%)	\$20	(17%)
Closet	600	(11%)	0	(0%)	18	(7%)	\$9	(8%)
Garage*	300	(6%)	0	(0%)	22	(8%)	\$14	(12%)
Substructure area or space	300	(5%)	4	(8%)	29	(11%)	\$7	(6%)
Kitchen	200	(4%)	0	(0%)	21	(8%)	\$5	(4%)
Bathroom	200	(3%)	0	(0%)	4	(2%)	\$3	(2%)
Storage room	100	(2%)	0	(0%)	0	(0%)	\$3	(2%)
Unclassified storage area	100	(2%)	0	(0%)	0	(0%)	\$5	(4%)
Unclassified function area	100	(2%)	0	(0%)	7	(3%)	\$2	(2%)
Bedroom	100	(1%)	0	(0%)	6	(2%)	\$2	(2%)
Attic or other space above top story	100	(1%)	0	(0%)	2	(1%)	\$2	(2%)
Unclassified area of origin	100	(1%)	0	(0%)	2	(1%)	\$0	(0%)
Unclassified structural area	100	(1%)	0	(0%)	0	(0%)	\$1	(1%)
Unclassified equipment or service area	100	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Other known area of origin	300	(5%)	15	(32%)	7	(3%)	\$6	(5%)
Total	5,800	(100%)	46	(100%)	266	(100%)	\$117	(100%)

* Excludes dwelling garages coded as separate property.

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Gas-Fueled Water Heater Fires, by Area of Origin
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heating room or area	1,400	(38%)	19	(46%)	92	(38%)	\$30	(32%)
Laundry area	700	(19%)	4	(10%)	50	(21%)	\$17	(18%)
Closet	300	(7%)	0	(0%)	14	(6%)	\$5	(5%)
Garage*	200	(6%)	0	(0%)	20	(8%)	\$12	(12%)
Substructure area or crawl space	200	(5%)	4	(9%)	24	(10%)	\$7	(7%)
Kitchen	200	(4%)	0	(0%)	19	(8%)	\$5	(5%)
Bathroom	100	(4%)	0	(0%)	4	(2%)	\$2	(3%)
Unclassified storage area	100	(3%)	0	(0%)	0	(0%)	\$4	(5%)
Storage room	100	(2%)	0	(0%)	0	(0%)	\$2	(2%)
Unclassified function area	100	(2%)	0	(0%)	7	(3%)	\$2	(2%)
Other known area of origin	400	(10%)	15	(35%)**	12	(5%)	\$9	(10%)
Total	3,800	(100%)	42	(100%)	242	(100%)	\$95	(100%)

* Excludes dwelling garages coded as separate property.

** Including interior stairway or ramp (17%); entrance way or lobby (9%); courtyard, patio, porch, or terrace (9%).

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Electric-Powered Water Heater Fires, by Area of Origin
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heating room or area	700	(36%)	0	(0%)	0	(0%)	\$6	(32%)
Closet	400	(19%)	0	(0%)	4	(18%)	\$5	(26%)
Laundry area	200	(11%)	4	(100%)	9	(35%)	\$2	(13%)
Kitchen	100	(4%)	0	(0%)	3	(11%)	\$1	(4%)
Garage*	100	(4%)	0	(0%)	2	(9%)	\$1	(5%)
Substructure area or crawl space	100	(4%)	0	(0%)	0	(0%)	\$0	(1%)
Bedroom	100	(3%)	0	(0%)	6	(27%)	\$1	(3%)
Storage room	100	(3%)	0	(0%)	0	(0%)	\$1	(4%)
Other known area of origin	300	(17%)	0	(0%)	0	(0%)	\$2	(12%)
Total	1,900	(100%)	4	(100%)	24	(100%)	\$19	(100%)

* Excludes dwelling garages coded as separate property.

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

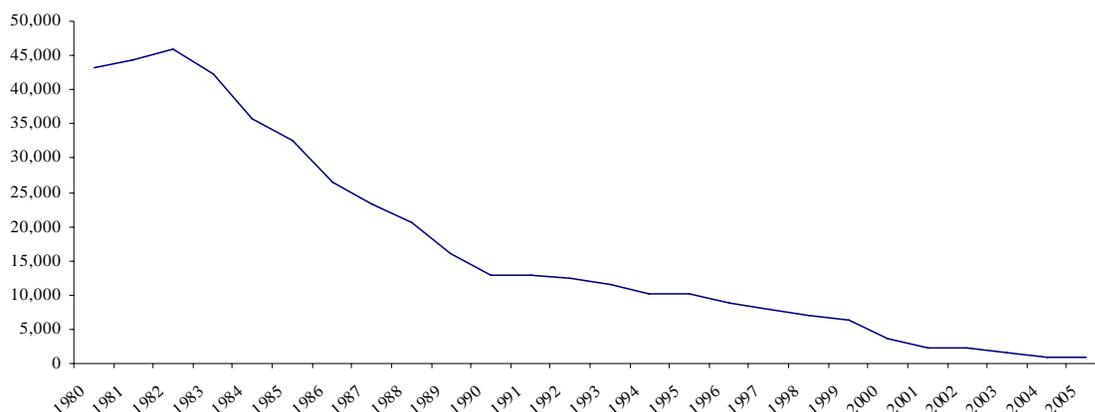
Source: Data from NFIRS Version 5.0 and NFPA survey.

Fireplaces

In 2005, an estimated 1,000 reported home structure fires involving fireplaces resulted in 10 reported civilian fire deaths (to the nearest ten), 10 civilian fire injuries (to the nearest ten), and \$67 million in direct property damage.

Estimated fires declined sharply from the early 1980s to the late 1990s, but the even steeper decline after 1998 appears to be a side effect of coding changes that may have shifted reporting of most of these fires from fireplaces to chimneys and chimney connectors.

Home Fires Involving Fireplaces, 1980-2005, by Year



Note: Confined fires are fires reported as confined to chimney, flue, fuel burner, or boiler and involving heating equipment; they are analyzed separately but are included above. 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. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. *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.*

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2005) and from NFPA survey.

In 2002-2005 combined, excluding fires reported as confined fires, 83% of fireplace fires were reported to be in solid-fueled (specifically wood-burning) fireplaces, 14% were reported in gas-fueled fireplaces (nearly all natural gas rather than LP-gas), and 3% were reported in electric-powered fireplaces.

One-third of non-confined home fireplace fires involve a construction deficiency (20%) or an installation deficiency (16%).

Heat source too close to combustibles, which is typically the leading factor contributing to ignition for home heating fires, ranks second with one-sixth (17%) of fires. For solid-fueled fireplaces specifically, these three percentages are comparable – construction deficiency (23%), heat source too close to combustibles (18%), and installation deficiency (15%).

All fire deaths were attributed to improper fueling technique, which did not contribute to enough fires to be shown in the table.

Half of non-confined home fireplace fires (55%) began with ignition of structural member or framing.

All deaths were in fires beginning with ignition of flammable or combustible gas or liquid. This supports the safety tip that flammable liquids should never be used to kindle or feed a fireplace fire.

The majority of non-confined home fireplace fires began with ignition in concealed spaces or structural spaces.

These include wall assembly (30%), ceiling/floor assembly or space between stories (7%), substructure area or crawl space (7%), attic or other space above top story (5%), and unclassified structural area (5%). One-quarter (25%) started in living room, family room, or den.

Safe Heating Behaviors

- Select and install heating equipment for safety and effectiveness.
 - Make sure your choice of heating equipment is permitted by law in your community. For example, kerosene heaters, chimineas, and firepits are not allowed in all communities.
 - Check for product recalls at www.cpsc.gov.
 - Install fireplaces according to the local codes and manufacturer's instructions.
 - If possible, have a qualified professional install the equipment.
 - Make sure all fuel-burning equipment is vented to the outside. Make sure the venting for exhaust is kept clear and unobstructed. This includes removal of snow around the outlet to the outside.
- Use heating equipment safely, in accordance with manufacturer's instructions.
 - Burn only dry, well-seasoned wood that has been split, stacked, and allowed to dry for 12 months. Do not use green wood, trash, or any other combustibles that could burn unevenly, resulting in flare-ups, or burn incompletely, resulting in deposits of creosote, an oily, sticky, combustible byproduct of incomplete burning of wood. Artificial logs, typically made of sawdust and wax, can pose a flare-up risk or a sticky deposit risk in some situations; they should be used only in accordance with manufacturer's instructions and never in wood stoves. Use only newspaper and kindling wood to start a fire. Never use flammable liquids, such as lighter fluid, kerosene or gasoline to start a fire.
And when adding wood to a working fire, wear only short, tight-fitting sleeves to reduce the risk of igniting your clothing if the fire flares up during the refueling.
 - Have a sturdy screen on a fireplace.
 - Allow ashes to cool before disposing. Dispose ashes in a metal container and keep the ash container at a safe distance from the home and any other nearby buildings.

- Do not use or store flammable or combustible liquids near or in rooms with heaters, in order to avoid a vapor ignition and possible flash fire.
 - Open fires must always be closely attended.
 - Keep fireplace doors and screens closed when such equipment is in use, to control the air flow and to keep fires from flaring up or embers from blowing outside the equipment.
 - Install and maintain carbon monoxide alarms to avoid risk of carbon monoxide poisoning.
- Keep adequate clearance between heating equipment and any combustible.
 - This means installing equipment with proper clearances, typically specified in an NFPA installation standard, to all fixed combustibles, including walls and structural elements.
 - This also means placing moveable combustibles, such as furniture and bedding, at least 3 feet away from the equipment.
 - Supervise children when open fires are being used and install a non-combustible screen around the appliance to prevent burns which are even more common than fire injuries.
 - Chimineas and fire pits should be used only outside the home and located at least 10 feet away from the home or anything that can burn. They should never be used on or near a structure, wooden deck, wooden shed, or gazebo.
- Inspect and maintain heating equipment regularly for safety.
 - Maintain heating equipment and chimneys by having them cleaned and inspected annually by a qualified professional.
 - The annual inspection can best be timed for just before the beginning of a new heating season. Inspection is also warranted if you move into a new home or begin use of your equipment after a period of non-use.
 - The annual inspection needs to address potential build-up of creosote in heating equipment and associated chimneys and chimney connectors.

**Home Fires Involving Fireplaces, by Year
Structure Fires Reported to U.S. Fire Departments**

Year	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
							As Reported	In 2005 Dollars
1980	43,200		140		560		\$141	\$335
1981	44,300		110		310		\$128	\$275
1982	45,900		110		390		\$120	\$242
1983	42,200		60		320		\$125	\$245
1984	35,700		80		280		\$122	\$228
1985	32,600		60		300		\$127	\$231
1986	26,400		30		290		\$96	\$170
1987	23,400		30		160		\$97	\$167
1988	20,700		20		470		\$117	\$194
1989	16,100		40		180		\$104	\$163
1990	12,900		30		180		\$95	\$142
1991	13,000		40		150		\$146*	\$209*
1992	12,400		50		220		\$94	\$131
1993	11,500		10		150		\$86	\$116
1994	10,100		10		140		\$83	\$110
1995	10,100		10		140		\$109	\$140
1996	8,900		80		160		\$111	\$139
1997	8,000		30		100		\$91	\$111
1998	7,000		30		100		\$87	\$105
1999	6,300	(3,500)	0	(0)	0	(0)	\$114 (\$103)	\$134 (\$121)
2000	3,700	(2,400)	170	(170)	120	(120)	\$76 (\$75)	\$86 (\$85)
2001	2,300	(1,800)	20	(20)	20	(20)	\$76 (\$76)	\$84 (\$84)
2002	2,300	(1,900)	0	(0)	0	(0)	\$53 (\$53)	\$58 (\$57)
2003	1,600	(1,500)	0	(0)	40	(40)	\$68 (\$67)	\$72 (\$72)
2004	1,000	(1,000)	0	(0)	20	(20)	\$67 (\$67)	\$70 (\$69)
2005	1,000	(1,000)	10	(10)	10	(10)	\$67 (\$67)	\$67 (\$67)

*All 1991 home fire property damage figures are inflated by estimation problems related to the handling of the Oakland fire storm.

Note: Numbers in parentheses exclude confined fires. Confined fires are fires reported as confined to chimney, flue, fuel burner, or boiler and involving heating equipment; they are analyzed separately. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and civilian injuries are expressed to the nearest ten and direct property damage is rounded to the nearest million dollars. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. *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 adjustment to 2005 dollars is done using the consumer price index.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Fireplace Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Factor	Fires		Civilian		Civilian		Direct Property	
			Deaths	Injuries	Injuries	Damage (in Millions)		
Construction deficiency	300	(20%)	0	(0%)	0	(0%)	\$11	(17%)
Heat source too close to combustibles	200	(17%)	0	(0%)	3	(20%)	\$16	(25%)
Installation deficiency	200	(16%)	0	(0%)	0	(0%)	\$8	(13%)
Leak or break	100	(9%)	0	(0%)	3	(20%)	\$6	(9%)
Unclassified operational deficiency	100	(7%)	0	(0%)	0	(0%)	\$4	(7%)
Unclassified design, manufacturing, or installation deficiency	100	(6%)	0	(0%)	3	(20%)	\$8	(12%)
Unclassified mechanical failure or malfunction	100	(5%)	0	(0%)	0	(0%)	\$6	(9%)
Unclassified factor contributed to ignition	100	(5%)	0	(0%)	0	(0%)	\$1	(2%)
Design deficiency	100	(4%)	0	(0%)	0	(0%)	\$3	(4%)
Worn out	100	(4%)	0	(0%)	0	(0%)	\$6	(9%)
Other known factor	300	(24%)	3	(100%)*	10	(60%)	\$15	(23%)
Total fires excluding confined fires	1,300	(100%)	3	(100%)	16	(100%)	\$63	(100%)
Total factor entries	1,500	(118%)	3	(100%)	19	(120%)	\$83	(131%)

* Including improper fueling technique (100%).

Note: Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocate. Home heating fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Solid-Fueled Fireplace Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Construction deficiency	300	(23%)	0	(0%)	0	(0%)	\$10	(20%)
Heat source too close to combustibles	200	(18%)	0	(0%)	3	(20%)	\$12	(23%)
Installation deficiency	200	(15%)	0	(0%)	0	(0%)	\$7	(14%)
Leak or break	100	(9%)	0	(0%)	3	(20%)	\$5	(10%)
Unclassified operational deficiency	100	(8%)	0	(0%)	0	(0%)	\$4	(7%)
Unclassified mechanical failure or malfunction	100	(6%)	0	(0%)	0	(0%)	\$5	(9%)
Unclassified factor contributed to ignition	100	(5%)	0	(0%)	0	(0%)	\$1	(1%)
Failure to clean	100	(5%)	0	(0%)	0	(0%)	\$1	(1%)
Other known factor	300	(31%)	3	(100%)*	13	(80%)	\$24	(46%)
Total fires excluding confined fires	1,100	(100%)	3	(100%)	16	(100%)	\$52	(100%)
Total factor entries	1,300	(119%)	3	(100%)	19	(120%)	\$68	(132%)

* Including improper fueling technique.

Note: Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocate. Home heating fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Fireplace Fires, by Item First Ignited
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Structural member or framing	700	(55%)	0	(0%)	5	(29%)	\$32	(51%)
Unclassified structural component or finish	100	(6%)	0	(0%)	0	(0%)	\$5	(7%)
Interior wall covering	100	(6%)	0	(0%)	0	(0%)	\$2	(3%)
Insulation within structural area	100	(5%)	0	(0%)	0	(0%)	\$3	(4%)
Floor covering	100	(4%)	0	(0%)	2	(14%)	\$6	(9%)
Other known item	300	(24%)	3	(100%)*	9	(57%)	\$17	(26%)
Total	1,300	(100%)	3	(100%)	16	(100%)	\$63	(100%)

* Including flammable or combustible gas or liquid (100%).

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fire reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Gas-Fueled Fireplace Fires, by Item First Ignited
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Structural member or framing	100	(42%)	0	(NA)	0	(NA)	\$3	(34%)
Other known item	100	(58%)	0	(NA)	0	(NA)	\$5	(66%)
Total	200	(100%)	0	(NA)	0	(NA)	\$8	(100%)

NA – Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fire reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Solid-Fueled Fireplace Fires, by Item First Ignited
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Structural member or framing	700	(60%)	0	(0%)	5	(29%)	\$29	(57%)
Interior wall covering	100	(6%)	0	(0%)	0	(0%)	\$2	(3%)
Floor covering	100	(5%)	0	(0%)	2	(14%)	\$5	(10%)
Other known item	300	(29%)	3	(100%)	9	(57%)	\$16	(30%)
Total	1,100	(100%)	3	(100%)*	16	(100%)	\$52	(100%)

* Including flammable or combustible gas or liquid (100%).

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fire reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Fireplace Fires, by Area of Origin
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
			Count	(%)	Count	(%)	Count	(%)
Wall assembly	400	(30%)	0	(0%)	5	(28%)	\$19	(30%)
Living room, den, or family room	300	(25%)	3	(100%)	9	(57%)	\$22	(35%)
Unclassified function area	100	(7%)	0	(0%)	2	(14%)	\$4	(6%)
Ceiling/floor assembly or space between stories	100	(7%)	0	(0%)	0	(0%)	\$2	(3%)
Substructure area or crawl space	100	(6%)	0	(0%)	0	(0%)	\$1	(2%)
Attic or other space above top story	100	(5%)	0	(0%)	0	(0%)	\$4	(6%)
Unclassified structural area	100	(5%)	0	(0%)	0	(0%)	\$2	(2%)
Other known area of origin	200	(16%)	0	(0%)	0	(0%)	\$10	(16%)
Total	1,300	(100%)	3	(100%)	16	(100%)	\$63	(100%)

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Home heating fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Solid-Fueled Fireplace Fires, by Area of Origin
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Wall assembly	300	(29%)	0	(0%)	5	(28%)	\$15	(29%)
Living room, den, or family room	300	(26%)	3	(100%)	9	(57%)	\$21	(40%)
Ceiling/floor assembly or space between stories	100	(7%)	0	(0%)	0	(0%)	\$2	(3%)
Unclassified function area	100	(7%)	0	(0%)	2	(14%)	\$4	(7%)
Substructure area or crawl space	100	(6%)	0	(0%)	0	(0%)	\$1	(2%)
Other known area of origin	300	(24%)	0	(0%)	0	(0%)	\$10	(20%)
Total	1,100	(100%)	3	(100%)	16	(100%)	\$52	(100%)

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Home heating fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Gas-Fueled Fireplace Fires, by Area of Origin
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
Wall assembly	100	(37%)	0	(NA)	0	(NA)	\$4	(52%)
Other known area of origin	100	(63%)	0	(NA)	0	(NA)	\$4	(48%)
Total	200	(100%)	0	(NA)	0	(NA)	\$8	(100%)

NA – Not applicable because total is zero.

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Home heating fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

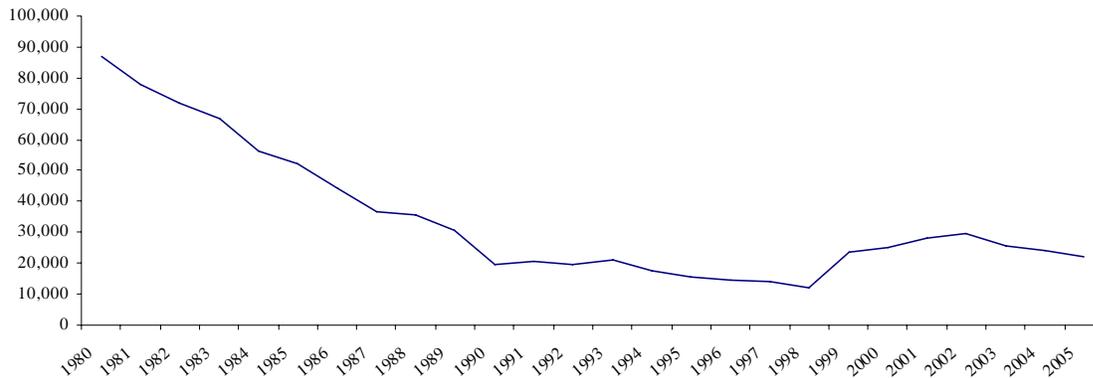
Source: Data from NFIRS Version 5.0 and NFPA survey.

Chimney and Chimney Connectors

In 2005, an estimated 22,100 reported home structure fires involving chimneys or chimney connectors resulted in 80 civilian injuries and \$97 million in direct property damage.

Civilian deaths rounded to zero to the nearest ten in 2005, but averaged 30 to the nearest ten in 2002-2005. Estimated fires declined sharply from the early 1980s to the late 1990s. The increase from 1998 to 1999 is probably due to small fires now being reported as confined fires that previously would have been coded as something other than fires (e.g., smoke scare), as well as some fires that would have been reported as fireplace or wood stove fires but are now being coded under chimneys or chimney connectors. The downward trend resumed in 2000 but from a higher baseline.

**Home Fires Involving Chimneys or Chimney Connectors,
1980-2005, by Year**



Note: Confined fires are fires reported as confined to chimney, flue, fuel burner, or boiler and involving heating equipment; they are analyzed separately but are included above. 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. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. *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.*

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2005) and from NFPA survey.

Installation, construction, design and manufacturing deficiencies collectively were cited in more than one-third of the non-confined fires.

Failure to clean, a factor cited frequently for heating equipment fires only when the equipment is solid-fueled, accounted for 20% of the non-confined chimney and chimney connector fires and for 64% of the far more numerous heating equipment fires confined to chimney or flue.

Home chimney and chimney connector non-confined fires nearly all begin with ignition of fixed combustibles involved in the structure, led by structural member or framing (45%).

Film or residue, which probably refers to creosote, is cited for only 4% of the non-confined fires.

The majority of non-confined home fires started by chimneys or chimney connectors begin in concealed or structural spaces.

These include wall assembly (22%), attic or other space above top story (16%), ceiling/floor assembly or other space between stories (16%), ceiling/floor assembly or other space between stories (8%), unclassified structural area (5%), substructure area or crawl space (3%), and the chimney (3%).

Safe Heating Behaviors

- Use heating equipment safely, in accordance with manufacturer's instructions.
 - Install chimneys and chimney connectors according to the local codes and manufacturer's instructions.
 - If possible, have a qualified professional install the equipment.
 - Make sure all fuel-burning equipment is vented to the outside. Make sure the venting for exhaust is kept clear and unobstructed. This includes removal of snow around the outlet to the outside.
 - Burn only dry, well-seasoned wood that has been split, stacked, and allowed to dry for 12 months. Do not use green wood, trash, or any other combustibles that could burn unevenly, resulting in flare-ups, or burn incompletely, resulting in deposits of creosote, an oily, sticky, combustible byproduct of incomplete burning of wood. Artificial logs, typically made of sawdust and wax, can pose a flare-up risk or a sticky deposit risk in some situations; they should be used only in accordance with manufacturer's instructions and never in wood stoves. Use only newspaper and kindling wood to start a fire. Never use flammable liquids, such as lighter fluid, kerosene or gasoline to start a fire. And when adding wood to a working fire, wear only short, tight-fitting sleeves to reduce the risk of igniting your clothing if the fire flares up during the refueling.
 - Have a sturdy screen on a fireplace.
 - Install and maintain carbon monoxide alarms to avoid risk of carbon monoxide poisoning.
- Keep adequate clearance between heating equipment and any combustible.
 - This means installing equipment with proper clearances, typically specified in an NFPA installation standard, to all fixed combustibles, including walls and structural elements.
 - This also means placing moveable combustibles, such as furniture and bedding, at least 3 feet away from the equipment.
 - Supervise children when open fires are being used and install a non-combustible screen around the appliance to prevent burns which are even more common than fire injuries.

- Inspect and maintain heating equipment regularly for safety.
 - Maintain heating equipment and chimneys by having them cleaned and inspected annually by a qualified professional.
 - The annual inspection can best be timed for just before the beginning of a new heating season. Inspection is also warranted if you move into a new home or begin use of your equipment after a period of non-use.
 - The annual inspection needs to address potential build-up of creosote in heating equipment and associated chimneys and chimney connectors.

Home Fires Involving Chimneys or Chimney Connectors, by Year Structure Fires Reported to U.S. Fire Departments

Year	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
							As Reported	In 2005 Dollars
1980	87,100		140		290		\$148	\$351
1981	77,800		170		150		\$128	\$274
1982	71,700		110		150		\$160	\$323
1983	66,900		90		180		\$136	\$267
1984	56,500		40		170		\$130	\$243
1985	52,200		80		100		\$164	\$297
1986	44,000		60		140		\$118	\$210
1987	36,900		70		150		\$110	\$189
1988	35,500		60		200		\$126	\$208
1989	30,500		20		140		\$146	\$231
1990	19,800		90		140		\$105	\$156
1991	20,800		20		140		\$143*	\$205*
1992	19,700		60		150		\$92	\$129
1993	21,000		20		90		\$109	\$147
1994	17,400		10		60		\$99	\$130
1995	15,800		10		90		\$116	\$149
1996	14,700		50		90		\$102	\$128
1997	14,300		20		100		\$102	\$124
1998	12,000		10		40		\$83	\$99
1999	23,600	(5,100)	0	(0)	80	(80)	\$172 (\$135)	\$201 (\$158)
2000	24,900	(4,100)	0	(0)	190	(160)	\$153 (\$137)	\$174 (\$155)
2001	28,200	(3,100)	50	(50)	30	(0)	\$108 (\$96)	\$119 (\$106)
2002	29,500	(2,900)	20	(20)	60	(30)	\$86 (\$72)	\$93 (\$79)
2003	25,600	(1,800)	90	(90)	70	(50)	\$105 (\$91)	\$112 (\$97)
2004	24,000	(1,800)	0	(0)	70	(50)	\$105 (\$96)	\$109 (\$100)
2005	22,100	(1,600)	0	(0)	80	(50)	\$97 (\$81)	\$97 (\$81)

*All 1991 home fire property damage figures are inflated by estimation problems related to the handling of the Oakland fire storm.

Note: Multiple entries are allowed, resulting in more factor entries than fires. Numbers in parentheses exclude confined fires. Confined fires are fires reported as confined to chimney, flue, fuel burner, or boiler and involving heating equipment; they are analyzed separately. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and civilian injuries are expressed to the nearest ten and direct property damage is rounded to the nearest million dollars. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. *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 adjustment to 2005 dollars is done using the consumer price index.

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2005) and from NFPA survey.

**Home Chimney or Chimney Connector Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	400	(22%)	5	(20%)	14	(32%)	\$23	(27%)
Installation deficiency	400	(22%)	0	(0%)	2	(5%)	\$11	(13%)
Failure to clean	400	(20%)	5	(20%)	13	(28%)	\$12	(14%)
Leak or break	200	(10%)	21	(80%)	7	(15%)	\$13	(15%)
Construction deficiency	200	(9%)	0	(0%)	2	(5%)	\$5	(6%)
Worn out	100	(5%)	0	(0%)	0	(0%)	\$8	(9%)
Unclassified mechanical failure or malfunction	100	(5%)	0	(0%)	2	(5%)	\$4	(4%)
Unclassified factor contributed to ignition	100	(4%)	0	(0%)	5	(10%)	\$4	(5%)
Unclassified design, manufacturing, or installation deficiency	100	(4%)	0	(0%)	2	(5%)	\$6	(7%)
Design deficiency	100	(3%)	0	(0%)	0	(0%)	\$2	(3%)
Unclassified operational deficiency	100	(3%)	0	(0%)	0	(0%)	\$3	(3%)
Other known factor	200	(9%)	0	(0%)	2	(5%)	\$12	(14%)
Total fires excluding confined fires	2,000	(100%)	26	(100%)	45	(100%)	\$85	(100%)
Total factor entries	2,400	(117%)	31	(120%)	50	(110%)	\$102	(120%)

Note: Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Home Heating Fires Confined to Chimney or Flue,
by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments**

Factor	Fires		Civilian Injuries		Direct Property Damage (in Millions)	
Failure to clean	15,400	(64%)	15	(51%)	\$3	(25%)
Unclassified factor contributed to ignition	1,800	(8%)	0	(0%)	\$1	(5%)
Unclassified operational deficiency	1,400	(6%)	0	(0%)	\$1	(5%)
Unclassified misuse of material or product	700	(3%)	0	(0%)	\$0	(3%)
Unclassified mechanical failure or malfunction	600	(3%)	7	(25%)	\$1	(4%)
Worn out	600	(3%)	0	(0%)	\$1	(9%)
Unclassified natural condition	600	(3%)	0	(0%)	\$0	(1%)
Installation deficiency	600	(2%)	0	(0%)	\$1	(8%)
Heat source too close to combustibles	400	(2%)	0	(0%)	\$2	(17%)
Improper fueling technique	400	(2%)	0	(0%)	\$0	(2%)
Equipment not being operated properly	200	(1%)	0	(0%)	\$2	(0%)
Construction deficiency	200	(1%)	0	(0%)	\$2	(13%)
Unclassified design, manufacturing, or installation deficiency	200	(1%)	0	(0%)	\$1	(4%)
Leak or break	200	(1%)	0	(0%)	\$0	(1%)
Unclassified fire spread or control	200	(1%)	0	(0%)	\$0	(2%)
Equipment overloaded	100	(1%)	0	(0%)	\$0	(2%)
Arc or spark from operating equipment	100	(1%)	0	(0%)	\$1	(5%)
Design deficiency	100	(1%)	0	(0%)	\$0	(2%)
Equipment unattended	100	(1%)	0	(0%)	\$1	(5%)
Other known factor	4,900	(15%)	15	(49%)	\$3	(20%)
Total confined fires	24,000	(100%)	29	(100%)	\$14	(100%)
Total factor entries	29,000	(121%)	37	(125%)	\$19	(134%)

Note: Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Chimney or Chimney Connector Fires, by Item First Ignited
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian		Civilian		Direct Property	
			Deaths	Injuries	Injuries	Damage (in Millions)		
Structural member or framing	900	(45%)	13	(51%)	22	(50%)	\$43	(50%)
Exterior wall covering or finish	200	(9%)	0	(0%)	0	(0%)	\$5	(6%)
Insulation within structural area	200	(8%)	0	(0%)	3	(6%)	\$8	(9%)
Interior wall covering	100	(6%)	0	(0%)	2	(5%)	\$5	(5%)
Unclassified structural component or finish	100	(6%)	9	(33%)	2	(5%)	\$7	(8%)
Unclassified item	100	(5%)	0	(0%)	0	(0%)	\$2	(2%)
Exterior roof covering or finish	100	(5%)	0	(0%)	0	(0%)	\$2	(2%)
Film or residue	100	(4%)	4	(16%)	8	(18%)	\$2	(3%)
Interior ceiling covering	100	(4%)	0	(0%)	0	(0%)	\$5	(5%)
Unclassified organic material	100	(3%)	0	(0%)	3	(6%)	\$2	(3%)
Other known item	100	(6%)	0	(0%)	5	(11%)	\$5	(6%)
Total	2,000	(100%)	26	(100%)	45	(100%)	\$85	(100%)

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Chimney or Chimney Connector Fires, by Area of Origin
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Wall assembly	400	(22%)	5	(18%)	11	(24%)	\$16	(19%)
Attic or other space above top story	300	(16%)	0	(0%)	7	(15%)	\$21	(24%)
Living room, den, or family room	200	(12%)	4	(16%)	9	(20%)	\$11	(13%)
Ceiling/floor assembly or space between stories	200	(8%)	0	(0%)	2	(5%)	\$6	(7%)
Exterior wall surface	100	(5%)	0	(0%)	0	(0%)	\$2	(2%)
Unclassified structural area	100	(5%)	0	(0%)	0	(0%)	\$4	(5%)
Exterior roof surface	100	(4%)	0	(0%)	2	(5%)	\$2	(3%)
Heating room or area	100	(3%)	0	(0%)	0	(0%)	\$2	(3%)
Unclassified function area	100	(3%)	17	(65%)	2	(5%)	\$3	(4%)
Chimney	100	(3%)	0	(0%)	2	(5%)	\$1	(1%)
Substructure area or crawl space	100	(3%)	0	(0%)	7	(15%)	\$2	(2%)
Duct	100	(3%)	0	(0%)	0	(0%)	\$2	(3%)
Other known area of origin	200	(12%)	0	(0%)	3	(6%)	\$12	(14%)
Total	2,000	(100%)	26	(100%)	45	(100%)	\$85	(100%)

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Heat Tape and Heat Lamps

A. Heat Tape

In 2005, an estimated 300 reported home structure fires involving heat tape resulted in no reported civilian deaths, 10 civilian injuries (to the nearest ten), and \$5 million in direct property damage.

Heat tape was added as a coding choice in 1999.

The leading factors contributing to ignition for home heat tape fires are all types of electrical failures.

The majority of home heat tape fires begin with ignition of insulation, either wire or cable insulation (40%) or thermal, acoustic, or other insulation in a structural area (14%).

Half (49%) of home heat tape fires begin in a substructure area or crawl space.

Home Fires Involving Heat Tape, by Year

	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions of Current Dollars)	Direct Property Damage (in Millions of 2005 Dollars)
1999	1,000	0	0	\$1	\$2
2000	600	0	80	\$22	\$25
2001	600	0	0	\$15	\$17
2002	600	0	10	\$8	\$9
2003	400	0	20	\$7	\$7
2004	500	0	0	\$12	\$12
2005	300	0	10	\$5	\$5

Note: These are national estimates of non-confined 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and civilian injuries are expressed to the nearest ten and direct property damage is rounded to the nearest million dollars. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as heating or air conditioning equipment of unknown type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. *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 adjustment to 2005 dollars is done using the consumer price index.

Source: Data from NFIRS Version 5.0 and NFPA survey.

B. Heat Lamps

In 2005, an estimated 300 reported home structure fires involving heat lamps resulted in no reported civilian deaths, 20 civilian injuries (to the nearest ten), and \$9 million in direct property damage.

Heat lamp was added as a coding choice in 1999.

The leading factor contributing to ignition for home heat lamp fires was heat source too close to combustibles (65%).

There is no table shown for item first ignited or area of origin, because no item first ignited or area of origin accounted for enough fires to round to 100.

Home Fires Involving Heat Lamp, by Year

	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions of Current Dollars)	Direct Property Damage (in Millions of 2005 Dollars)
1999	400	0	0	\$20	\$23
2000	200	0	0	\$9	\$10
2001	300	0	0	\$10	\$11
2002	200	0	10	\$7	\$8
2003	400	0	30	\$23	\$25
2004	400	0	0	\$9	\$9
2005	300	0	20	\$9	\$9

Note: These are national estimates of non-confined 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and civilian injuries are expressed to the nearest ten and direct property damage is rounded to the nearest million dollars. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as heating or air conditioning equipment of unknown type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. *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 adjustment to 2005 dollars is done using the consumer price index.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Safe Use of Electrical Appliances, Including Heat Tape and Heat Lamps

- Select and install equipment for safety and effectiveness.
 - Use heat tape only in locations deemed appropriate by the manufacturer.
 - Make sure your heat tape has the label showing that it is listed by a recognized testing laboratory.
 - Check for product recalls at www.cpsc.gov.
 - Install equipment according to the local codes and manufacturer’s instructions.
- Use electric-powered equipment safely, in accordance with manufacturer’s instructions.
 - Plug power cords only into outlets with sufficient capacity and never into an extension cord.

- Do not position electric-powered equipment near water or where there is danger of water being spilled, to avoid serious risk of electric shock.
- Do not use or store flammable or combustible liquids near or in rooms with energized equipment, in order to avoid a vapor ignition and possible flash fire.
- Inspect and maintain electric-powered equipment regularly for safety.
 - Inspect cords for cracking, fraying, loose connections, or broken plugs, and replace any damaged equipment before use.

Home Heat Tape Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Factor	Fires		Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)	
Unclassified electrical failure or malfunction	200	(33%)	0 (NA)	5 (53%)	\$2	(30%)
Unspecified short circuit arc	100	(18%)	0 (NA)	0 (0%)	\$2	(30%)
Short circuit arc from defective or worn insulation	100	(14%)	0 (NA)	4 (47%)	\$1	(10%)
Other known factor	200	(43%)	0 (NA)	0 (0%)	\$2	(30%)
Total fires excluding confined fires	500	(100%)	0 (NA)	9 (100%)	\$8	(100%)
Total factor entries	500	(108%)	0 (NA)	9 (100%)	\$8	(101%)

NA – Not applicable because total is zero.

Note: Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heat tape fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Heat Tape Fires, by Item First Ignited
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Wire or cable insulation	200	(40%)	0	(NA)	5	(53%)	\$3	(42%)
Insulation within structural area	100	(14%)	0	(NA)	0	(0%)	\$1	(11%)
Structural member or framing	100	(13%)	0	(NA)	4	(47%)	\$1	(16%)
Other known item	100	(33%)	0	(NA)	0	(0%)	\$2	(30%)
Total	500	(100%)	0	(NA)	9	(100%)	\$8	(100%)

NA – Not applicable because total is zero.

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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Heat Tape Fires, by Area of Origin
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)	
Substructure area or crawl space	200	(49%)	0 (NA)	7 (71%)	\$3	(35%)
Other known area of origin	200	(51%)	0 (NA)	3 (29%)	\$5	(65%)
Total	500	(100%)	0 (NA)	9 (100%)	\$8	(100%)

NA – Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fire reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involve din ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error..

Source: Data from NFIRS Version 5.0 and NFPA survey.

Home Heat Lamp Fires, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Department
(Excluding Fires Reported as Confined Fires)

Factor	Fires		Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)	
Heat source too close to combustibles	200	(65%)	0 (NA)	11 (69%)	\$8	(70%)
Other known factor	200	(44%)	0 (NA)	5 (31%)	\$5	(44%)
Total fires excluding confined fires	300	(100%)	0 (NA)	15 (100%)	\$12	(100%)
Total factor entries	400	(110%)	0 (NA)	15 (100%)	\$14	(114%)

NA – Not applicable because total is zero.

Note: Multiple entries are allowed, resulting in more factor entries than fires. 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. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest one, and did react property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as heating or air conditioning equipment of undetermined type. Fires reported as “no equipment” but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home heating fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Appendix A.

How National Estimates Statistics Are Calculated

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

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/download/nfirspaperforms2007.pdf>.

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; and (3) 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.

Analysts at the NFPA, the USFA and the Consumer Product Safety Commission have developed the specific 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.

Figure 1.

Fires Originally Collected in NFIRS 5.0 by Year

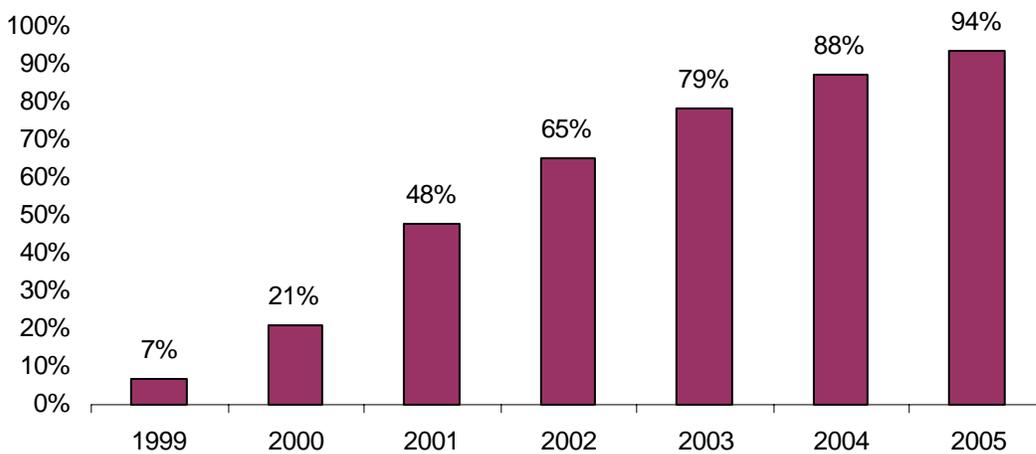


Figure 1 shows the percentage of fires originally collected in the NFIRS 5.0 system. Each year's release version of NFIRS data also includes data collected in older versions of NFIRS that were converted to NFIRS 5.0 codes.

For 2002 data on, analyses are based on scaling ratios using only data originally collected in NFIRS 5.0:

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

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

A second option is to omit year estimates for 1999-2001 from year tables.

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

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

Although causal and other detailed information is typically not required for these incidents, it is provided in some cases. In order for that limited detail to be used to characterize the confined fires, they must be analyzed separately from non-confined fires.

Otherwise, the patterns in a factor for the more numerous non-confined fires with factor known will dominate the allocation of the unknown factor fires for both non-confined and confined fires. If the pattern is different for confined fires, which is often the case, that fact will be lost unless analysis is done separately.

For most fields other than Property Use, 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.

For Factor Contributing to Ignition, 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%.

Type of Material First Ignited (TMI). This field is required only if the Item First Ignited falls within the code range of 00-69. NFPA has created a new code “not required” for this field that is applied when Item First Ignited is in code 70-99 (organic materials, including cooking materials and vegetation, and general materials, such as electrical wire, cable insulation, transformers, tires, books, newspaper, dust, rubbish, etc..) and TMI is blank. The ratio for allocation of unknown data is:

$$\frac{(\text{All fires} - \text{TMI Not required})}{(\text{All fires} - \text{TMI Not Required} - \text{Undetermined} - \text{Blank})}$$

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, fusee
68. Backfire from internal combustion engine. Excludes flames and sparks from an exhaust system, (11)
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

All fires in range 60-69
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, the 2006 data is not yet available and a large portion of the fires coded as no equipment involved (NNN) have heat sources in the operating equipment category. To compensate, NFPA treats fires in which EII = NNN and heat source is not in the range of 40-99 as an additional unknown.

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

All fires

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

Additional allocations may be used in specific analyses. For example, NFPA’s report about home heating fires treats Equipment Involved in Ignition Code 120, fireplace, chimney, other” as a partial unknown (like Heat Source 60) and allocates it over its related decade of 121-127, which includes codes for fireplaces (121-122) and chimneys (126-127) but also includes codes for fireplace insert or stove, heating stove, and chimney or vent connector. More general analyses of specific occupancies may not perform as many allocations of partial allocations. Notes at the end of each table describe what was allocated.

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. Values that appear identical may be associated with different percentages, and identical percentages may be associated with slightly different values.